



REGIONAL BOUNDARY
COMMISSION

OPERATIONS AND
MAINTENANCE MANUAL

SOUTH BAY
INTERNATIONAL
WASTEWATER TREATMENT
PLANT

VOLUME 1 OF 4

OPERATIONS AND MAINTENANCE MANUAL

SOUTH BAY INTERNATIONAL WASTEWATER TREATMENT PLANT

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**INTERNATIONAL BOUNDARY
AND
WATER COMMISSION**

**OPERATION AND MAINTENANCE
MANUAL**

**FOR THE
SOUTH BAY**

INTERNATIONAL WASTEWATER TREATMENT PLANT

Volume 1 of 4

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April 2011

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Chapter 1

INTRODUCTION

NOTICE AND CAUTIONS TO USERS OF THIS O&M MANUAL

This O&M Manual provides a general overview only of the South Bay International Wastewater Treatment Plant (SBIWTP).

This O&M Manual relies on information obtained from the various equipment manufactures and the Construction Contractors that were involved in construction of the SBIWTP. The information obtained from equipment manufacturers and construction Contractors was reviewed by Malcolm Pirnie only for general compliance with the submittal requirements specified in construction Contract Documents.

All USERS of this O&M Manual shall be required to consult the detailed O&M Manuals provided by the equipment manufactures and Construction Contractors and to understand and follow the directions given therein for safe operation and maintenance of all equipment and systems prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all safety manuals published and provided by their employer(s) and to understand and follow all directions given therein, including but not limited to *Personnel Protective Equipment (PPE)*, *Electrical Lock-Out Procedures*, *Fall Prevention Procedures* and *Confined Space Entry Procedures* prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all “record” drawings and to understand how equipment and systems are intended to be operated and controlled prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to understand and acknowledge that the SBIWTP contains chemicals and equipment that if not operated and/or maintained in a responsible and safe manner can result in serious injury or death.

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1.1 GENERAL

The South Bay International Wastewater Treatment Plant (IWTP) is the recommended long-term solution for treatment of a major portion of Tijuana, Mexico's wastewater, and represents a major design and construction program by the International Boundary and Water Commission (IBWC).

In November 1990, Boyle Engineering Corporation completed the *Preliminary Report -International Wastewater Treatment Plant, San Diego County, California*, which was authorized by the U.S. Army Corps of Engineers and describes the South Bay IWTP as an initial phase for the 25 MGD secondary treatment plant, expandable to 100 MGD.

The 1990 Boyle Report evaluated site and process alternatives, and developed design criteria for the recommended South Bay IWTP, located on a 100-acre site known as the Dairy Mart Road site. See Figure 1.1-1 for Location and Vicinity Maps.

In July 1991, Malcolm Pirnie, Inc. was selected by the IBWC to enter into negotiations for design of the South Bay IWTP, and on April 7, 1992 Contract IBM 92-15 was finalized and awarded by the IBWC to Malcolm Pirnie for design of the initial (Phase I) 25 MGD project.

On November 23, 1993, Malcolm Pirnie submitted the *Final Conceptual Design Report - South Bay International Wastewater Treatment Plant* in response to the requirements of contract IBM 92-15 and Modification No. 5 to this contract issued by the IBWC.

On December 2, 1993, the IBWC issued Modification No. 6 to Contract IBM 92-15 to accelerate the design of the advanced primary treatment portion of the Phase I South Bay IWTP and to divide the original Phase I project into four (4) separate construction contracts. The four (4) Construction Contracts defined in Modification No. 6 for accelerated design and construction of the Phase I South Bay IWTP are identified below.

- CC-1: Levee Construction/Site Grading
- CC-2: 25 MGD Advanced Primary Treatment Plant
- CC-3: 25 MGD Secondary Treatment Plant
- CC-4: Conveyance and Collection Facilities

These four (4) construction contracts designed by Malcolm Pirnie and identified as CC-1 through CC-4, are briefly described below:

CC-1 Levee Construction/Site Grading

This construction contract include site preparation and rough grading of the Phase I project area, included construction of a levee to provide flood protection for the site, and included mitigation of site liquefaction concerns via “deep dynamic compaction” (DDC).

CC-2 25 MGD Advanced Primary Treatment Plant

This construction contract included construction of the “chemically assisted” advanced primary treatment portion of the Phase I project, including all ancillary facilities to support the 25 MGD Advanced Primary Treatment Plant.

CC-3 25 MGD Secondary Treatment Plant

This construction contract included construction of the secondary treatment portion of the Phase I project, including ancillary facilities to support the 25 MGD Secondary Treatment Plant.

CC-4 Collection and Conveyance Facilities

This construction contract included portions of the wastewater collection and conveyance facilities to deliver wastewaters generated in Mexico to the IWTP, and included off-site wastewater pump stations at Goat Canyon and Smuggler’s Gulch (Hollister Street). Some elements of the Collection and Conveyance Facilities were also constructed under CC-2.

In accordance with the Modification No. 6, the preliminary treatment and primary sedimentation facilities are sized such that the first module constructed under the Advanced Primary Treatment Plant (CC-2) provides for treatment of 25 MGD annual average flow with peak flows of 75 MGD, and accommodating a flow through hydraulic capacity of 100 MGD.

The first module originally planned and designed by Malcolm Pirnie for constructed under the Secondary Treatment Plant (CC-3) was to provide for treatment of 25 MGD constant. Under this original CC-3 project flows in excess of 25 MGD were to by-pass the secondary treatment system and be discharged directly to the South Bay Land Out Fall and Ocean Outfall facilities. The original CC-3 project designed by Malcolm Pirnie in mid-1996 was not constructed due to budget constraints. However, in 2007, the IBWC contracted with *S&B Infrastructure, LTD* to update the original CC-3 design. This redesign resulted in a secondary treatment capacity of 25 MGD average flow with peak flows of 48.75 MGD.

Further refinement to the definition of the Phase I South Bay IWTP designed by Malcolm Pirnie was provided in Modifications No. 25 and No. 27 to Contract IBM 92-15, dated August 7, 1995 and October 16, 1995, respectively. The key elements of Modifications No. 25 and No. 27 relative to the Phase I South Bay IWTP included a restructuring of the CC-4 project into two projects (CC-4A and CC-4B); the addition of two onsite emergency, stand-by, diesel powered generators for the combined CC-2 and CC-3 projects; and restructuring of the CC-3 project into two projects (CC-2B and CC-3) to facilitate and enhance construction coordination for the various projects.

The CC-2B project includes construction of effluent control structures associated with both the primary and secondary treatment portions of the Phase I treatment plant, as well as construction of a standby generator for the Advanced Primary Treatment (CC-2) portion of the Phase I project.

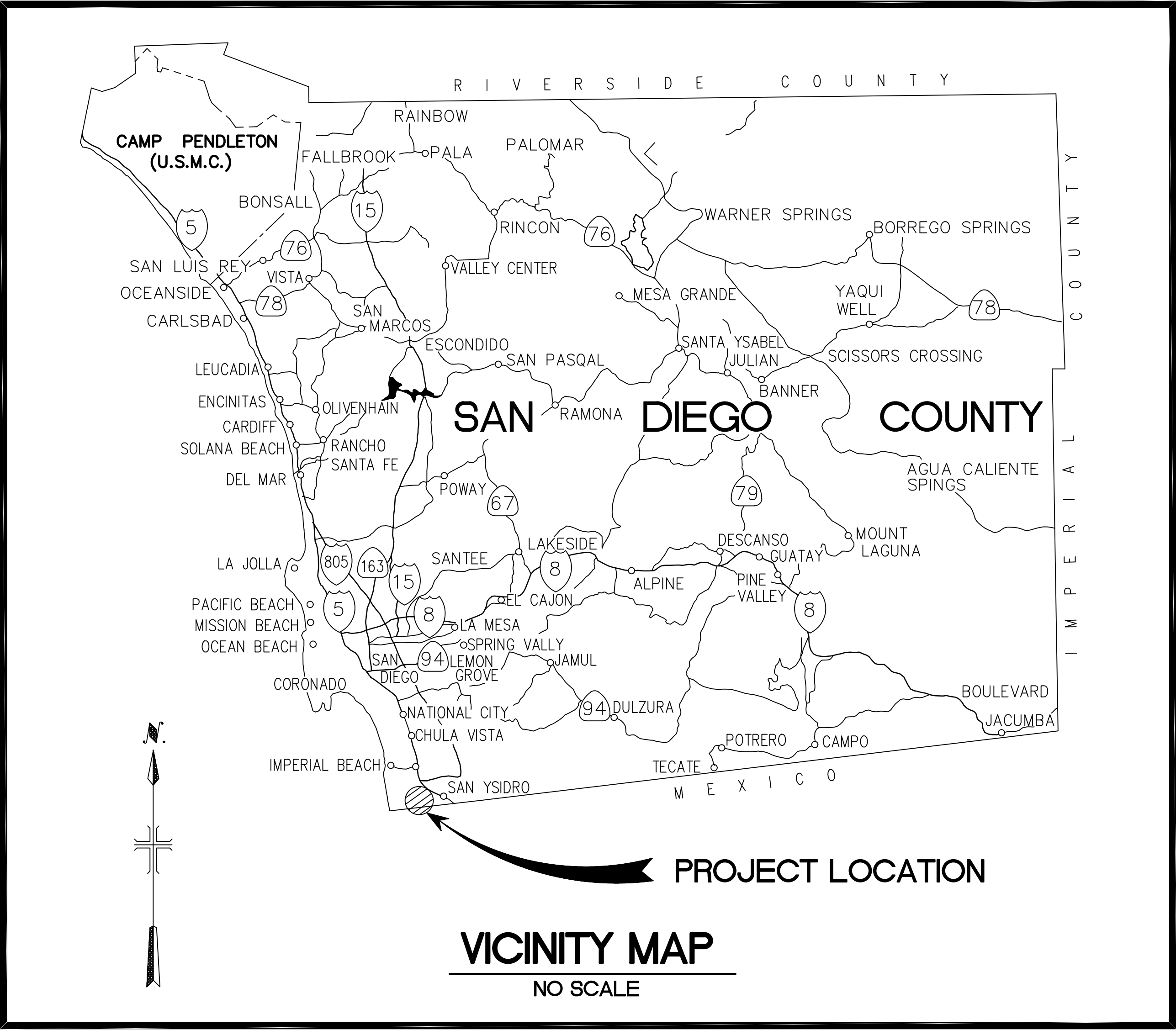
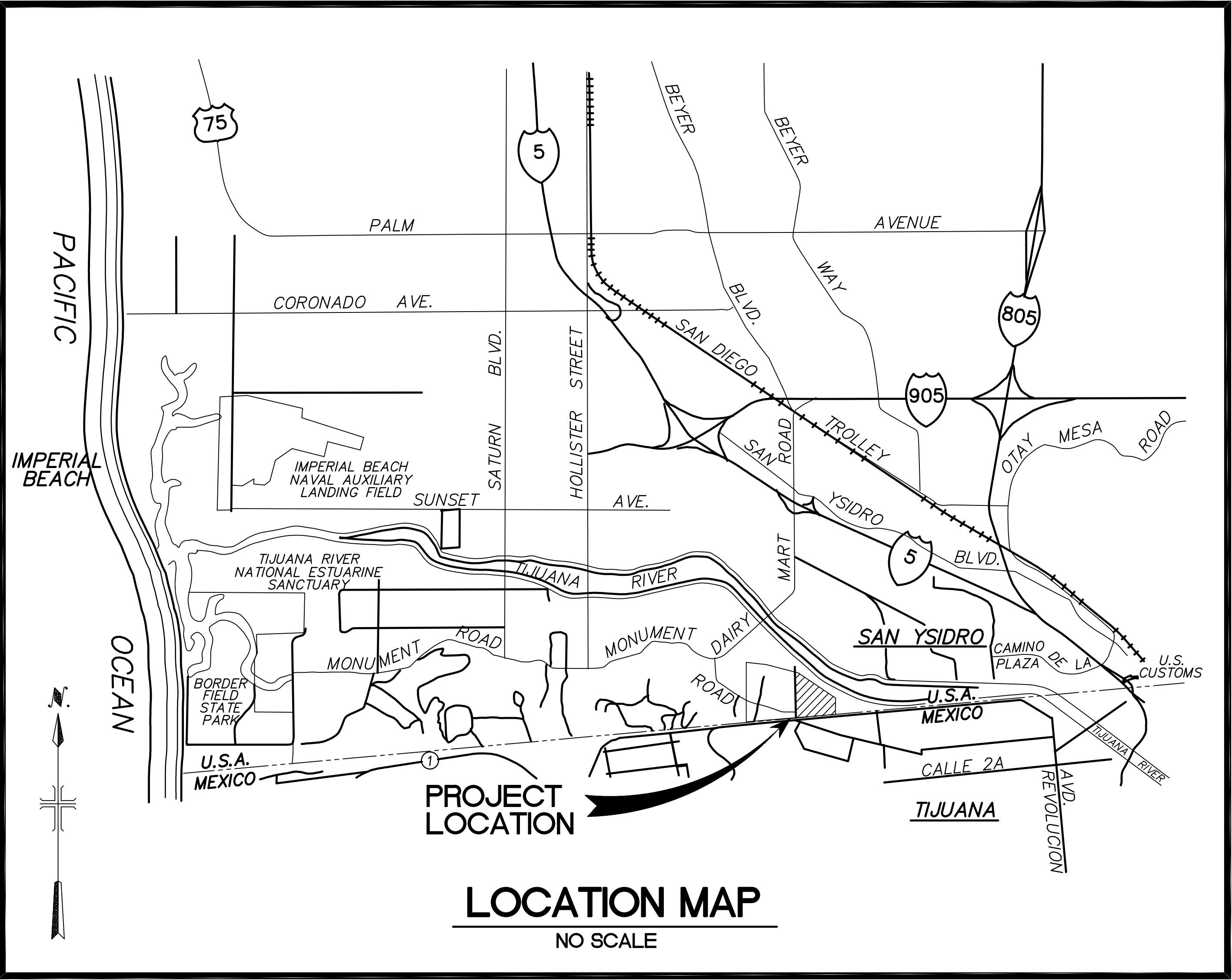
The CC-4A project includes the design of the Smuggler's Gulch Diversion Structure, a 30-inch gravity pipeline, and the Hollister Street Pump Station. Sewage flows collected at the Smuggler's Gulch Diversion Structure will flow by gravity to the inlet of the Hollister Street Pump Station. The Hollister Street Pump Station will pump sewage received from the Goat Canyon Pump Station and Smuggler's Gulch Diversion Structure through existing 16-inch and 30-inch parallel force mains to the South Bay IWTP.

The CC-4B project includes the Goat Canyon Diversion Structure, a 24-inch gravity pipeline, and the Goat Canyon Pump Station. Flows from the Goat Canyon Collection Structure will be conveyed by gravity to the Goat Canyon Pump Station and will be pumped through existing 12-inch and 16-inch parallel force mains to the inlet of the Hollister Street Pump Station.

The definition of the Phase I South Bay IWTP was further refined through Modification No. 30 to Contract IBM 92-15, dated October, 1996. The key element of Modification 30 was the removal of the Remote De-Chlorination Facility from the CC-3 project, and the addition of the CC-5 project for the construction of the Remote De-Chlorination Facility.

The CC-5 project was to include construction of the Remote De-Chlorination Facility located on the Goat Canyon Pump Station site adjacent to the South Bay Land Outfall (SBLO), and included a De-Chlorination Building, a Final Effluent Residual Sample Vault and a Sodium Bisulfite Addition Vault. However, this project was never constructed due to budget constraints.

XREFS: \\TLB\k\dwg IMAGES:None User:CARSON Spec:PIRNE STANDARD File: \\proj\1991037\Q&M schematics\I3OM FIG 1.1-1.DWG Scale:1:1 Date:12/14/2010 Time:15:18 Layout:Blank



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OPERATIONS AND MAINTENANCE MANUAL
LOCATION AND VICINITY MAPS
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FIGURE 1.1-1
CAD REF. NO. I3OM FIG 1.1-1

1.2 PURPOSE OF MANUAL

The purpose of this Operation and Maintenance Manual is to provide a **general overview only** of the South Bay International Wastewater Treatment Plant (SBIWTP) and provides **general** process by process descriptions of the function, provides **general** sizing criteria and equipment data, and provides **general** operational strategies and maintenance requirements.

- All users of this manual are directed to the “NOTICE AND CAUTIONS TO USERS OF THIS O&M MANUAL” that is included at the beginning of this manual and at the beginning of each chapter.
- Manufacturer O&M manuals and videos of manufacturer training for the equipment and systems incorporated into the SBIWTP are on file with the IBWC. All users of this manual shall be deemed to have reviewed and shall be deemed to be knowledgeable of the information on file with the IBWC prior to performing any operations and maintenance activities at the SBIWTP.
- In the event of conflicts between the information contained in this O&M Manual and information contained in the Manufacturer O&M manuals and training videos, the Manufacturer O&M manuals and training videos shall take precedence.

This manual is organized into seven chapters. The contents of each chapter, in accordance with the requirements of Modification No. 24 and No. 31 to Contract IBM 92-15, are as follows:

1. **Chapter 1 - INTRODUCTION:** provides a **general** description of the project, a **general** description of the process and facilities, the plant loadings and flows used in design, and the plant hydraulic profile.
2. **Chapter 2 - PROCESS DESCRIPTION:** gives **general** process by process descriptions and performance and design objectives.
3. **Chapter 3 - EQUIPMENT DESCRIPTION:** presents a **general** description of the purpose of each unit treatment process, and **general** descriptions of important features of each unit treatment process.
4. **Chapter 4 - OPERATIONAL PROCEDURES:** presents **general** process by process descriptions of controls and operation; **general** step by step start-up and shutdown instructions for each unit treatment process; **general** alarm

and status annunciation for each unit treatment process; **general** daily operational checks and a training log for each unit treatment process.

5. **Chapter 5 - PREVENTIVE MAINTENANCE SCHEDULES:** summarizes **general** preventive maintenance schedules and procedures for each unit treatment process.
6. **Chapter 6 - EQUIPMENT SCHEDULES:** presents **general** descriptions of equipment including main equipment characteristics, identification of manufacturers, suppliers, local representatives for major equipment, and drives for each unit treatment process.
7. **Chapter 7 - EMERGENCY RESPONSE AND SAFETY PROCEDURES:** defines **general** system failure and response procedures for unit treatment processes; and **general** plant safety procedures.

1.3 PLANT SCHEMATIC

A plant general flow schematic for the liquid and solids treatment processes for the South Bay IWTP is provided in Figure 1.3-1. Key elements of the flow schematic are highlighted below.

The primary source of the plant influent is from the existing 72" diameter International Interceptor located just south of the USA/Mexico Border. A portion of the flow from this 72" diameter sewer is intercepted prior to Mexico's Pump Station No. 1 in an existing junction box located immediately south of the border with Mexico. The wastewater flows by gravity through the 72" diameter Influent Wastewater (IW) pipeline toward Junction Box No. 1, which is located approximately 10 feet north of the international border near Stewart's Drain. Junction Box No. 1 contains a sluice gate over the 96" diameter outlet of the box which can be used for flow control to the plant. The motor operated sluice gate can only be operated at Junction Box No. 1. Dry weather flow from the Stewart's Drain Diversion Structure also flows to this box via an 18" line. The wastewater flows by gravity towards the South Bay IWTP headworks through the 96" diameter IW line. From Junction Box No. 1, the flow passes through Junction Box No. 2, the Headworks Junction Structure and the Headworks Inlet Structure before reaching the influent screens. Dry weather flow collected at the Silva Drain and Canyon Del Sol diversions is conveyed by gravity through a 20" pipe and is also discharged to Junction Box No. 2.

The tank drainage system also discharges into the Headworks Junction Structure through a 48" diameter pipe. The Tank Drain (TD) is a gravity flow piping system located throughout the Plant through which the primary sedimentation, activated sludge and secondary sedimentation tanks are drained. The tank drainage is conveyed to the headworks (HW). The TD system takes all drain lines from process areas by means of gravity flow or pumped lines, in addition to all sewer lines by means of gravity flow from personnel occupied buildings. The TD system consists of 48-, 42-, 36-, 24-, and 18-inch piping and manhole structures (See Figure 1.3-1).

The secondary source of plant influent is the 16- and 30-inch Sewer Force Mains (SFM) which convey raw sewage pumped from off-site canyon collection facilities and sewage pump stations located at Goat Canyon and Smuggler's Gulch (Hollister Street).

These two metered SFMs discharge into a manhole structure which is at the upstream end of the TD system and then flows by gravity to the HW.

Figure 1.3-3 shows the facilities associated with conveying wastewater from Mexico's collection system to the South Bay IWTP. Figure 1.3-4 shows the Flow Schematic of the Diversion Structure of the Collection and Conveyance Facilities. Key elements of the flow scheme and Collection and Conveyance Facilities are highlighted below:

- Collection structures at Goat Canyon and Smuggler's Gulch intercept flows from across the border.
- 24-inch and 30-inch gravity flow pipelines transfer collected flows to the Goat Canyon and Hollister Street Pump Stations respectively.
- The Goat Canyon Pump Station pumps collected flows into existing 12-inch and 16-inch parallel force mains which discharge to the inlet of the Hollister Street Pump Station.
- The Hollister Street Pump Station pumps collected flows from the Goat Canyon Pump Station and the Smuggler's Gulch Collection Facility into existing parallel 16-inch and 30-inch force mains and then discharges into TD system of the South Bay IWTP.
- A collection structure at Canyon Del Sol transfers surface flows through a 16-inch gravity line to a 20-inch gravity pipeline where it combines with collected flows from the 12-inch gravity pipeline from the Silva's Drain Collection Structure. The combined collected sewage flows by gravity to the headworks of the South Bay IWTP through Junction Box No. 2.
- A collection structure at Stewart's Drain transfers surface flows through an 18-inch gravity pipeline to the Junction Box No. 1 and then to the headworks of the South Bay IWTP.
- A 72-inch conveyance pipeline transfers flows from the stubout of the pump station/diversion structure to Junction Box No. 1. A 96-inch conveyance pipeline transfer flows from Junction Box No. 1 to the Headworks of the South Bay IWTP (See Figure 1.3-3).

The screened influent wastewater is pumped to the grit chamber from the HW through the metered 60-inch IW pipeline. The IW line has a 60-inch bypass line around the meter vault.

The Primary Effluent (PE) from the Primary Sedimentation Tanks (PST) is conveyed to the Primary Effluent Bypass Structure (PEBS), which allows the flow to be split between the Activated Sludge Tanks (ASTs) and the Effluent Blending Structure (EBS). A motor operated gate allows the average PE flow of 25 MGD and the associated peak PE flow of 48.75 MGD to be sent via a 72-inch PE gravity flow pipeline to the ASTs for secondary treatment, flows in excess of 48.75 MGD will bypass the ASTs and flow by gravity directly to the EBS through the metered 66-inch PE Bypass pipeline. A 66-inch PE Emergency Bypass Pipe is provided from the PEBS to the Bypass Junction Structure. This bypass allows peak flow in excess of approximately 100 MGD to spill over an overflow weir in the PEBS, bypass the meter vault, and be conveyed to the EBS. At the EBS, effluent flows from the primary and secondary treatment processes are combined prior to being discharged to the South Bay Land Outfall/Ocean Outfall.

From the EBS, the flow is distributed between two 144-inch energy dissipaters which dissipate the energy from the elevation change in this piping system. Downstream of the energy dissipaters, the effluent flow is conveyed into the 144-inch South Bay Land Outfall (SBLO) that conveys the discharge to the South Bay Ocean Outfall.

The Secondary Effluent (SE) pipeline is an 84-inch gravity flow line that delivers flow from the secondary treatment processes (Activated Sludge Tanks and Secondary Sedimentation Tanks) to the EBS where it is combined with PE from primary treatment (PST) via the 66-inch PE Bypass pipe when flows exceed the secondary treatment system peak flow capacity of 48.75 MGD.

A 42-inch Return Activated Sludge (RAS) Pipe conveys RAS from the RAS Pump Station at the Secondary Sedimentation Tanks (SSTs) back to the front of the Activated Sludge Tanks (ASTs). The 42-inch RAS header pipe is fed by six 16-inch vertical turbine pumps at the pump station, and conveys the RAS to the seven 10-inch RAS pipes that feed the RAS diffusers at the head of each AST.

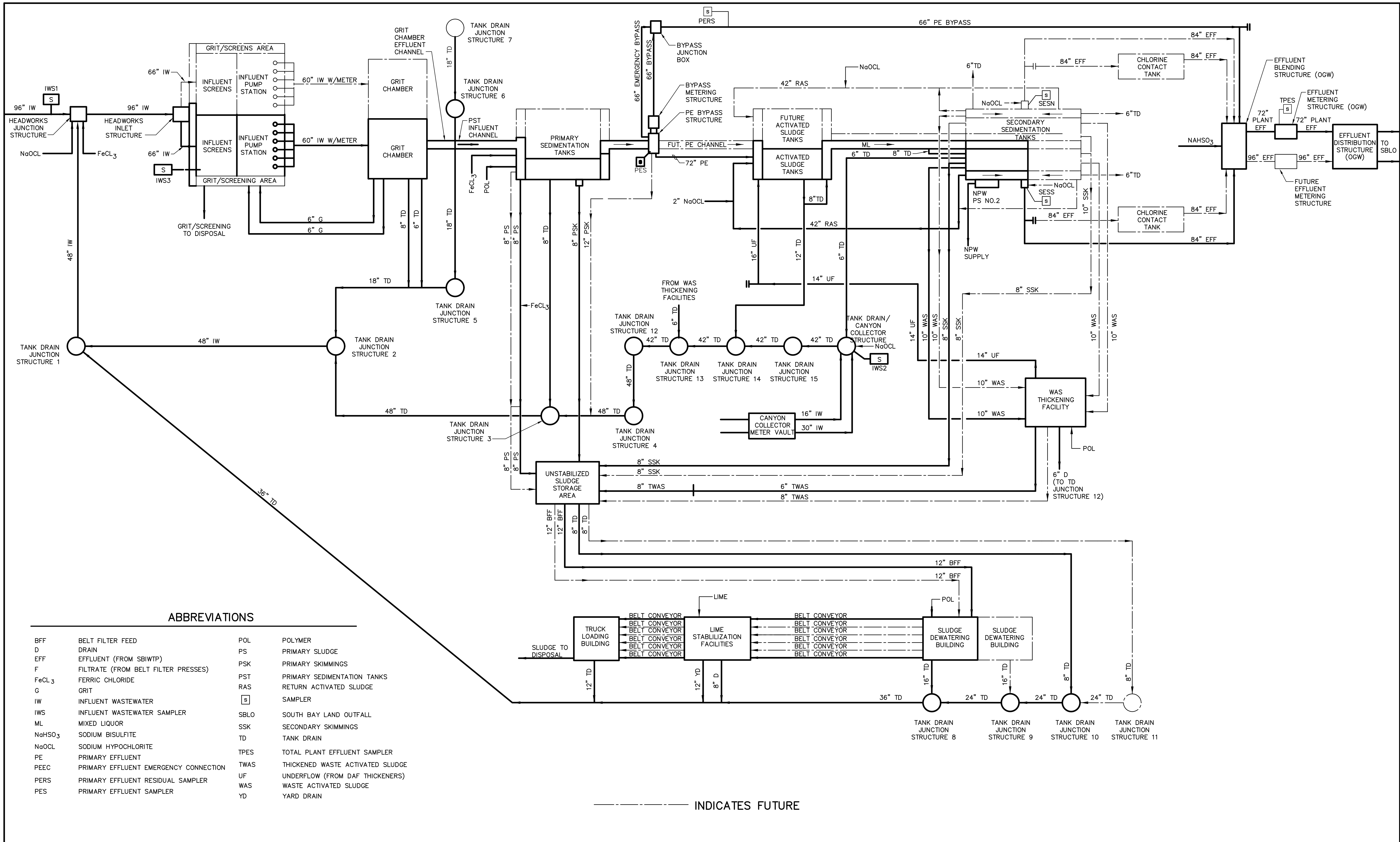
Primary Sludge (PS) and Primary Skimmings (PSK) are produced at the PSTs, and are pumped via 8-inch pipes to the Unstabilized Sludge Storage Tanks (USST).

The SSTs generate both Secondary Skimmings (SSK) and Waste Activated Sludge (WAS). SSK is pumped via a 10-inch pipe to the USSTs, and WAS is pumped via 10-inch pipe to the WAS Thickening Facilities.

The WAS Thickening Facilities generate Thickened Waste Activated Sludge (TWAS) and Underflow (UF). The TWAS is pumped via 6-inch pipe to the USSTs, and the UF flows by gravity via 14-inch UF line back to the front of the ASTs.

The Sludge Dewatering Facilities generate the Dewatered Sludge (cake) and Belt Filter Press Filtrate (F) and Washwater (WW). The dewatered sludge is stabilized by mixing with lime, loaded in the hauling trucks in the Truck Loading Building, and disposed of at a sludge disposal site in Mexico. The filtrate and washwater flow by gravity via 16-inch pipe into the plant wide tank drain system for return to the Headworks Junction Structure.

XREFS: \\TLBUK.dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:t:\proj\1991037\3&M schematics\130M FIG 1.3-1.DWG Scale:1:1 Date:03/25/2011 Time:12:58 Layout:-



ABBREVIATIONS

BFF	BELT FILTER FEED	POL	POLYMER
D	DRAIN	PS	PRIMARY SLUDGE
EFF	EFFLUENT (FROM SBIWTP)	PSK	PRIMARY SKIMMINGS
F	FILTRATE (FROM BELT FILTER PRESSES)	PST	PRIMARY SEDIMENTATION TANKS
FeCl ₃	FERRIC CHLORIDE	RAS	RETURN ACTIVATED SLUDGE
G	GRIT	<div><div></div></div>	SAMPLER
IW	INFLUENT WASTEWATER	SBLO	SOUTH BAY LAND OUTFALL
IWS	INFLUENT WASTEWATER SAMPLER	SSK	SECONDARY SKIMMINGS
ML	MIXED LIQUOR	TD	TANK DRAIN
NaHSO ₃	SODIUM BISULFITE	TPES	TOTAL PLANT EFFLUENT SAMPLER
NaOCl	SODIUM HYPOCHLORITE	TWAS	THICKENED WASTE ACTIVATED SLUDGE
PE	PRIMARY EFFLUENT	UF	UNDERFLOW (FROM DAF THICKENERS)
PEEC	PRIMARY EFFLUENT EMERGENCY CONNECTION	WAS	WASTE ACTIVATED SLUDGE
PERS	PRIMARY EFFLUENT RESIDUAL SAMPLER	YD	YARD DRAIN
PES	PRIMARY EFFLUENT SAMPLER		

----- INDICATES FUTURE

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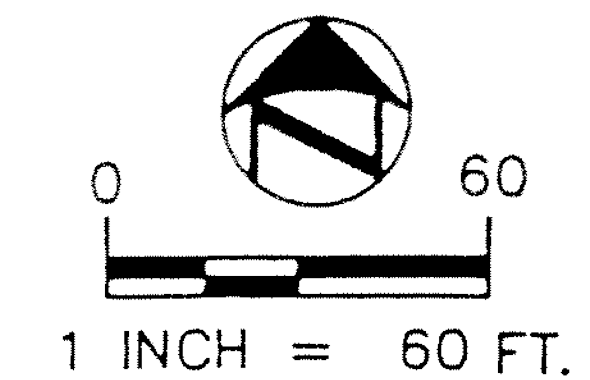
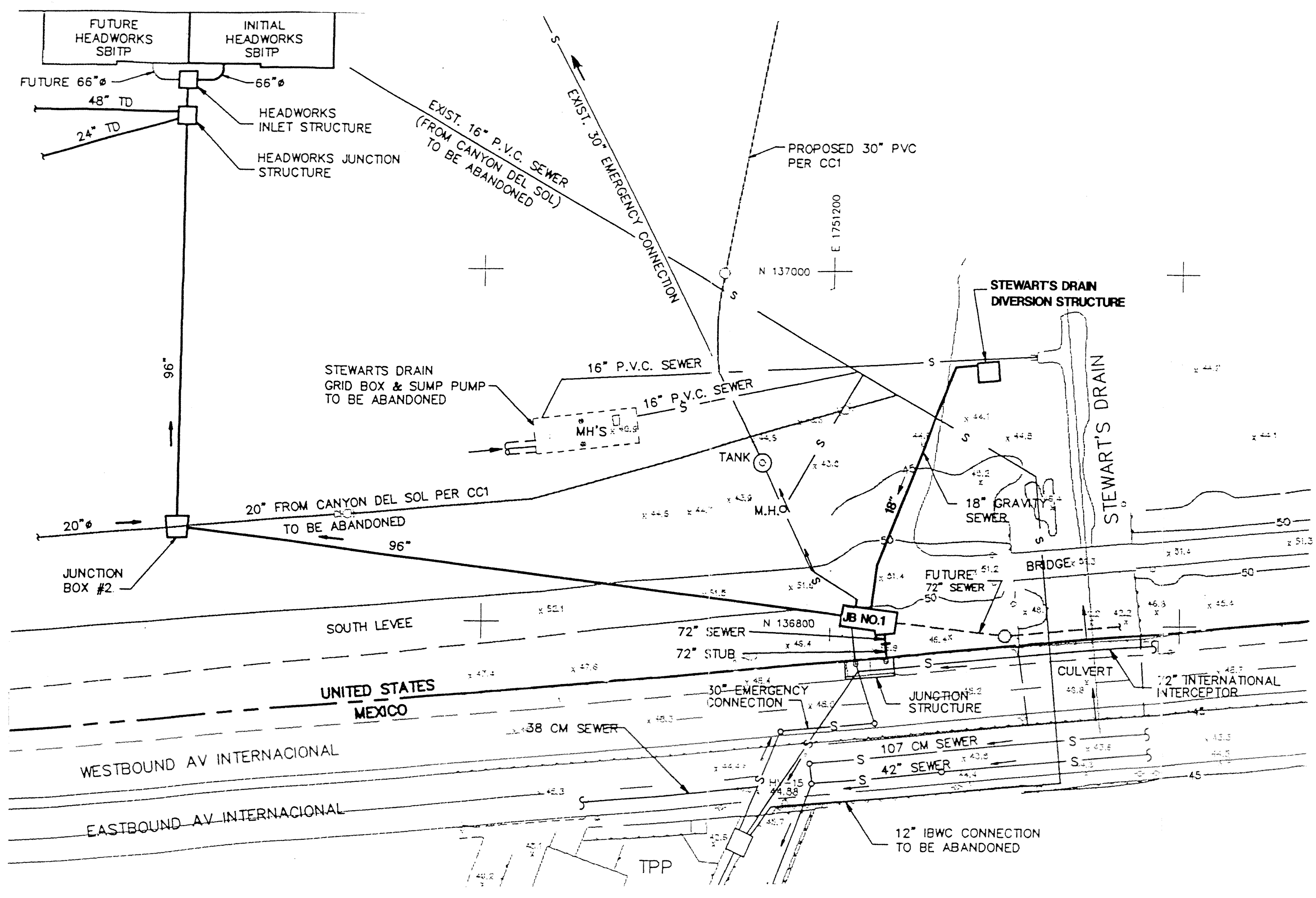
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South Bay International Wastewater Treatment Plant

OPERATION AND MAINTENANCE MANUAL

PLANT FLOW SCHEMATIC

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FIGURE 1.3-1
CAD REF. NO. 130M FIG 1.3-1



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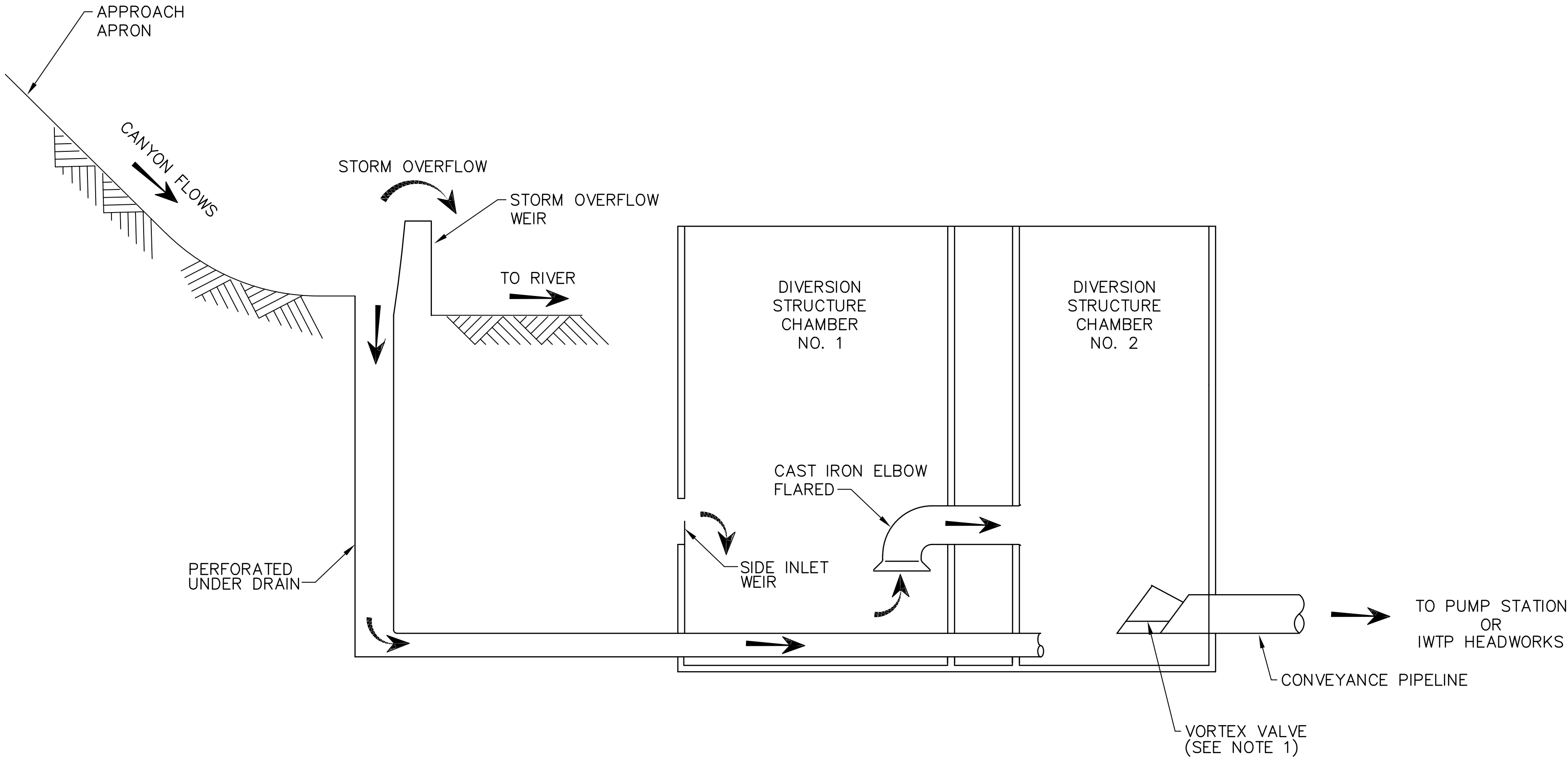


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OPERATIONS AND MAINTENANCE MANUAL
CONVEYANCE FACILITIES FOR
SEWAGE FLOWS FROM MEXICO
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FIGURE 1.3-3
CAD REF. NO. I30M FIG 1.3-3

XREFS: \\TLBLK.dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:1:1991037\3&M schematics\30M FIG 1.3-4.DWG Scale:1:1 Date:12/14/2010 Time:13:54 Layout:Blank



NOTE:
1. AT CANYON DEL SOL AND SILVA DRAIN
DIVERSION STRUCTURES ONLY.

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OPERATIONS AND MAINTENANCE MANUAL
DIVERSION STRUCTURAL
FLOW SCHEMATIC (TYPICAL)
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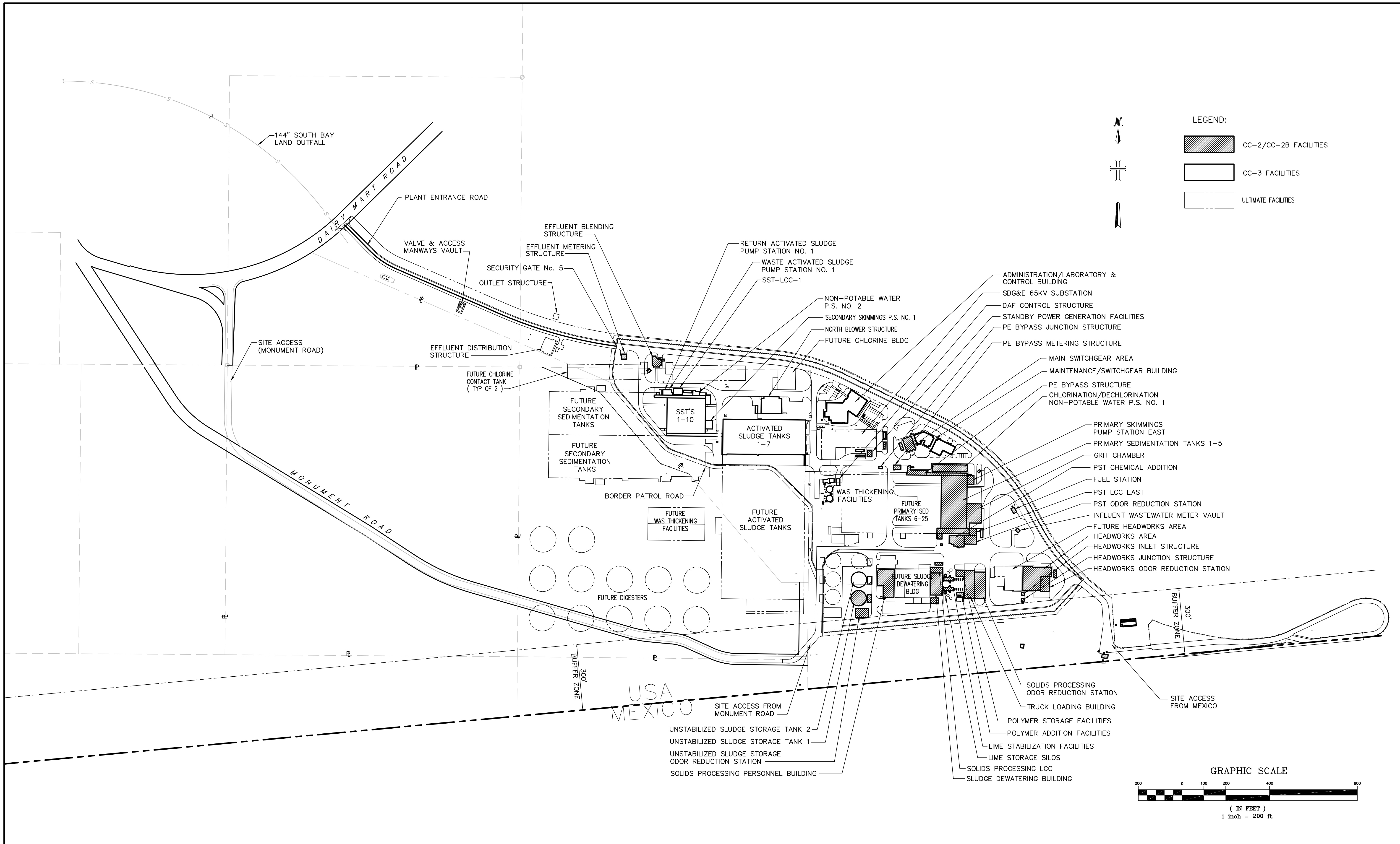
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FIGURE 1.3-4
CAD REF. NO. I30M FIG 1.3-4

1.4 SITE LAYOUT

The site layout for the Phase I South Bay IWTP and the ultimate facilities is presented in Figure 1.4-1.

The site layout satisfies the unit process siting and land requirements defined in Modification No. 6. Specifically, the site layout incorporates siting of the Advanced Primary Treatment facilities, the Secondary Treatment facilities and support systems for the South Bay IWTP including sludge dewatering and stabilization on the land currently owned by the IBWC. Siting of the future facilities and space for potential anaerobic digesters are planned on the property immediately west of the land currently owned by the IBWC.

The site layouts for the Goat Canyon and Smuggler Gulch (Hollister Street) Pump Stations are presented in Figure 1.4-2 and Figure 1.4-3, respectively.



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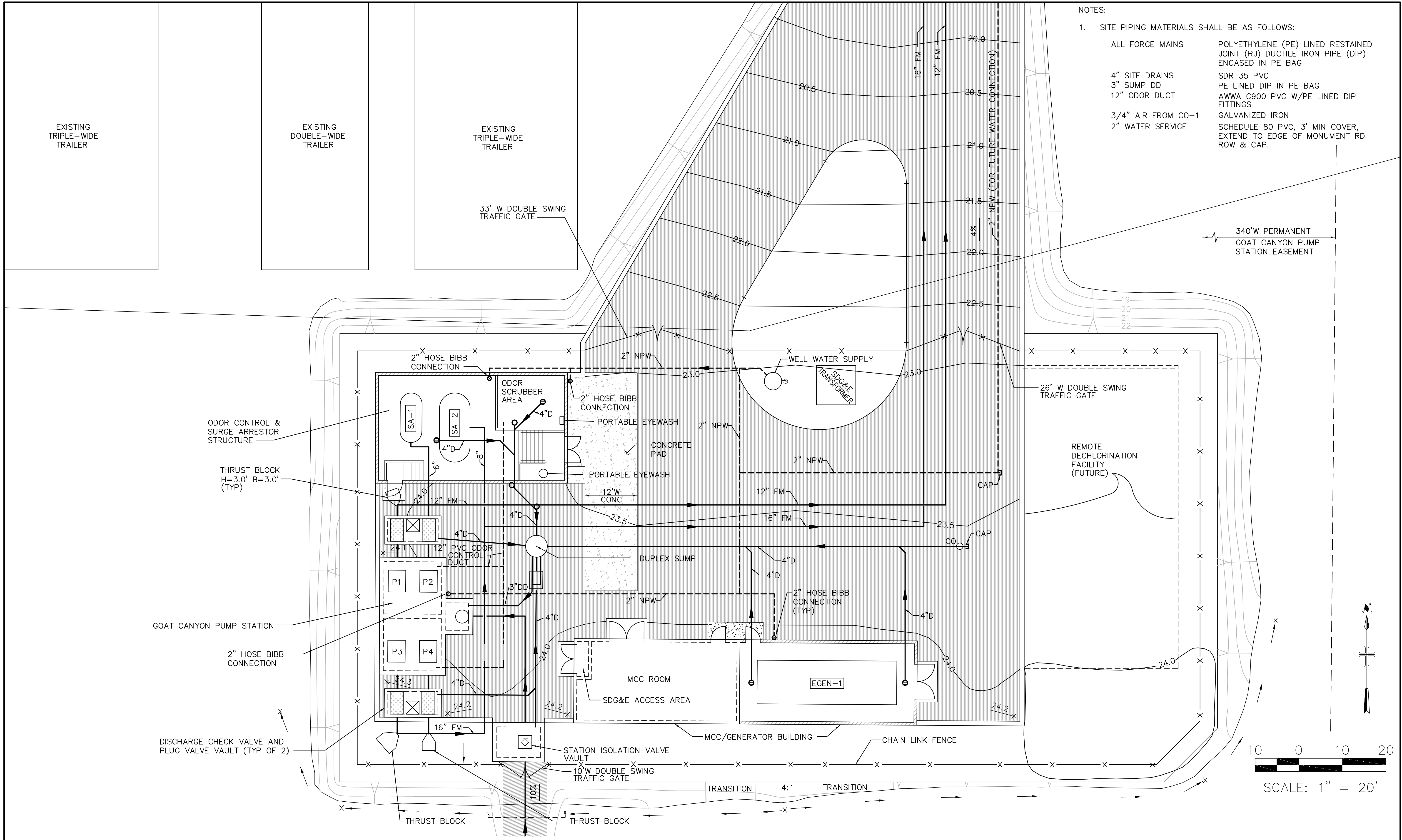
OPERATIONS AND MAINTENANCE MANUAL

SITE LAYOUT
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FIGURE 1.4-1
CAD REF. NO. I30M FIG 1.4-1

XREFS: \\TLEB\dwg\X3SITE.dwg X3BASE.dwg IMAGES:None
User: LARSON SpectraPINE STANDARD File: \\proj\1991037\08M schematics\I30M FIG 1.4-1.DWG Scale: 1:1 Date: 04/06/2011 Time: 10:03 Layout: Blank

XREFS: \\TLBLK.dwg IMAGES:None
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- NOTES:
1. SITE PIPING MATERIALS SHALL BE AS FOLLOWS:
- | | |
|--------------------|--|
| ALL FORCE MAINS | POLYETHYLENE (PE) LINED RESTAINED JOINT (RJ) DUCTILE IRON PIPE (DIP) ENCASED IN PE BAG |
| 4" SITE DRAINS | SDR 35 PVC |
| 3" SUMP DD | PE LINED DIP IN PE BAG |
| 12" ODOR DUCT | AWWA C900 PVC W/PE LINED DIP FITTINGS |
| 3/4" AIR FROM CO-1 | GALVANIZED IRON |
| 2" WATER SERVICE | SCHEDULE 80 PVC, 3' MIN COVER, EXTEND TO EDGE OF MONUMENT RD ROW & CAP. |

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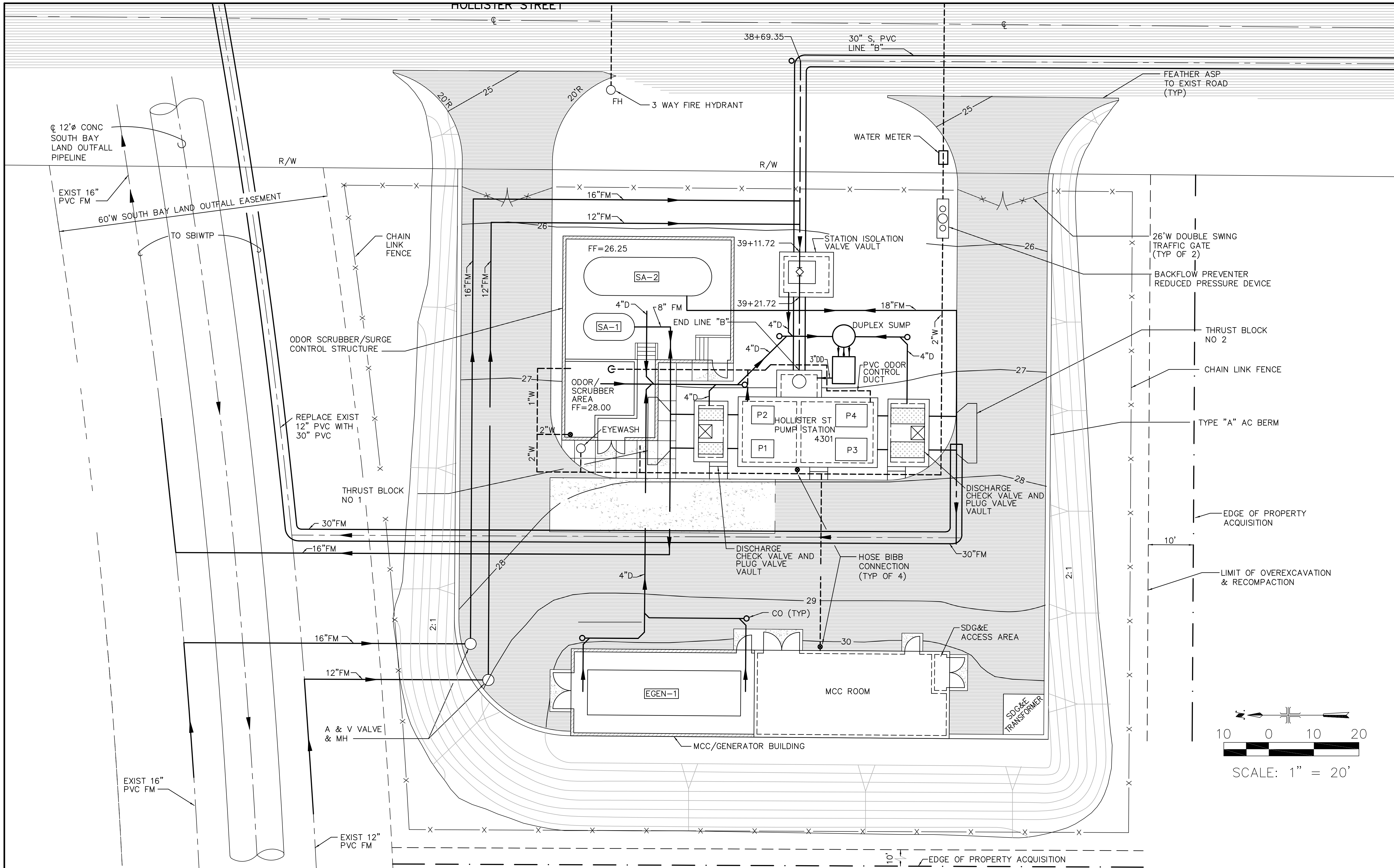


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OPERATIONS AND MAINTENANCE MANUAL
GOAT CANYON PUMP STATION
SITE PLAN
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FIGURE 1.4-2
CAD REF. NO. 130M FIG 1.4-2

XREFS: \\TLB\dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:1:\proj\1991037\3&M schematics\130M FIG 1.4-3.DWG Scale:1:1 Date:12/15/2010 Time:10:45 Layout:Blank



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OPERATIONS AND MAINTENANCE MANUAL
HOLLISTER STREET PUMP STATION
SITE PLAN

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FIGURE 1.4-3
CAD REF. NO. 130M FIG 1.4-3

1.5 GENERAL DESCRIPTION OF SBIWTP PROCESSES

1.5.1 Headworks

Influent sewage from Mexico flows to the Headworks facility directly via 96-inch gravity pipe, and indirectly via the 48-inch tank drain pipe conveying flow from diversion structures at Goat Canyon and Smuggler's Gulch. Both gravity pipelines terminate at the Headworks Junction Structure, located south of the Headworks facility. Influent sewage flows are conveyed via a 96-inch pipe from the Headworks Junction Structure to the Headworks Inlet Structure which is located adjacent to the Headworks Area. Flows from the Headworks Inlet Structure are conveyed by gravity to the Screenings Area.

The Screening Area consists of six screening channels with three self-cleaning, climber-type mechanical bar screens and three manually cleaned bar screens. The manual screens can be used for bypass if the mechanical screens are taken out of service. After passing through the mechanical screens, the wastewater flows by gravity into the Influent Pump Station (IPS). Six (6) vertical turbine solids handling (VTSH) pumps are provided to pump the wastewater to the aerated grit chamber.

The 60-inch IPS header pipe discharges into the bottom of the grit chamber inlet box, and flows up through the inlet box and into the aerated grit chamber located east of the Primary Sedimentation Tanks (PST). A bypass channel is provided for the aerated grit chamber; allowing it to be taken out of service for maintenance activities during low flow conditions.

Settled grit is removed from the hoppers via recessed impeller grit pumps and pumped to the grit classifier/separator units located in the Grit Dewatering Building within the Headworks Area. Dewatered grit is discharged to the storage bins located below and subsequently disposed of in Mexico.

1.5.2 Primary Sedimentation Facilities

Effluent from the grit chamber is conveyed by gravity to the Primary Sedimentation Tanks (PST) influent channel and then through the rapid mixing chamber to the selected in-service PSTs. Channel aeration is provided in the PST influent channel via coarse air bubble diffusers in the channel that are supplied with air by channel aeration blowers located on the lower level of the PST-LCC-EAST structure.

Each of the rapid mixing chambers (RMC) is equipped with a top mounted mechanical mixer. Ferric chloride and/or polymer are introduced into each in-service RMC.

Plastic flight and chain sludge collectors in each PST move the settled sludge to dual sludge hoppers located on the inlet side of each PST. Settled primary sludge from each PST is removed and pumped to the Unstabilized Sludge Storage Tanks (USST) via individual primary sludge pumps located in the PST Influent Gallery.

Primary skimmings (PSK) are removed from each PST via the surface sludge scrapers and 18" diameter rotary skimmers located at the effluent end of each PST. Skimmings are conveyed by gravity to the PSK Pump Station, where they are concentrated and subsequently pumped through a grinder and then to the Unstabilized Sludge Storage Tanks (USST).

1.5.3 Activated Sludge Facilities

Primary effluent (PE) is conveyed by gravity to the Primary Effluent Bypass Structure (PEBS) and then conveyed by gravity via a 72" PE pipeline to the Activated Sludge Tanks (AST) for secondary treatment. PE flow from 72" line is discharged to the AST Influent Channel Junction Box located on the east end of the ASTs from where it discharges into the AST Influent Channel also located on the east side ASTs. Channel aeration is provided in the AST influent channel via coarse air bubble diffusers in the channel that are supplied with air by channel aeration blowers located in the Blower Building on the north side of the ASTs.

From the AST influent channel, PE is conveyed via gravity into each AST by two (2) parallel 24" pipes that discharge to an 18" diffusion header located in the "B" zone of each AST.

Each AST is subdivided into seven (7) treatment zones (“A”, “B”, “C”, “D”, “E”, “F” and “Aerobic”). Each of these seven zones is separated by a red wood overflow baffle.

- Zone “A” is the pre-anoxic zone and receives only RAS flows. This zone is mixed but is not aerated.
- Zone “B” is the anaerobic zone and receives overflow from Zone “A” and PE. This zone is mixed but is not aerated. Zone “B” can also receive “Intermediate Mixed Liquor Return” (IMLR) from the effluent end of the last “aerated” zone within the AST.
- Zone “C” is an anoxic zone and receives overflow from Zone “B”. This zone is mixed but is not aerated.
- Zone “D” is an anoxic zone and receives overflow from Zone “C”. This zone is mixed but is not aerated. Zone “D” can also receive “Intermediate Mixed Liquor Return” (IMLR) from the effluent end of the last “aerated” zone within the AST.
- Zone “E” is an anoxic zone and receives overflow from Zone “D”. This zone is mixed but is not aerated.
- Zone “F” is an anoxic zone and receives overflow from Zone “E”. This zone is mixed but is not aerated.
- The “Aerobic” Zones are sub-divided into three (3) aeration zones which do not include any baffles. Each aeration sub-zone includes an independent air drop leg with flow control valves and air flow meters and fine bubble diffusers. The air to each drop leg is supplied by Process Air Blowers located in the Blower Building.

At the western end of the ASTs, after the last aerobic zone, the mixed liquor is discharged over weirs and comingled in the common AST effluent channel, from which it flows by gravity to the Secondary Sedimentation Tanks (SST) influent channel. Channel aeration is provided in the AST effluent channel and the SST influent channel via coarse air bubble diffusers in the channels that are supplied with air by channel aeration blowers located in the Blower Building on the north side of the ASTs.

1.5.4 Secondary Sedimentation Facilities

The mixed liquor enters each of ten (10) SSTs through two parallel influent channel wall penetrations, which utilize diffuser assemblies (24-inch tees) to disperse the mixed liquor as it enters each SST.

Settled, secondary sludge collects in two sludge hoppers at the effluent (north) end of each SST, and the secondary skimmings (SSK) are collected in the rotary skimmer at the

influent (south) end of each SST. Clarified secondary effluent flows by gravity through three launders in each SST to the SST Effluent Channel and subsequently to the Effluent Blending Structure.

Each of the 10 SSTs is equipped with a plastic chain and flight collector apparatus that moves the settled secondary sludge (RAS) to the two sludge hoppers located at the effluent (north) end of each of the SSTs. RAS is removed from the hoppers through suction piping and delivered by gravity into the RAS Wet Well located on the north-west corner of the SSTs.

Secondary skimmings (SSK) are removed from each SST via the surface sludge scrapers and 18" diameter rotary skimmers located at the influent end of each SST. Skimmings are conveyed by gravity to the SSK Pump Station, where they are concentrated and subsequently pumped through a grinder and then to the Unstabilized Sludge Storage Tanks (USST).

Each of the SSTs is equipped with a RAS suction line consisting of two parallel influent pipes (one for each of the two sludge hoppers), which remove RAS from the hoppers at the effluent (north) end of the SSTs. The suction lines associated with SSTs 1, 2, and 3 are connected by a common RAS suction manifold located in the SST Effluent Gallery under the SST Effluent Channel. This manifold conveys the RAS by gravity into the RAS/WAS Wet Well located at the northwest end of the SSTs. Likewise, the suction lines associated with SSTs 4, 5, and 6 are connected via a common manifold that discharge into the RAS/WAS Wet Well. The suction lines for SSTs 7, 8, 9, and 10 each discharge directly into the RAS/WAS Wet Well.

The RAS Pump Station consists of six pumps that transfer the RAS from the RAS/WAS Wet Well to the Activated Sludge Tank (AST) Influent Gallery via a common header pipe that ultimately splits and delivers RAS into Zone "A" at each of the ASTs.

The WAS system allows for a portion of the RAS flow to be wasted by diverting the WAS flow away to the Dissolved Air Flotation (DAF) Thickeners that are located southeast of AST 7. The WAS Pump Station consists of two pumps (duty and standby) located in the SST Effluent Gallery below the RAS/WAS Wet Well.

1.5.5 Chlorination/Dechlorination and Non-Potable Water (NPW) Facilities

1.5.5.1 Chlorination

Chlorine in the form of sodium hypochlorite is used for throughout the IWTP for intermittent pre-chlorination at the Headworks Inlet Structure and Canyon Collector/Tank Drain Joint Structure; intermittent chlorination of the primary sludge line for hydrogen sulfide control and to avoid methane gas production in the Unstabilized Sludge Storage Tanks (USSTs); intermittent RAS chlorination to help suppress the growth of filamentous organisms in the activated sludge system; intermittent chlorination of the NPW distribution system to help suppress organic growth in the NPW distribution system; and continuous plant effluent chlorination for effluent disinfection. The sodium hypochlorite (NaOCl) supply system is located to the north of the primary sedimentation tanks (PSTs), and consists of a bulk storage system with two tanks and three pairs of metering pumps. One pair of metering pumps is dedicated to effluent chlorination, another pair is dedicated to the intermittent chlorination needs, and the final pair is dedicated to chlorination of the NPW distribution system

1.5.5.2 Dechlorination

Sodium Bisulfite is available to dechlorinate primary effluent only; however, under normal operating conditions this system will no longer be used. Plans to construct a remote dechlorination facility at the Goat Canyon Pump Station to dechlorinate IWTP final effluent prior to discharge to the South Bay Ocean Outfall have not materialized due to budget constraints.

1.5.5.3 Non-Potable Water Facilities

Non-Potable Water (NPW) is provided to meet various plant needs including pump seal water, area wash-down, chemical make-up water, wash water for the belt filter presses, and surface spray water for the ASTs.

There are two (2) NPW Pump Stations on the IWTP site. Non-Potable Water Pump Station No.1 (NPWPS1) is located the northeast side of the PSTs and includes an air-gap connection to the City of San Diego potable water system and to the City of San Diego

reclaimed water system. Non-Potable Water Pump Station No. 2 (NPWPS2) is located northeast corner of the SST effluent channel and is supplied with secondary effluent.

NPWPS2 which consists of five open line shaft vertical turbine pumps; three main pumps (two operating and one standby) and two jockey pumps (one operating and one standby) is the primary system that will be in continuous service. NPWPS 1 will remain but will only be placed into service in the unlikely event of a total failure of NPWPS2.

1.5.6 Waste Activated Sludge (WAS) Thickening Facilities

WAS thickening facilities consists of two (2) dissolved air flotation (DAF) thickeners located southeast of AST 7. The system also includes a polymer bulk storage tanks, a bulk polymer transfer pump, two (2) polymer addition pumps (one for each DAF thickener), two (2) pressurization pumps and pressurization tanks (one for each DAF thickener), two (2) thickened waste activated sludge (TWAS) pumps (one for each DAF thickener), and two (2) air compressors (one duty and one stand-by).

Waste activated sludge (WAS) is pumped via the WAS pumps located below the RAS/WAS Wet Well in the SST Effluent gallery to the DAF thickeners. Thickened waste activated sludge (TWAS) is pumped from the DAF thickeners to the USSTs.

1.5.7 Unstabilized Sludge Storage Facilities

Unstabilized primary sludge, thickened waste activated sludge, and skimmings from the primary and secondary sedimentation tanks are delivered to the unstabilized sludge storage tanks (USST) via their respective pumping facilities. Each sludge and skimming source is delivered to the USSTs via a separate glass lined ductile iron pipe that enters the storage tanks at an elevation above the high operating level.

Each sludge and skimmings feed is equipped with manually operated plug valves for operator selection of the in-service storage tank and isolation of out of service tanks.

Each storage tank is provided with a dedicated external recirculation pump recirculation system that consists of three (3) sludge mixing pumps. In addition each USST is provided with ferric chloride supply to reduce the potential for odor production and to minimize deposition of struvite. It is important to note that sludge shall not be held in any

USST in excess of 4 days and primary sludge should be chlorinated on a regular basis to avoid the production of methane gas in the USSTs.

1.5.8 Sludge Dewatering Facilities

Unstabilized sludge from the unstabilized sludge storage tanks flows by gravity to the belt filter press (BFP) sludge feed pumps which pump the sludge to the belt filter presses in the Sludge Dewatering Building. Polymer is injected into the feed manifold piping upstream of each belt filter press to enhance the dewatering characteristics of the sludge.

The dewatered sludge (cake) is conveyed to the lime stabilization facilities at the eastern end of the Sludge Dewatering Building. One inclined belt conveyor is provided for each pair of belt filter presses.

1.5.9 Sludge Conveyance and Lime Stabilization Facilities

Dewatered sludge (cake) is conveyed from the Sludge Dewatering Building to the Lime Stabilization Facilities by the BFP conveyors. The lime stabilization facilities are composed of quicklime storage facilities, lime transfer facilities, sludge/lime mixing facilities, and a stabilized sludge conveyance system.

Two parallel systems of lime stabilization facilities are provided. Each system includes a lime storage silo, volumetric feeder, lime transfer conveyor, and a sludge/lime mixer. Stabilized sludge from each system is conveyed by an individual incline truck loading conveyor to the Truck Loading Building to the east of the lime stabilization facilities.

1.5.10 Primary Effluent Structures

PE flows directly from the PST effluent channel to the Primary Effluent Bypass Structure (PEBS) which allows the flow to be split. PE is either sent to be discharged via the Primary Effluent Bypass Metering Structure, or directed to the Activated Sludge Tanks for secondary treatment. Under normal operation flows will be sent to the ASTs and no flow will be by-passed.

Under a by-pass event flows from the PE Bypass Metering Structure (PEBPMS) are delivered by gravity via a 66-inch PE pipeline to the Effluent Blending Structure (EBS). Under normal operation PE flows are delivered by gravity to the AST influent channel via a 72-inch PE pipeline, processed through the ASTs and SSTs and then conveyed to the Effluent Blending Structure (EBS) via an 84-inch SE pipeline. The PEBS is provided with a drain pump to pump out the PEBS in case it is taken out of service.

The Primary Effluent Bypass Metering Structure (PEBMS), located east of the PEBS is provided with two pipelines (24-inch and 48-inch) which can divert flow to the Primary Effluent Bypass Junction Structure (PEBPJS). Each pipeline has two knife gate valves, a flow control valve and a magnetic flow meter associated with it.

The Primary Effluent Bypass Junction Structure (PEBPJS) is located west of the Primary Effluent Bypass Metering Structure (PEBPMS) and is provided with a 66-inch flap valve on the Primary Effluent Bypass Line to prevent backflow into the PEBS.

1.5.11 Final Effluent Structures

The Final Effluent Structures include the Effluent Blending Structure (EBS), the Effluent Metering Structure (EMS), and the Effluent Distribution Structure (EDS). The EBS can receive primary effluent via gravity through a 66" Primary Effluent Bypass pipe in a by-pass event, and secondary effluent via gravity through an 84" secondary effluent pipe. The blended primary (under a by-pass event) and secondary effluent flows by gravity through a 72" plant effluent line to the EMS, and then to the Effluent Distribution Structure (EDS) and the South Bay Land Outfall (SBLO).

The EBS contains motor-operated, isolation slide gates to control flow from Primary Effluent Structures and the Secondary Sedimentation Tanks and to control the flow of blended effluent to the EMS. The EBS contains provisions for the connection of an additional 84" secondary effluent (SE) pipeline; an additional 96" blended effluent line, and two 84" connections from Chlorine Contact Tanks. The EBS contains facilities for the chlorination of effluent prior to discharge to the SBLO.

1.5.12 Standby Power Generation Facilities

Standby Power Generation Facilities are provided to supply electrical power to the plant in the event of power failure. The standby power generation facilities are located northwest of the Primary Effluent Bypass Junction Structure (PEBPJS). Standby Power Generation Facilities include two mobile containerized generators, two diesel fuel storage tanks, two diesel fuel transfer pump stations with associated day tanks, two overflow return pumps, two overflow return tanks and a Generator Local Control Center (GEN-LCC). The facilities are sized to provide power for all critical and essential process/equipment systems.

1.5.13 Collection and Conveyance Facilities

Transboundary sewage flows from Tijuana, Mexico are collected at diversion structures at Goat Canyon, Smuggler's Gulch, Canyon del Sol, Silva's Drain and Stewart's Drain, and conveyed through a system of approximately 15,000 feet of 12" through 30" gravity sewers.

Two pump stations, Goat Canyon and Smuggler Gulch (Hollister Street) Pump Stations, and two existing pairs of raw sewage force mains transfer wastewater collected at the Goat Canyon and the Smuggler's Gulch collection structures to the Headworks of the South Bay IWTP via the plant's tank drainage system.

The Goat Canyon Pump Station pumps all flow directly to the Smuggler Gulch (Hollister Street) Pump Station, and the combined flows from the Hollister Street Pump Station are then pumped to the South Bay IWTP tank drain system.

Each pump station consists of an inlet motor operated plug valve, a below grade concrete divided wet well, aluminum access hatches, submersible wastewater pumps, discharge headers to connect to the existing force mains, programmable controllers for level control and alarms, mercury floats for high level alarm, surge arrestors, odor control system with packed tower, and standby emergency generator.

Tijuana sewage flows from Tijuana Pumping Plant No. 1 and the 72" diameter International Interceptor are also conveyed to the Headworks of the South Bay IWTP via Junction Box No. 1 in a 96" diameter sewer.

Wastewater from the Stewart's Drain Diversion Structure also flows to Junction Box No. 1 through an 18" sewer and then to the Headworks of the South Bay IWTP.

Wastewater from the Silva Drain and Canyon Del Sol Diversion Structures is conveyed by gravity through a 20" sewer and is discharged via Junction Box No. 2 to the Headworks of the South Bay IWTP.

1.6 PLANT LOADINGS AND FLOWS

1.6.1 Introduction

The performance and design as presented in the *Final Conceptual Design Report-South Bay International Wastewater Treatment Plant* (FCDR) and as defined by the IBWC in Modification No. 6 are utilized as the basis for preliminary and final design of the Phase I South Bay IWTP. A summary of the key unit process performance and sizing criteria to satisfy the requirements defined in Contract IBM 92-15 and subsequent contract modifications issued by the IBWC are provided below.

1.6.2 Waste Loadings

The most critical of the criteria for design of the South Bay IWTP deals with the influent wastewater characteristics and anticipated sustained maximum loadings. Based on the results of Malcolm Pirnie's wastewater characterization program, the key influent wastewater characteristics for the South Bay IWTP are as recommended in the FCDR and as summarized below.

1.6.2.1 Annual Average Design Loadings

Annual average loading criteria for sizing of the Phase I South Bay IWTP and the Advanced Primary Treatment Plant (CC-2) portion of the Phase I project are based on the following key constituent concentrations.

- $\text{BOD}_5 = 370 \text{ mg/L}$
- $\text{TSS} = 350 \text{ mg/L}$
- $\text{NH}_3\text{-N} = 35 \text{ mg/L}$

1.6.2.2 Planning Design Loadings

Site planning for the Ultimate South Bay IWTP is based on the potential maximum 30-day loading conditions associated with the following key constituent correlations.

- $BOD_5 = 480 \text{ mg/L}$
- $TSS = 510 \text{ mg/L}$
- $NH_3-N = 42 \text{ mg/L}$

1.6.3 Plant Flows

In accordance with the requirements of Modifications No. 5 and No. 6, to Contract IBM 92-15, the South Bay IWTP is designed for the following flows for the Phase I Advanced Primary Treatment and Secondary Treatment Facilities, and the Ultimate facilities.

Advanced Primary Treatment Plant

Annual Average Flow	25 MGD
Peaking Factor	3
Peak Flow	75 MGD
Hydraulic Capacity	100 MGD

Secondary Treatment Plant

Annual Average Flow	25 MGD
Annual Average Peaking Factor	1.95
Peak Flow	48.75 MGD

Ultimate Project

Annual Average Flow	100 MGD
Peaking Factor	2
Peak Flow	200 MGD

The hydraulic capacity of 100 MGD identified above for the Advanced Primary Treatment Plant project refers only to the ability to deliver these flows to the Headworks

influent pump station, through the advanced primary treatment facilities and to the South Bay Land Outfall. The Headworks Facilities including the influent screens, influent pump station, and the grit chamber, and the chlorination/dechlorination chemical addition facilities are designed to meet their performance requirements at the hydraulic capacity flow requirement of 100 MGD. All other process sizing and performance criteria for the Advanced Primary Treatment Plant are based on an annual average flow of 25 MGD and a peaking factor of 3 (75 MGD). The secondary treatment facilities are sized based on an annual average flow of 25 MGD with a peaking factor of 1.95 (48.75 MGD).

Collection and Conveyance Facilities

The design capacity of 72" connection pipeline from the existing junction structure near Pump Station No. 1 in Mexico to Junction Box No. 1 is 100 MGD. Junction Box No. 1 is fitted with a 72" stub for a future second 100 MGD capacity 72" connection from Mexico. The design capacity of the 96" sewer that conveys sewage from Junction Box No. 1 to the Headworks of the South Bay IWTP is 200 MDG. This also includes fugitive flows captured at Canyon Del Sol (2 MGD peak capacity) and Silva Drain (1 MGD peak capacity) Diversion Structures that are conveyed to Junction Box No. 2 via a 20" sewer, and fugitive flows captured at Stewart's Drain Diversion Structure (5 MGD peak capacity) that are conveyed to Junction Box No. 1 via an 18" sewer.

The Goat Canyon Pump Station pumps flows collected at the Goat Canyon Diversion Structure (7 MGD peak capacity) directly to the Hollister Street Pump Station. The Hollister Street Pump Station pumps combined flows from the Goat Canyon Pump Station and the Smuggler's Gulch Diversion Structure (14 MGD peak capacity) to tank drain system of the South Bay IWTP which ties into the Headworks of the South Bay IWTP. Design flows for the Goat Canyon Pump Station and the Hollister Street Pump Station are 7.0 MGD and 21.0 MGD, respectively.

1.6.4 Hydraulic Profile

The hydraulic profile for the South Bay IWTP is presented in Figures 1.6-1 and 1.6-2, and was developed based on the following plant flow schemes:

Ultimate Construction

- Represents the hydraulic profile for the ultimate peak influent wastewater flow of 200 MGD plus plant recycle flows.

Phase I Maximum Hydraulic

- Represents the hydraulic profile for the Phase I facilities with a PST hydraulic flow through capacity of 100 MGD plus plant recycle flows.

Phase I Peak

- Represents the hydraulic profile for the Phase I facilities with a peak flow of 75 MGD plus plant recycle flows.

Phase I Average Annual

- Represents the hydraulic profile for the Phase I average annual flow of 25 MGD plus plant recycle flows.

Water surface elevations for the flow schemes described above were developed for five (5) design cases:

Case 1:

- One (1) PST out of service for Phase I and Ultimate flow conditions
- One (1) AST out of service for Phase I and Ultimate flow conditions
- One (1) SST out of service for Phase I flow conditions and two future SSTs out of service for Ultimate flow conditions

Case 2:

- All tanks in service.

Case 3:

- Overflow condition at the effluent distribution structure - WS El. 48.00

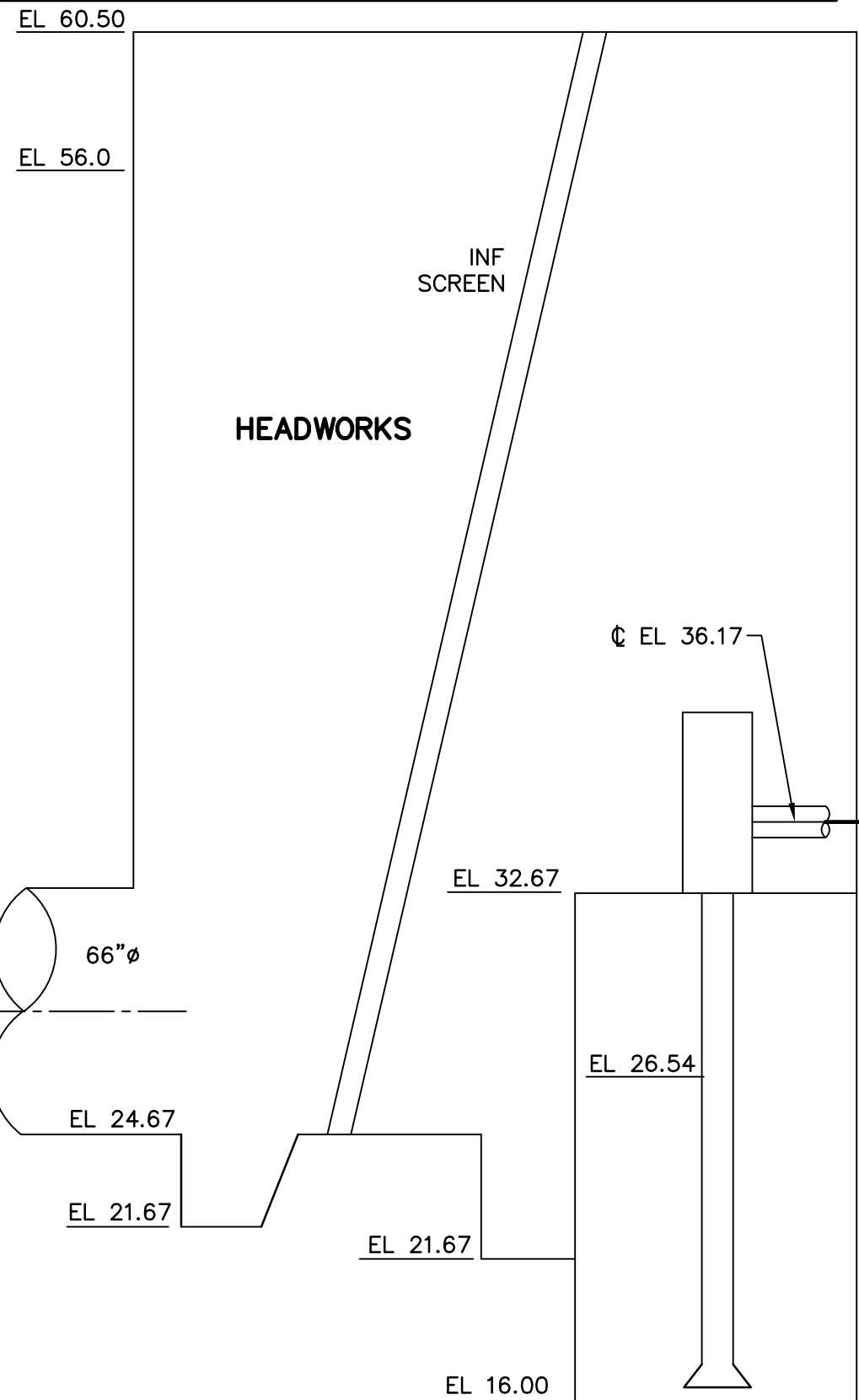
Case 4:

- Maximum level condition at the effluent distribution structure - WS El 45.00

Case 5:

- Minimum level condition at the effluent distribution structure - WS El. 43.19

FLOW CONDITIONS	FLOW (MGD)	CASE 1	CASE 2
ULTIMATE PEAK FLOW	200	XX.XX	XX.XX
PHASE 1 MAXIMUM HYDRAULIC FLOW	100	XX.XX	XX.XX
PHASE 1 PEAK FLOW	75	XX.XX	XX.XX
PHASE 1 CC3 MAX. FLOW TO AST'S.	25	XX.XX	XX.XX
CASE 1: PROCESS UNITS OUT OF SERVICE:			
• GRIT CHAMBERS		ULTIMATE	PHASE 1
• PRIMARY SED TANKS		N/A	N/A
• ACTIVATED SLUDGE TANKS		1 OF 25	1 OF 5
• SECONDARY SED. TANKS		1 OF 32	1 OF 6
CASE 2: ALL UNITS IN SERVICE			
		2 OF 64	1 OF 8



CASE 1	CASE 2
65.32	65.32
65.28	65.28
64.97	64.97
64.18	64.18

CASE 1	CASE 2
65.16	65.16
65.13	65.13
64.87	64.87
64.17	64.17

CASE 1	CASE 2
60.01	59.99
62.83	60.88
61.52	60.30
59.76	59.67

CASE 1	CASE 2
59.79	59.76
61.61	60.88
60.79	60.30
59.67	59.61

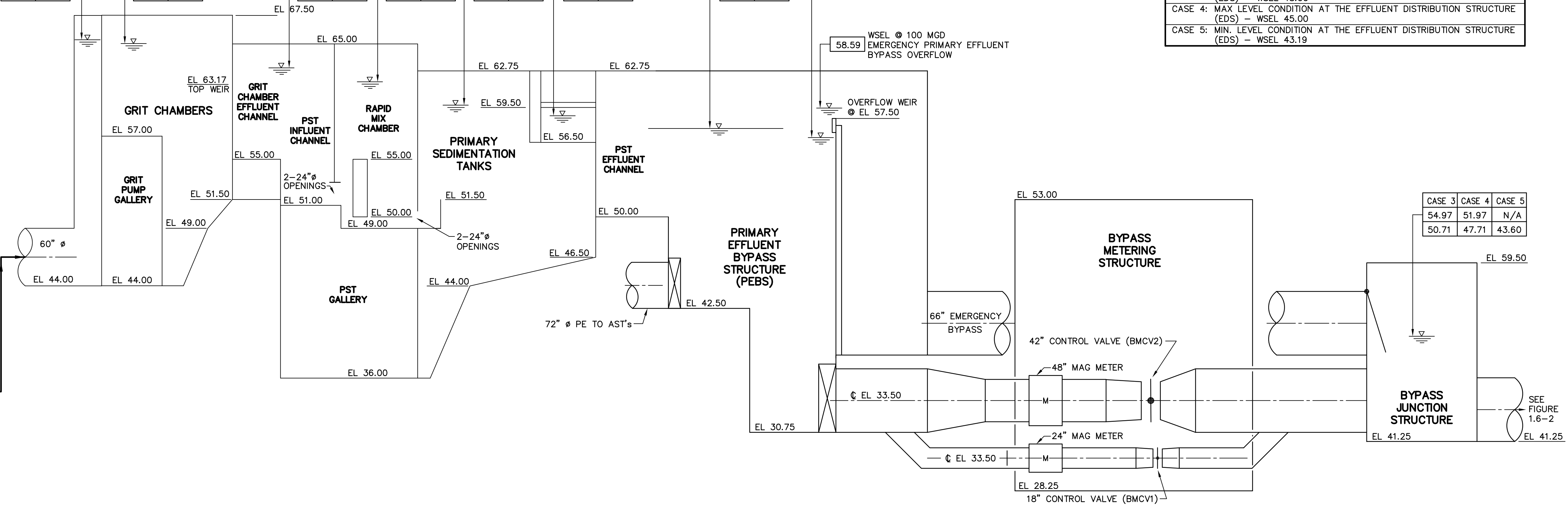
CASE 1	CASE 2
59.69	59.69
59.80	59.77
59.77	59.75
59.68	59.66

CASE 1	CASE 2
58.68	SEE(2)
57.97	SEE(2)
57.74	SEE(2)
57.35	SEE(2)

CASE 1	CASE 2
58.67	N/A
57.55	N/A
57.35	N/A
57.35	N/A

CASE 3	CASE 4	CASE 5
N/A	57.19	57.19
57.19	57.19	57.19

FLOW CONDITIONS	FLOW (MGD)	CASE 3	CASE 4	CASE 5
MAXIMUM PE BYPASS FLOW (W/ 25 MGD TO THE AST'S)	100	XX.XX	XX.XX	XX.XX
MINIMUM BYPASS FLOW (W/ 25 MGD TO THE AST'S)	4	XX.XX	XX.XX	XX.XX
CASE 3: OVERFLOW CONDITION AT THE EFFLUENT DISTRIBUTION STRUCTURE (EDS) - WSEL 48.00				
CASE 4: MAX LEVEL CONDITION AT THE EFFLUENT DISTRIBUTION STRUCTURE (EDS) - WSEL 45.00				
CASE 5: MIN. LEVEL CONDITION AT THE EFFLUENT DISTRIBUTION STRUCTURE (EDS) - WSEL 43.19				



CASE 3	CASE 4	CASE 5
54.97	51.97	N/A
50.71	47.71	43.60

- NOTES:**
- (1). N/A INDICATES "NOT APPLICABLE"
 - (2). CASE 2 DATA IS NOT SHOWN CASE 2 IS LESS CONSERVATIVE THAN CASE 1 AND WSEL'S ARE SLIGHTLY LESS THAN THOSE SHOWN FOR CASE 1.
 - (3). ALL WORK HERE IS EXISTING (OGW) AND IS INCLUDED AS GENERAL INFORMATION ONLY.



REVISIONS			
NO.	BY	DATE	REMARKS

DES	AR
DWN	PAL
CKD	LDT



INTERNATIONAL BOUNDARY & WATER COMMISSION
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
South Bay International Wastewater Treatment Plant

OPERATION AND MAINTENANCE MANUAL

HYDRAULIC PROFILE 1

NOT TO SCALE

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MALCOLM PIRNIE, INC.
DATE MARCH 2011
FIGURE 1.6-1
CAD REF. NO. I30M FIG 1.6-1

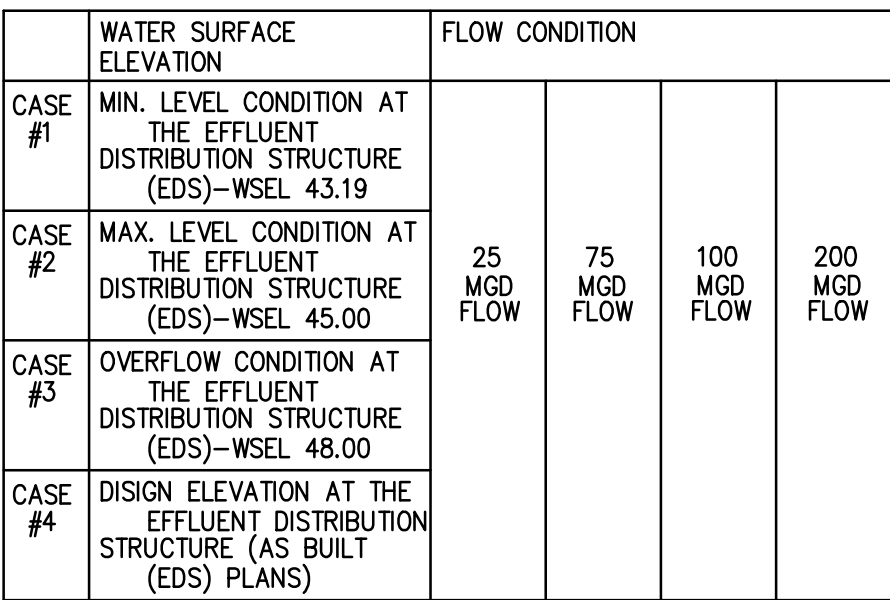
	25 MGD	75 MGD	100 MGD	200 MGD
CASE#1	56.17 ft.	56.60 ft.	56.91 ft.	60.39 ft.
CASE#2	56.17 ft.	56.60 ft.	56.91 ft.	60.39 ft.
CASE#3	56.17 ft.	56.60 ft.	56.91 ft.	60.39 ft.
CASE#4	56.17 ft.	56.60 ft.	56.91 ft.	60.39 ft.

	25 MGD	75 MGD	100 MGD	200 MGD
CASE#1	54.25 ft.	55.05 ft.	55.49 ft.	58.30 ft.
CASE#2	54.25 ft.	55.05 ft.	55.49 ft.	58.30 ft.
CASE#3	54.25 ft.	55.05 ft.	55.55 ft.	58.30 ft.
CASE#4	54.25 ft.	55.05 ft.	55.49 ft.	58.30 ft.

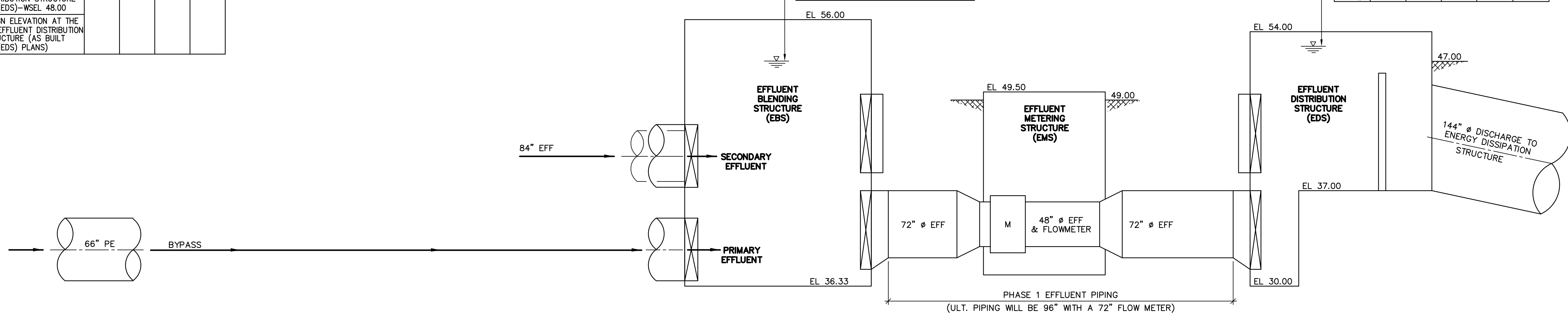
100 MGD	200 MGD
54.20 ft.	54.49 ft.
54.20 ft.	54.49 ft.
54.25 ft.	54.49 ft.
54.20 ft.	54.49 ft.

	25 MGD	75 MGD	100 MGD	200 MGD
CASE#1	43.55 ft.	46.42 ft.	49.11 ft.	65.66 ft.
CASE#2	45.36 ft.	48.23 ft.	50.92 ft.	67.47 ft.
CASE#3	48.36 ft.	51.23 ft.	53.92 ft.	70.47 ft.
CASE#4	42.82 ft.	45.69 ft.	48.38 ft.	64.93 ft.

	25 MGD	75 MGD	100 MGD	200 MGD
CASE#1	43.55 ft.	46.42 ft.	49.11 ft.	65.66 ft.
CASE#2	45.36 ft.	48.23 ft.	50.92 ft.	67.47 ft.
CASE#3	48.36 ft.	51.23 ft.	53.92 ft.	70.47 ft.
CASE#4	42.82 ft.	45.69 ft.	48.38 ft.	64.93 ft.



CASE#1	43.19 ft.	25 MGD FLOW	75 MGD FLOW	100 MGD FLOW	200 MGD FLOW
CASE#2	45.00 ft.				
CASE#3	48.00 ft.				
CASE#4	42.46 ft.				



1. WSEL'S PROVIDED BY GOVERNMENT.
2. FOR PEAK HYDRAULIC FLOWS AT 200 MGD, IT IS ASSUMED THAT THE PRIMARY EFFLUENT FLOWS FROM THE PST'S TO THE AST'S VIA OPEN CHANNEL FLOW.
3. THE OVERFLOW WEIR ELEVATION SHOWN IS BASED ON CC3 CONDITIONS. WEIR ELEVATION WILL BE REVISED AS PLANT FLOWS INCREASE AND AS THE CONFIGURATION OF TREATMENT PROCESSES IS EXPANDED.
4. THE CONTROL GATE AT THE SST EFFLUENT CHANNEL ADJUSTS TO CONTROL THE LEVEL IN THE SST EFFLUENT CHANNELS. IN THE EVENT OF GATE FAILURE, THE OVERFLOW WEIR PROVIDES A FAILSAFE BYPASS OF SECONDARY EFFLUENT TO THE EFFLUENT BLENDING STRUCTURE.
5. MAX FLOW PER CONTACT TANK = 100 MGD: TWO CHLORINE TANKS AT ULTIMATE CONDITIONS.
6. CHLORINE CONTACT TANK FLOOR SLAB SET ASSUMING A 30 MINUTE DETENTION TIME AT A PEAK FLOW PER CONTACT TANK OF 100 MGD.
7. MINOR SUBMERGENCE OF SST WEIRS AT PEAK ULTIMATE CONDITIONS WITH AN OVERFLOW CONDITION AT THE EDS.

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DATE MARCH 2011

FIGURE 1.6-2

CAD REF. NO. I30M FIG 1.6-2

Chapter 2

PROCESS DESCRIPTION

NOTICE AND CAUTIONS TO USERS OF THIS O&M MANUAL

This O&M Manual provides a general overview only of the South Bay International Wastewater Treatment Plant (SBIWTP).

This O&M Manual relies on information obtained from the various equipment manufactures and the Construction Contractors that were involved in construction of the SBIWTP. The information obtained from equipment manufacturers and construction Contractors was reviewed by Malcolm Pirnie only for general compliance with the submittal requirements specified in construction Contract Documents.

All USERS of this O&M Manual shall be required to consult the detailed O&M Manuals provided by the equipment manufactures and Construction Contractors and to understand and follow the directions given therein for safe operation and maintenance of all equipment and systems prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all safety manuals published and provided by their employer(s) and to understand and follow all directions given therein, including but not limited to *Personnel Protective Equipment (PPE)*, *Electrical Lock-Out Procedures*, *Fall Prevention Procedures* and *Confined Space Entry Procedures* prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all “record” drawings and to understand how equipment and systems are intended to be operated and controlled prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to understand and acknowledge that the SBIWTP contains chemicals and equipment that if not operated and/or maintained in a responsible and safe manner can result in serious injury or death.

CHAPTER 2

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2.1 HEADWORKS

2.1.1 Purpose

The Headworks Facility is the first in line of the physical treatment processes in which large suspended particles are removed. The influent screens remove all solid materials larger than the screen openings. The Aerated Grit Chamber further removes solid grit particles from the influent flow before being conveyed to the Primary Sedimentation Facilities.

2.1.2 Process Description

The Headworks Facilities consist of two structures, the Headworks Area Structure and the Aerated Grit Chamber. The Headworks Area Structure includes the Screening Area, the Screenings Discharge Area, the Influent Pump Station, the Headworks Odor Reduction Station, the Grit Dewatering Area, the Storage Bin Area, and the Headworks Local Control Center - East (HW-LCC-EAST). The Aerated Grit Chamber is located remote from the Headworks Area adjacent to the Primary Sedimentation Facilities and includes grit pumps and grit blowers.

The Headworks Facilities are sized such that the first module constructed under Advanced Primary Treatment Plant (CC-2) has a capacity of 50 MGD plus recycle flows. This equates to 1/2 of the ultimate flow. A second mirror imaged headwork's module will be added for ultimate capacity when the plant is expanded.

2.1.2.1 Screenings Area

Influent sewage flows from Mexico flow to the headworks facility via a 96-inch diameter gravity pipeline and a 48-inch gravity pipeline. Both gravity pipelines terminate at the Headworks Junction Structure, located south of the Headworks Area. The 96-inch gravity line conveys flow from Tijuana Pump Station No. 1 to the Headworks Junction Structure. The 48-inch gravity line connects Tank Drainage Junction Structure No. 1 with the Headworks Junction Structure, and serves as the trunk line for the tank drainage system, which also receives flows from Mexico via 16-inch and 30-inch forcemains which enter the tank drainage system at the Canyon Collector Junction Structure. Influent flows are

conveyed via a 96-inch pipe from the Headworks Junction Structure to the Headworks Inlet Structure, which is located adjacent to the Headworks Area. Influent wastewater flows by gravity from the Headworks Inlet Structure to the Screening Area via a 66-inch pipeline.

The Screening Area consists of six screening channels with three (3) self-cleaning, climber-type mechanical bar screens and three (3) manually cleaned bar screens which can be used as a bypass if the mechanical screens are out of operation. One of the manual screens is provided at a future mechanical screen location. During bypass of the mechanical screens, the manual screens allow somewhat larger solids to enter the Influent Pump Station (IPS), thus requiring less maintenance and still providing protection for downstream equipment. Twelve (12) 4 ft by 6 ft 316L stainless steel isolation slide gates are provided for the upstream and downstream isolation of the six screens. Mechanical screen operation is controlled by an interval and a 24-hour cycle duration timer logic in a Programmable Logic Controller (PLC), and a bubbler level sensing system. The screens normally operate on a preset timing sequence or the bubbler level sensing system, which overrides timer control when differential water surface elevations upstream and downstream of the influent screens reach a preset level.

Refrigerated, automatic samplers with remote, explosion-proof sample pumps are provided at the Headworks Junction Structure, the Canyon Collector Junction Structure, and the Screening Area Influent Channel. The automatic samplers are used to take plant influent samples at time or flow paced intervals as determined by the operator.

The Screening and Screenings Discharge Areas are not enclosed. However, structural provisions have been made such that the Screenings Discharge Area may be enclosed in the future.

A photograph of the Mechanical Bar Screens is presented in Figure 2.1-1.

2.1.2.2 Influent Pump Station

After passing through the mechanical screens, influent wastewater flows into the IPS Influent Channel. Influent wastewater enters the IPS wetwell through six (6) 24-inch square submerged openings. Three (3) 24-inch handwheel operated slide gates are provided for the openings which discharge to the western portion of the IPS Wetwell. An IPS wetwell

isolation wall and 6 ft by 9 ft 316L stainless steel stop plate are provided in order to isolate either half of the IPS Wetwell as required for maintenance. In order to isolate the western portion of the IPS Wetwell, the wetwell isolation stop plate is installed via a boom truck or crane. The 24-inch slide gates on the west IPS wetwell openings are closed, thus directing flow in the IPS Influent Channel to the eastern portion of the IPS Wetwell. To isolate the east portion of the IPS Wetwell, the wetwell isolation and IPS Influent Channel Stop Plates are installed thereby directing flow to the west portion of the wetwell only. In order to allow floatable material to pass from the IPS Influent Channel to the IPS Wetwell, each portion (eastern and western) of the IPS Wetwell is provided with one (1) 3 ft by 4 ft opening at an elevation of 25.00 ft. Each opening is provided with a downward-opening slide gate which allows the operator to control the flow of floatable material into the respective IPS Wetwell portion. To dissolve floatables which may collect in the IPS Wetwell, a scum suppression system has been installed. The scum suppression system consists of a separate NPW spray header installed in the east and west portions of the IPS Wetwell. Each header is provided with a quick-connect for sodium hydroxide addition to aid in dissolving and scum, grease or other floatables which may collect. The addition of sodium hydroxide to the NPW spray line would be accomplished via a hand pump used in conjunction with a 55-gallon drum for sodium hydroxide storage.

Five (5) vertical turbine solids handling (VTSH) pumps are provided. Three (3) of the VTSH pumps are operated with variable frequency drives and two (2) are operated with constant speed drives. One (1) variable speed pump serves as a standby unit. Provisions have been made for the installation of one (1) additional constant speed influent pump in the future. The IPS operates by maintaining a constant wetwell water surface elevation as measured by a bubbler level sensing system. A redundant bubbler level sensing system serves as backup to the primary system. IPS Wetwell access is provided via two access hatches in the IPS concrete deck. The influent pumps discharge into a 60-inch cement mortar lined ductile iron (CMLDI) header which carries influent flows to the Aerated Grit Chamber.

A photograph of the IPS is presented in Figure 2.1-2.

2.1.2.3 Aerated Grit Chamber

The 60-inch header from the IPS discharges at the bottom of the grit chamber inlet box. Raw sewage flows up through the inlet box and into the Aerated Grit Chamber. The Aerated Grit Chamber is provided with a bypass channel which allows the grit chamber to be taken out of service during low-flow conditions or for maintenance. The grit chamber bypass channel and grit chamber are isolated by 316L stainless steel stop plates. The 6 ft by 9 ft stop plates are provided with lifting eyes to facilitate installation and removal.

The aerated grit chamber consists of six (6) grit hoppers and corresponding pumps. Two (2) positive displacement blowers, one duty and one standby, are provided to supply air to the aerated grit chamber. The blowers are located at the north end of the grit pump gallery and are housed in fiberglass acoustical covers. Air is conveyed from the blowers to the grit chamber through the grit chamber air supply header and a type 304L stainless steel downcomer with an air diffuser for each grit hopper. Each downcomer is provided with a 3-inch quarter-turn butterfly valve to regulate the airflow into the grit chamber at each diffuser. The stainless steel downcomer is provided with a lifting eye and a victaulic coupling which allows the header to be removed from the grit chamber for maintenance.

Settled grit is removed from the hoppers via recessed impeller centrifugal grit pumps and pumped to the Grit Classifier/Separator units located in the Headworks Building via a 6-inch glass lined ductile iron pipe (GLDI). Six (6) grit pumps (one for each hopper) are provided along with an off-the-shelf replacement grit pump which serves as a standby unit. Parallel grit pumping discharge headers are provided for pumps 1-3 and 4-6 between the aerated grit chamber and the grit dewatering equipment. Both headers are used during normal operation, but can be isolated so that maintenance may be performed should one of the discharge headers become clogged. Both headers are provided with 6-inch magnetic flow meters which are used to totalize flows along with the Influent Pump Station magnetic flow meter. Each grit pump is provided with a hard-piped, 3-inch, non-potable water (NPW) flushing connection on the suction piping. Each pump is also provided with a 3-inch hose connection and valve on suction piping such that the grit pumps may be cleaned out through the pump from the suction piping.

Three (3) grit classifier/seperator units, with one (1) unit serving as a standby, are provided at the Grit Dewatering Area, which is located above the Storage Bin Area, in the Headworks Area Structure. Dewatered grit is discharged to the storage bins located below, while grit decant is conveyed back to the IPS via a 10-inch drain line. A monorail hoist is provided in order to remove the grit classifier/separators for maintenance as necessary.

A photograph of the Aerated Grit Chamber is presented in Figure 2.1-3. A photograph of the Grit Pump Station with blower is presented in Figure 2.1-4. A photograph of the Grit Classifier/Seperator Facilities is presented in Figure 2.1-5.

Two motor-operated bin winching systems are provided in the Bin Storage Area in order to manipulate the storage bins which collect screenings and grit. Each bin winching system consists of a Transport Winch and a Positioning Winch. The Transport Winch is used to pull an empty storage bin into the building and the Positioning Winch is used to move the storage bin within the building in order to help distribute the grit and screenings collected.

2.1.2.4 Odor Reduction Station

Odorous air from the Screening Area, IPS Wetwell, and Storage Bin/Grit Dewatering Areas are continuously ventilated and treated by the Headworks Odor Reduction Station.

The Headworks Odor Reduction Station consists of a single stage counter current packed column and exhaust fans to provide a slight negative pressure within the containment areas. The enclosures are configured to allow a "sweep effect" to maximize the containment and collection of the potential odorous compounds.

The scrubber is a closed vessel in which a scrubber solution (sodium hypochlorite (NaOCl), sodium hydroxide (NaOH), and water) are continuously recirculated to the top of the scrubber where it is distributed over plastic media. The media, or packing, inside the scrubber provides a large amount of surface area to facilitate for the transfer of odorous compounds to be oxidized/absorbed into the scrubber solution. Fresh chemicals (NaOCl and NaOH) and make-up water are added to the scrubber solution which displaces spent scrubber solution (blowdown) into an overflow drain. The overflow drain returns to the Headworks via the tank drainage system.

A photograph of the Headworks Odor Reduction Station is presented in Figure 2.1-6.

2.1.3 Design and Performance Criteria

2.1.3.1 Influent Screens

The following criteria were utilized for design of the mechanically cleaned influent screens:

Annual Average Flow	25 MGD	(95,000 m ³ /day)
Peak Flow	100 MGD	(378,500 m ³ /day)
Channel Velocity		
@ Q Avg and Recycle	1.3 ft /sec	(0.4 m/sec)
@ Q Peak and Recycle	4.0 ft /sec	(1.2 m/sec)
Number of Screens		
Manual Screens	3	
Mechanical Screens	3	
Screen Openings		
Manual Screens	1-1/2 inch	(38 mm)
Mechanical Screens	5/8 inch	(16 mm)

2.1.3.2 Influent Pumps

The following criteria are utilized for design of the influent pumps which are Vertical Turbine Solids Handling (VTSH) Pumps, or equal:

Annual Average Flow	25 MGD	(95,000 m ³ /day)
Peak Flow	100 MGD	(378,500 m ³ /day)
Number of Pumps		
Constant Speed	2	
Variable Speed	3	

2.1.3.3 Grit Chamber

The following criteria were used for design of the grit chamber facilities which are of the aerated grit chamber design:

Annual Average Flow	25 MGD	(95,000 m ³ /day)
Peak Flow	100 MGD	(378,500 m ³ /day)
Detention Time		
@ Q Avg and Recycle	8 to 9 minutes	
@ Q Peak and Recycle	3.0 minutes	
Flow Thru Velocity		
@ Q Avg and Recycle	0.13 ft/sec	(0.04 m/sec)
@ Q Peak and Recycle	0.4 ft/sec	(0.12 m/sec)
Number of Chambers	1	
Dimensions		
Depth	14 ft	(4.3 m)
Length	72 ft	(22.1 m)
Width	28 ft	(8.6 m)
Air Supply	4.0 to 7.4 cfm/lf	(0.37 to 0.69 cm/lm)
Grit Production		
Average	4 ft ³ /MG	(0.03m ³ /1000 m ³)
Peak	40 ft ³ /MG	(0.30m ³ /1000 m ³)

2.1.3.4 Odor Reduction Station

The following criteria were utilized for the design of the Odor Reduction Station:

Air Change Covered Tanks (per hour)	6
Air Change Building (per hour)	12
Design Loading to Scrubber (ppm)	25



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OPERATION AND MAINTENANCE MANUAL
HEADWORKS AREA
MECHANICAL BAR SCREENS

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FIGURE 2.1-1
CAD REF. NO. I20M FIG 2.1-1



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OPERATION AND MAINTENANCE MANUAL
HEADWORKS AREA
INFLUENT PUMP STATION

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FIGURE 2.1-2
CAD REF. NO. I2OM FIG 2.1-2



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OPERATION AND MAINTENANCE MANUAL
HEADWORKS AREA
AERATED GRIT CHAMBER

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FIGURE 2.1-3
CAD REF. NO. I20M FIG 2.1-3



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GRIT PUMP STATION
WITH BLOWER



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OPERATION AND MAINTENANCE MANUAL
HEADWORKS AREA
GRIT CLASSIFIER/SEPARATOR

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FIGURE 2.1-5
CAD REF. NO. I2OM FIG 2.1-5



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OPERATION AND MAINTENANCE MANUAL
HEADWORKS AREA
ODOR REDUCTION STATION

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FIGURE 2.1-6
CAD REF. NO. I2OM FIG 2.1-6

2.2 PRIMARY SEDIMENTATION FACILITIES

2.2.1 Purpose

The purpose of the Primary Sedimentation Facility is to remove settleable solids as well as free oil and grease and other floating material from wastewater. The primary sedimentation facilities incorporate a chemical conditioning of wastewaters to enhance gravity settling of suspended solids in wastewater. The accumulated primary sludge and skimmings are collected and pumped to the Unstabilized Sludge Storage Facilities. Odors are controlled by a dedicated Odor Reduction Station.

2.2.2 Process Description

The Primary Sedimentation Facilities consist of five rectangular primary sedimentation tanks (PST); five rapid mix chambers (RMC); a PST Gallery that houses the primary sludge pumps, polymer and ferric chloride addition pumps, the RMC mixing pumps; a channel aeration blower station; a primary skimmings (PSK) pump station; ferric chloride and polymer bulk storage facilities; a single stage counter current packed column odor reduction station; and the PST Local Control Center East (PST-LCC-EAST).

The PST facilities are sized such that the first module constructed under the Advanced Primary Treatment Plant (CC-2) provides for treatment of 25 MGD annual average flow with peak flows of 75 MGD, and accommodates a flow through hydraulic capacity of 100 MGD.

The PST facilities could operate in routine, chemically assisted gravity sedimentation mode, or in the fill and draw mode as described in Section 1.3, 1.5.2, and 1.5.10. The fill and draw mode of operation provides an opportunity to store and/or equalize up to 2 million gallons of sewage in the PSTs as described in Section 1.3.

2.2.2.1 Primary Sedimentation Tanks

Effluent from the grit chamber located immediately east of the PSTs flows by gravity to the PST influent channel, through the selected in-service rapid mixing chamber and primary sedimentation tanks. Two isolation stop plates are provided in the inlets to each RMC, isolating the entire basin. On the influent end, each tank is equipped with two (2)

inlets and a finger baffle/diffuser assembly. On the effluent end, each tank is equipped with effluent launders and weirs and FAD valves.

A photograph of the Primary Sedimentation Tanks is presented in Figure 2.2-1.

2.2.2.2 Channel Aeration System

To prevent settling of solids in the primary influent and effluent channels, channel aeration is provided by a channel aeration blower system located in the lower level of PST-LCC-EAST. The channel aeration system is composed of two (2) air blowers and two (2) supply fans located in the Blower Room (lower level of the PST-LCC-EAST). Air is added to the primary influent and effluent channels on a continuous basis. The air is introduced via a series of diffusers located in the channels.

A photograph of the Blower Room is presented in Figure 2.2-2.

2.2.2.3 Rapid Mix Facilities

Each rapid mixing chamber (RMC) is equipped with one (1) vertical mounted chopper pump mixer located in the PST Gallery. Ferric chloride is introduced by pumping into the discharge line of each pump mixer. Polymer is pumped into a diffuser located in each RMC.

A photograph of the PST Gallery is presented in Figure 2.2-3.

2.2.2.4 Sludge Collection and Pumping

Plastic flight and chain sludge collectors in each tank move the settled sludge to dual sludge hoppers on the inlet side of each tank. Settled sludge is removed and pumped to the Unstabilized Sludge Storage Tanks (USST) via constant speed driven, timer controlled, heavy duty plunger type sludge pumps located in the PST Gallery (See Figure 2.2-3). Two (2) sedimentation tanks are provided with a single dedicated sludge pump.

2.2.2.5 Primary Skimmings Processing Facilities

Primary skimmings (PSK) are removed via the surface sludge scrapers and 18-inch diameter rotary skimmers at the effluent end of the tanks. Each rotary skimmer is operated automatically by a non-modulating multi-turn motor actuator. Skimmings flow by gravity to the Skimmings Wet Well, where they are concentrated and subsequently pumped through a grinder and to the Unstabilized Sludge Storage Tanks (USST). The PSK pumps and the grinder are located in the Skimmings Dry Well.

A photograph of the Rotary Skimmer is presented in Figure 2.2-4. A photograph of the Skimmings Dry Well is presented in Figure 2.2-5.

2.2.2.6 PST Chemical Addition Facilities

The PST chemical (ferric chloride and polymer) addition systems are each composed of two (2) bulk storage tanks with two (2) transfer pumps which pump the concentrated chemical to the dedicated mixing tanks. Nonpotable make-up water and concentrated chemical are added to the mixing facilities automatically on a demand basis. When chemical addition is required, mixing tank level sensors control the activation and deactivation of the chemical solution make-up capabilities. Each of the chemicals is mixed for a minimum of 30 minutes before being pumped by the chemical addition pumps to the RMC. The ferric chloride is injected into the rapid mix pump discharge line. The polymer is introduced via a diffuser in the rapid mix chamber.

Separate ferric chloride addition pumps are provided for injection of ferric chloride solution to the primary sludge discharge line prior to the USSTs.

A photograph of the PST Chemical Addition Facilities is presented in Figure 2.2-6.

2.2.2.7 Odor Reduction Station

Odorous air from the grit chamber, Primary Sedimentation Tank (PST) influent channel, PST launder, PST effluent channel, and PSK Pump Station are continuously ventilated and treated by the PST Odor Reduction Station.

The PST Odor Reduction Station consists of a single stage counter current packed column and exhaust fans to provide a slight negative pressure within the containment areas. The enclosures are configured to allow a "sweep effect" to maximize the containment and collection of the potential odorous compounds.

A photograph of the Primary Sedimentation Facilities Odor Reduction Station is presented in Figure 2.2-7.

The scrubber is a closed vessel in which a scrubber solution (sodium hypochlorite (NaOCl), sodium hydroxide (NaOH), and water) is continuously re-circulated to the top of the scrubber where it is distributed over plastic media. The media, or packing, inside the scrubber provides a large amount of surface area to facilitate for the transfer of odorous compounds to be oxidized/absorbed into the scrubber solution. Fresh chemicals (NaOCl and NaOH) and make-up water are added to the scrubber solution which displaces spent scrubber solution (blowdown) into an overflow drain. This blowdown overflow drain returns to the Headworks via the tank drainage system.

2.2.3 Design and Performance Criteria

The following criteria were utilized for design of the primary sedimentation facilities:

Annual Average Flow	25 MGD	(95,000 m ³ /day)
Peak Flow	75 MGD	(284,000 m ³ /day)
Hydraulic Capacity	100 MGD	(378,500 m ³ /day)

Maximum Overflow Rate (With All Units in Service)

@ Q Avg and Recycle	1000 gpd/ft ²	(42 m ³ /m ² · d)
@ Q Peak and Recycle	3000 gpd/ft ²	(122 m ³ /m ² · d)

Maximum Weir Rate (With All Units in Service)

@ Q Avg and Recycle	14,000 gpd/LF	(177 m ³ /m · d)
@ Q Peak and Recycle	40,000 gpd/LF ²	(506 m ³ /m · d)

Number of Tanks	5	
Dimensions		
Average Side Water Depth	13.5 ft	(4.1 m)
Length	240 ft	(73.15 m)
Width	21.25 ft	(6.48 m)
Rapid Mix Detention Time		
@ Q Average (25 MGD)	1 minute	
@ Q Peak (75 MGD)	20 seconds	
Rapid Mix Velocity Gradient	300 to 400 sec ⁻¹	
Ferric Chloride Dose	25 to 40 mg/L	
Anionic Polymer Dose	0.2 to 1.2 mg/L	
Removal Efficiencies		
Total Suspended Solids	75%	
Total BOD ₅	45%	
H ₂ S Scrubber Design Loading (ppm)	34	

It should be noted that the overflow rates defined above denote the maximum surface loadings under annual average and peak flow conditions.



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PRIMARY SEDIMENTATION
TANKS

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FIGURE 2.2-1
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FIGURE 2.2-2
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FIGURE 2.2-3
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ROTARY SKIMMER

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FIGURE 2.2-4
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FIGURE 2.2-5
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FACILITIES

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FIGURE 2.2-6
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FIGURE 2.2-7
CAD REF. NO. I20M FIG 2.2-7

2.3 ACTIVATED SLUDGE FACILITIES

2.3.1 Purpose

The purpose of the activated sludge system is to reduce the dissolved and suspended organic content of the primary treatment flow in a once through “selector” modified activated sludge treatment process to remove organics and solids to the levels required to meet effluent discharge requirements. The system in place at the plant utilizes a “selector” modified process designed to provide a competitive advantage to beneficial microorganisms active in absorbing and removing Biochemical Oxygen Demand (BOD) while discouraging the growth of undesirable filamentous microorganisms.

2.3.2 Process Description

The major components of the activated sludge system includes seven (7) Activated Sludge Tanks (ASTs), which contain baffled pre- anoxic, anaerobic, anoxic and aerobic “selector” zones; mixers in the pre-anoxic, anaerobic and anoxic zones; air diffusers in the aerobic zones; Intermediate Mixed Liquor Return Pumps (IMLR); Process Air Blowers; Channel Air Blowers, and Tank Drainage Facilities.

2.3.2.1 Activated Sludge Tanks

After passing through the primary sedimentation process, the primary effluent (PE) is conveyed to the Primary Effluent Bypass Structure (PEBS). This PEBS is designed to convey an average PE flow of 25 MGD with an associated diurnal peak flow of 48.75 MGD to the activated sludge system. From the PEBS, a 72" pipe conveys flow to the AST Influent Channel Junction Box from where it discharges into the AST Influent Channel on the AST structure's east side. Air diffusers located in this influent channel keep solids suspended in the PE for conveyance to the individual ASTs. From this influent channel, PE is conveyed via two (2) parallel 24" pipes into an 18" diffusion header which distributes the process flow across the full width of each AST into the first anaerobic zone (Zone “B”).

Each AST is subdivided into seven (7) treatment zones (“A”, “B”, “C”, “D”, “E”, “F” and “Aerobic”). Each of these seven zones is separated by a red wood overflow baffle.

- Zone “A” is the pre-anoxic zone and receives only RAS flows. This zone is mixed but is not aerated.

- Zone “B” is the anaerobic zone and receives overflow from Zone “A” and PE. This zone is mixed but is not aerated. Zone “B” can also receive “Intermediate Mixed Liquor Return” (IMLR) from the effluent end of the last “aerated” zone within the AST.
- Zone “C” is an anaerobic zone and receives overflow from Zone “B”. This zone is mixed but is not aerated.
- Zone “D” is an anoxic zone and receives overflow from Zone “C”. This zone is mixed but is not aerated. Zone “D” can also receive “Intermediate Mixed Liquor Return” (IMLR) from the effluent end of the last “aerated” zone within the AST.
- Zone “E” is an anoxic zone and receives overflow from Zone “D”. This zone is mixed but is not aerated.
- Zone “F” is an anoxic zone and receives overflow from Zone “E”. This zone is mixed but is not aerated.
- The “Aerobic” Zone is sub-divided into three (3) aeration zones but does not include any baffles. Each aeration sub-zone includes an independent air drop leg with flow control valves and air flow meters and fine bubble diffusers. The air to each drop leg is supplied by Process Air Blowers located in the Blower Building.

At the western end of the ASTs, after the last aerobic zone, the mixed liquor is discharged over a weir and comingled in the common AST effluent channel, from which it flows by gravity to the Secondary Sedimentation Tanks (SST) influent channel. Channel aeration is provided in the AST effluent channel and the SST influent channel via coarse air bubble diffusers in the channels that are supplied with air by channel aeration blowers located in the Blower Building on the north side of the ASTs. A photograph of the ASTs is shown in Figure 2.3-1

2.3.2.2 AST Selector Zones

Each AST operates as a single-pass treatment system, and is divided into seven (7) different treatment zones as identified above to promote the development of specific desirable microorganisms. Baffles are used in the pre-anoxic, anaerobic and anoxic zones to separate the zone and individual "cells" to achieve the desired detention time and minimize short circuiting within the tank. Each the pre-anoxic, anaerobic and anoxic zones (A, B, C, D, E and F) are equipped with mechanical mixers to ensure a mixed environment within the process stream and to maintain microorganisms in suspension. A pump, known as an intermediate mixed liquor return (IMLR) pump, is located at the end of the aerobic zone. This pump returns a portion of the mixed liquor (microorganism

population) to the front of the AST to ensure continual growth of the beneficial microorganisms.

The pre-anoxic zone (Zone A) is comprised of the first 16-feet of the ASTs. No PE is introduced into this zone, since it receives only Return Activated Sludge (RAS) from the Secondary Sedimentation Facilities. The RAS is conveyed to the east side of the ASTs via a 42" pipe, and distributed across the width of each tank via a 10" diffusion header at the front of each AST. A mechanical mixer centered at the downstream end of this zone keeps the microorganisms in suspension. The function of this zone is to remove free oxygen and nitrate from the RAS and to establish the anaerobic environment in the subsequent zone. A photograph of the Pre-Anoxic Zone is shown in Figure 2.3-2.

The anaerobic zone is comprised of the next 43-feet of each AST, and is contains two (2) treatment cells (Zone B and C) separated by baffles, each with a mechanical mixer centered at the downstream end. The beginning of Zone B contains a diffusion header that introduces the PE uniformly across the width of the tank and into the treatment stream. Also, intermediate mixed liquor pumped from the downstream end of the aerobic zone may be returned at the head of this zone by the IMLR pump. The absence of oxygen or nitrate-nitrogen in this environment forces the selected microorganisms to absorb BOD directly, and hydrolyzes particulate BOD into dissolved BOD for easier uptake by the microorganisms. A photograph of the Anaerobic Zones is shown in Figure 2.3-3.

The anoxic zone is comprised of the next 57-feet of each AST, and contains three (3) treatment cells (Zones D, E and F) separated by baffles. The downstream end of each cell is provided with a mechanical mixer to help maintain the mixed liquor in suspension. Intermediate mixed liquor pumped from the downstream end of the aerobic zone may be returned at the head of Zone D by the IMLR pump. This returns nitrate-nitrogen into the process flow, which the microorganisms reduce to nitrogen gas as a result of oxidizing the BOD. A photograph of the Anoxic Zones is shown in Figure 2.3-4.

The aerobic zone is comprised of the final 230-feet of each AST, and contains three (3) differing air diffuser grids to aerate the treatment flow and provide mixing energy to keep microorganisms in suspension. Aeration of the mixed liquor in this aerobic zone enables microorganisms to oxidize organic nitrogen to nitrate, a portion of which is returned to the anaerobic and/or anoxic zone(s) by the IMLR pump. This zone does not contain any baffles. A photograph of the Aerobic Zone is shown in Figure 2.3-5.

2.3.2.3 Air Diffusers

The three (3) air diffuser grids (Grids 1, 2 and 3) in the aerobic zone of each AST are supplied with air from the Process Air Blowers located in the Blower Building immediately north of the ASTs. Process Air (PA) is conveyed from the blowers to the AST diffuser grids via a 48" header pipe mounted above the tanks and running perpendicular to the process stream between Air Diffuser Grids 1 and 2. Between odd and even numbered tanks, 16" pipe branches tee off of this main header toward the east and west to provide PA to the drop legs serving each of the three (3) diffuser grids in the adjacent tanks. The eastern 16" branch conveys PA to the 10" drop legs that supply air to the Grid 1 diffusers, while the western 16" branch conveys PA to the 8" drop legs and the 6" drop legs that supply air for the Grid 2 and Grid 3 diffusers, respectively. Each of the 10", 8" and 6" drop legs contains a wafer style butterfly valve to allow independent manual control of the PA supplied to each diffuser grid. All three (3) diffuser grids are fitted with identical 9" fine bubble disc diffusers with flexible EPDM membranes, and PVC base plates, membrane support, and distributor piping. A photograph of the Diffuser Grids is shown in Figure 2.3-6.

Grid 1 is the most densely populated of the diffuser grids, containing eighteen (18) air distributor pipes, bundled into a 4-5-5-4 piping configuration. Each distributor pipe contains 80 diffuser connections for a possible total of 1440 diffusers. To meet the design air flow requirement; however, 112 of the diffusers are plugged so that only 1328 are active. Grid 2 contains fourteen (14) air distributor pipes, bundled into a 3-4-4-3 piping configuration. Each distributor pipe contains 50 diffuser connections for a possible total of 700 diffusers. To meet the design air flow requirement; however, 112 of the diffusers are plugged so that only 588 are active. Grid 3 contains eleven (11) equally spaced air distributor pipes. Each distributor pipe contains 32 diffuser connections for a possible total of 352 diffusers. To meet the design air flow requirement; however, 64 of the diffusers are plugged so that only 288 are active.

Grids 1, 2 and 3 in ASTs 1, 3, 5 and 7 are equipped with dissolved oxygen (DO) probes. ASTs 2, 4 and 6 do not have DO probes.

2.3.2.4 Process Air Blowers

The PA is generated by three (3) skid-mounted 16" centrifugal air compressors located in the Blower Building to the immediate north of the ASTs. Ambient air is drawn into each compressor through a louvered inlet that directs incoming air through a filter that is installed in the intake piping. The filtration is provided to screen particulate matter out of the incoming air to avoid damaging the compressor impeller. The inlet and discharge sides of each compressor have electrically actuated variable vanes that allow for optimization of power consumption while maintaining the required air flow capacity. Each compressor also contains a complete lubrication system that is integral to its base with a reservoir for oil, two (2) circulation pumps, and a heat exchanger that uses potable water to cool the circulated oil. A photograph of the Process Air Compressors is shown in Figure 2.3-7.

The three (3) compressors discharge PA into a common 48" header pipe that conveys the air to the aerobic diffuser grids located in each AST. This header is designed for an ultimate flow of 37,500cfm and a velocity of 3000 fpm. Each compressor has a maximum output capacity of 12,500 SCFM; is driven by a 460 volt, 60 hertz, 3 phase 700 hp motor; and is provided with an integrally mounted control panel factory wired to the compressor components. A master blower control panel functions to coordinate the overall operation of the blowers, operating them in a lead/lag/standby configuration as needed to achieve the required process flow.

2.3.2.5 Intermediate Mixed Liquor Return

Submersible propeller pumps, mixed liquor return pumps referred to as IMLR (intermediate mixed liquor return) pumps, are located at the very western end in the last aerobic zone of each AST. Each of these pumps consists of a horizontally mounted propeller that is driven by a submersible 40 hp motor. These pumps are mounted directly to a 30" discharge pipe and a guide rail assembly to ease removal of the pump from the tank. These pumps return approximately 9,300 gpm of nitrified mixed liquor to the head of each AST via dedicated piping, and can discharge at the head of the anaerobic (Zone B) and/or anoxic (Zone D) zones, as selected by plant operations. Manual butterfly valves are operated to select the specific discharge location in the AST, or can be throttled to allow flow to be split between both discharge locations. Accommodation is made for the

connection of a portable electromagnetic flow meter in the IMLR piping to allow field measurement of the IMLR flow. A photograph of the IMLR Pump is shown in Figure 2.3-8.

2.3.2.6 Tank Drainage Facilities

The AST Tank Drainage Facilities are located on the east side of the ASTs within the influent gallery, and are comprised of a centrifugal pump and the associated tank drain piping. Each AST is sloped toward a drainage trough running the length of the tank; which, in turn is sloped toward the low point at the very eastern end of each tank. Mixed liquor that settles out of the process flow accumulates in these drainage troughs and is conveyed via gravity to this low point. An 8" suction pipe, penetrating the eastern tank wall, is centered over this low point and is connected to a common 12" Tank Drain (TD) pipe running the length of the influent gallery. Each 8" suction pipe contains a manual plug valve prior to its connection with the 12" pipe header to allow isolation of individual tank drains. Plant hydraulics allow a portion of the tank drainage to discharge by gravity; however, pumping is required for the remainder. For this a 25 hp self priming centrifugal pump is manifolded into the piping at the northern end of the influent gallery for the pumping of discharge when required. The coordination of isolation valves in the pump and piping connections, allow tank drainage to be conveyed to two (2) different discharge points. A 12" TD pipe directs discharge into the Tank Drain Junction Structure at the northeast corner of the ASF, from where it recycles back to the plant headworks via a 42" TD pipe. Alternatively, a 10" TD pipe buried along the northern edge of the ASTs, discharges into the effluent channel on the western side of the ASTs. This allows operators to conserve the biologic solids from the mixed liquor by discharging the tank drainage to the Secondary Sedimentation Facilities for further processing. A photograph of the Tank Drainage Pump is shown in Figure 2.3-9.

2.3.2.7 Channel Aeration Facilities

The Channel Air (CA) is generated by three (3) skid-mounted 8" positive displacement rotary air blowers located in the Blower Building to the immediate north of the ASTs. Ambient air is drawn in through an inlet filter/silencer located atop each unit by the rotating action of two (2) three-lobe rotor shafts. The rotor shafts are belt driven by

a 100 hp motor mounted adjacent to the blower housing on the same equipment skid. Each inlet filter/silencer contains a pleated paper filter element to remove particulate matter from the incoming air that could damage the rotor lobes, and the silencer to mitigate blower noise within the Blower Building. A second silencer located on the discharge side of each unit also serves to mitigate blower noise within the building. Splash oil lubrication is provided for the timing gears and bearings by oil slingers mounted on the gear end of the blower, and automatic belt tensioning increases operational consistency of the blowers while decreasing the required maintenance.

The channel aeration blowers are sized for a discharge capacity range of 1,100 to 2,000 SCFM, but will operate at the design capacity of 1,650 SCFM. Each blower is provided with its own Remote-Off-Test switch for local operation and lockout; however instrument readings and alarm signals are coordinated by PLC logic and logged and displayed in the SCADA System. The three channel aeration blowers will operate in a two (2) duty / one (1) standby process configuration and discharge CA into a piping manifold. One blower is dedicated to the ASF, splitting to supply both influent and effluent channels; one blower is dedicated to the SST influent channel; and the standby blower backs up both duty blowers in the event one is taken out of service. A photograph of the Channel Aeration Blowers is shown in Figure 2.3-10.

2.3.3 Design and Performance Criteria

2.3.3.1 Activated Sludge Tanks

Length:	350 feet
Width:	24 feet
Channel Slab Elevation:	38.3 feet (High Point) 38.0 feet (Low Point)
Discharge Weir Elevation:	55.8 feet
Annual Average Flow (PE):	25 MGD (38.7 cfs)
Peaking Factor:	1.95
Peak Flow:	48.75 MGD (75.4 cfs)

Annual Average Flow (RAS):	16.5 MGD (25.5 cfs)
Annual Average Flow (Total):	41.4 MGD (64.2 cfs)
Approximate Side Water Depth:	18 feet

2.3.3.2 Selector Zone Mixing System

Pre-Anoxic Zone

Length:	16 feet
Cells:	1 (Cell A)
Cell Volume:	6,900 ft ³ /51,700 gal
Q _{RAS} :	3.64 cfs
Detention Time:	31.6 minutes

Anaerobic Zones

Length:	43 feet
Cells:	2 (Cells B and C)
Cell Volume:	9,300 ft ³ /69,500 gal (per cell)
Q _{RAS+PE+IMLR} :	29.9 cfs
Detention Time:	5.2 minutes (per cell)

Anoxic Zone:

Length:	57 feet
Cells:	3 (Cells D, E and F)
Cell Volume:	8,200 ft ³ /61,400 gal (per cell)
Q _{RAS+PE+IMLR} :	29.9 cfs
Detention Time (theor.):	4.6 minutes (per cell)

Aerobic Zone:

Overall Length:	232.5 feet
Q _{RAS+PE+IMLR} :	29.9 cfs
Zone 1 Length:	86.5 feet
Volume:	37,370 ft ³ /280,000 gal
DT (theor.):	20.8 minutes
Zone 2 Length:	78 feet
Volume:	33,700 ft ³ /252,000 gal
DT (theor.):	18.8 minutes

Zone 3	Length:	68 feet
	Volume:	29,375 ft ³ /220,000 gal
	DT (theor.):	16.4 minutes

2.3.3.3 Air Diffusers

Disc diffuser	Type:	Fine Bubble, EPDM membrane
	Size:	9 inch nominal diameter
	Airflow:	1.9 SCFM (max.)

Diffuser Grid 1:

Location:	Aerobic Zone 1
Dropleg Pipe Diameter:	10 inches
Manifold Pipe Diameter:	10 inches
Air Flow:	Ave.: 1,827 scfm
	Max.: 2,508 scfm
	Min.: 795 scfm
Diffuser Number:	1328 active/112 plugged

Diffuser Grid 2:

Location:	Aerobic Zone 2
Dropleg Pipe Diameter:	8 inches
Manifold Pipe Diameter:	8 inches
Air Flow:	Ave.: 803 scfm
	Max.: 1,102 scfm
	Min.: 349 scfm
Diffuser Number:	588 active/112 plugged

Diffuser Grid 3:

Location:	Aerobic Zone 3
Dropleg Pipe Diameter:	6 inches
Manifold Pipe Diameter:	6 inches

Air Flow:	Ave.:	398 scfm
	Max.:	547 scfm
	Min.:	173 scfm
Diffuser Number:		288 active/64 plugged

2.3.3.4 Process Air Blowers

Process Air Compressor:

Number:		3
Connection:	Inlet:	20 inches
	Outlet:	16 inches
Impeller:	Size:	16 inches
	Speed:	1788 RPM
Output:	Ave.:	9,100 scfm
	Max.:	12,500 scfm
	Min.:	7,460 scfm

Process Air Compressor Drive Motor:

Number:	3 (1 per PA Compressor)	
Power:	700 hp	
Rating:	460V / 3P / 60 Hz	
Insulation Class:	F	
Enclosure:	TEFC	
Service Factor:	1.15	
Motor Efficiency:	Full Load:	95.4%
	0.75 Load:	95.4%
	0.50 Load:	94.8%
	0.25 Load:	92.0%

Process Air Compressor Oil Lubrication System:

Pump Number:	6 (2 per PA Compressor: 1 main/1 aux)
Main Pumps:	Gear Driven from Compressor Motor Drive Shaft, 18 gpm @ 1,800 RPM
Auxiliary Pumps:	3 to 5 hp; 460V / 3P / 60 Hz; TEFC; 3,600 RPM

2.3.3.5 Intermediate Mixed Liquor Return

IMLR Pump:

Type:	3-Blade, Submersible Propeller
Number:	8 (1 per AST / 1 spare)
Power:	40 hp
Rating:	460V / 3P / 60 Hz
Speed:	440 RPM
Duty Cycle:	Continuous
Flow:	9,300 gpm
Outlet Size:	30 inches

2.3.3.6 Tank Drainage Facilities

Tank Drainage Pump:

Type:	Horizontal, Self-Priming, Centrifugal
Number:	1
Service:	Mixed Liquor (Solids Conc. 0.5% max.)
Inlet/Outlet Size:	8 inches
Solids Passed:	3 inch diameter
Drive Assembly:	V Belt
Speed:	1,200 RPM
Flow:	1,500 gpm @ 40 feet TDH

Tank Drainage Pump Motor:

Power:	25 hp
Rating:	460V / 3P / 60 Hz
Speed:	1,750 RPM
Insulation Class:	F
Enclosure:	TEFC
Service Factor:	1.15

2.3.3.7 Channel Aeration Facilities

Channel Aeration Blowers:

Type: Rotary lobe, positive displacement
Number: 3 (2 duty / 1 standby)
Inlet/Outlet Size: 8 inches
Design Speed: 1950 RPM
Range: 1,378 RPM (min) – 2,312 RPM (max)
Design Flow: 1,650 scfm
Range: 1,100 scfm (min) – 2,000 scfm (max)
Design Pressure: 6.61 psig
Range: 5.52 psig (min) – 7.41 psig (max)

Channel Aeration Blower Motor:

Type: Squirrel Cage
Number: 3 (1 per CA Blower)
Power: 100 hp
Rating: 460V / 3P / 60 Hz
Speed: 1,785 RPM
Insulation Class: F
Enclosure: TEFC
Service Factor: 1.15
Motor Efficiency: Full Load: 94.5%
0.75 Load: 94.8%
0.50 Load: 92.9%

XREFS: \\TLBUK.dwg IMAGES: \\pro\\1991037\\O&M schematics\\images\\Fig2.3-1.jpg User: LARSON Spec: PIRNIE STANDARD File: \\pro\\1991037\\O&M schematics\\I3OM FIG 2.3-1.DWG Scale: 1:1 Date: 03/18/2011 Time: 17:38 Layout: Blank



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ACTIVATED SLUDGE TANKS

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FIGURE 2.3-1
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PRE-ANOXIC ZONE

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FIGURE 2.3-2
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FIGURE 2.3-3
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FIGURE 2.3-4
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OPERATION AND MAINTENANCE MANUAL
ACTIVATED SLUDGE AREA
DIFFUSER GRIDS

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FIGURE 2.3-6
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OPERATION AND MAINTENANCE MANUAL
ACTIVATED SLUDGE AREA
PROCESS AIR COMPRESSORS

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FIGURE 2.3-7
CAD REF. NO. I30M FIG 2.3-7



XREFS: \\TLBUK.dwg IMAGES: \\pro\\1991037\\Q&M schematics\\images\\fig2.3-8.jpg User: Dong Spec: PIRNIE STANDARD File: \\pro\\1991037\\Q&M schematics\\I3OM FIG 2.3-8.DWG Scale: 1:1 Date: 03/03/2011 Time: 14:41 Layout: Blank

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OPERATION AND MAINTENANCE MANUAL
ACTIVATED SLUDGE AREA
INTERMEDIATE MIXED LIQUOR
RETURN (IMLR) PUMP

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FIGURE 2.3-8
CAD REF. NO. I3OM FIG 2.3-8



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OPERATION AND MAINTENANCE MANUAL
ACTIVATED SLUDGE AREA
TANK DRAINAGE PUMP

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FIGURE 2.3-9
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OPERATION AND MAINTENANCE MANUAL
ACTIVATED SLUDGE AREA
CHANNEL AERATION BLOWERS

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FIGURE 2.3-10
CAD REF. NO. I30M FIG 2.3-10

2.4 SECONDARY SEDIMENTATION FACILITIES

2.4.1 Purpose

The purpose of the Secondary Sedimentation Facilities is to settle and separate the activated sludge mixed liquor suspended solids (MLSS) from the flow stream, and to concentrate and return the MLSS to the ASTs to maintain the desired bio-mass population in the activated sludge system.

2.4.2 Process Description

The SSF consists of 10 rectangular secondary sedimentation tanks (SSTs) and associated sludge collectors, the return activated sludge (RAS) system, the waste activated sludge (WAS) system, a secondary skimmings pump station, RAS chlorination facilities, and tank drainage facilities. A process description of each of these components of the SSF is provided in the following subsections. The SSF also includes a local control center (SST-LCC-1); the functions of this local control center (LCC) are described in Section 4.4 in the context of the SSF operational procedures.

2.4.2.1 Sedimentation Tanks

Mixed liquor from the activated sludge system flows by gravity to the SSTs, through the SST Influent Channel on the south end of the tanks. Coarse bubble diffusers in the influent channel maintain the solids in suspension to prevent settling prior to entering the SSTs. The mixed liquor enters each SST through two parallel influent channel wall penetrations, which utilize diffuser assemblies (24-inch tees) to disperse the mixed liquor as the flow enters each SST. Each of the inlet diffuser “tees” is equipped with a knife gate valve. Settled, secondary sludge collects in two sludge hoppers at the effluent (north) end of each SST, and the secondary skimmings (SSK) are collected in the rotary skimmer at the influent (south) end of each SST. Clarified secondary effluent flows by gravity through three launders in each SST to the SST Effluent Channel and subsequently to the Effluent Blending Structure. A photograph of the SSTs is shown in Figure 2.4-1.

2.4.2.2 Sludge Collectors

Each of the 10 SSTs are equipped with a plastic chain and flight collector apparatus that moves the settled solids to the two sludge hoppers located at the effluent (north) end of each of the SSTs. Collected sludge is removed from the hoppers through suction piping and into the RAS and WAS systems, as described in Section 2.4.2.3, respectively. The return flight of the sludge collector apparatus removes the secondary skimmings (SSK) from the SSTs, as discussed in Section 2.4.2.5. A photograph of the chain and flight sludge collector apparatus is shown in Figure 2.4-2.

2.4.2.3 Return Activated Sludge (RAS) System

The RAS system conveys concentrated mixed liquor suspended solids (MLSS) from the SSTs to the ASTs. Each of the SSTs is equipped with a single RAS suction line consisting of two parallel influent pipes (one for each of the two sludge hoppers), which remove sludge (i.e. RAS) from the hoppers at the effluent (north) end of the SSTs.

The suction lines associated with SSTs 1, 2, and 3 are connected by a common RAS suction manifold located in the SST Effluent Gallery under the SST Effluent Channel. This manifold conveys the MLSS by gravity flow into the RAS/WAS Wet Well at the RAS Pump Station, located at the northeast end of the SSF. Likewise, the suction lines associated with SSTs 4, 5, and 6 are connected via a common manifold. The suction lines for SSTs 7, 8, 9, and 10 each discharge directly into the RAS/WAS Wet Well. The RAS Pump Station consists of six pumps that transfer the MLSS from the RAS/WAS Wet Well to the Activated Sludge Tank (AST) Influent Channel via a common header pipe. A photograph of the RAS Pump Station is shown in Figure 2.4-3.

2.4.2.4 Waste Activated Sludge (WAS) System

The WAS system allows for a portion of the RAS to be waste to the Dissolved Air Flotation (DAF) Thickeners. Two (2) WAS pumps (duty and standby) located in the WAS Pump Station withdraw RAS from the RAS/WAS Wet Well and pump it to the WAS Thickening Facility DAFs. A photograph of the WAS Pump Station is shown in Figure 2.4-4.

2.4.2.5 Skimmings Facility

Secondary skimmings are removed from the surface of each SST by the return travel of the respective chain and flight sludge collector apparatus. Skimmings are collected in a rotary skimmer at the top of the influent (south) end of each SST. Spray water is used to push the skimmings into the rotary skimmers in each tank as they are tilted in sequence at timed intervals to collect and remove skimmings from the SSTs. The collected skimmings flow by gravity to the Secondary Skimmings Wet Well, where skimmings are concentrated at the water surface. Two secondary skimmings pumps (duty and standby) located in the adjacent Secondary Skimmings Pump Station withdraw subnatant from the wet well and return this flow to the SST Influent Channel. Subnatant pumping is stopped when the water surface falls to the low level point. Skimmings accumulate in the wet well over a set number of the subnatant removal cycles. After this set number of cycles, the collection and flow of secondary skimmings from the SSTs is temporarily stopped while the duty pump recirculates the skimmings for a set period of time to homogenize the suspension. The duty pump subsequently transfers the homogenized skimmings to the Unstabilized Sludge Storage Tank (USST), and the collection and flow of secondary skimmings from the SSTs resumes. The operation of the secondary skimmings pumping can be either automatic or manually controlled, at the discretion of the plant operator. A photograph of the pumps in the Secondary Skimmings Pump Station is shown in Figure 2.4-5.

2.4.2.6 RAS Chlorination

As a component of the SSF, the RAS stream may be subject to as-needed chlorination (e.g., either shock load or continuous feed) for the purpose of disinfection to control filamentous organisms. Sodium hypochlorite is injected into the RAS at the RAS Chlorination Vault located at the northeast corner of the ASF. A more detailed process description of the chlorination facilities, including a photograph, is provided in Section 2.5.2.2 Secondary Treatment Plant Chlorination.

2.4.2.7 Tank Drainage Facilities

Tank drainage facilities associated with each SST allow for each tank to be individually drained for the purpose of as-needed maintenance or repair. Plug valves on the respective RAS suction lines (see Section 2.4.2.3) enable each SST to be drained into a common pipe, which transfers the drainage water to the east end of the SST Effluent Gallery. From this point, a single pump (i.e., no standby) either conveys the drainage to the tank drain facilities or recycles the flow to the SST Influent Channel. A photograph of the tank drainage pump is shown in Figure 2.4-6.

Three sumps and associated sump pumps located in the SST Effluent Gallery also facilitate drainage in the SSF. The pump in each of these three sumps conveys liquid to the RAS/WAS Wet Well. A photograph of a representative sump pump is included in Figure 2.4-7.



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OPERATION AND MAINTENANCE MANUAL
SECONDARY SEDIMENTATION AREA
**SECONDARY SEDIMENTATION
TANKS**

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FIGURE 2.4-1
CAD REF. NO. I30M FIG 2.4-1



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OPERATION AND MAINTENANCE MANUAL
SECONDARY SEDIMENTATION AREA
CHAIN AND FLIGHT SLUDGE
COLLECTOR APPARATUS

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FIGURE 2.4-2
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OPERATION AND MAINTENANCE MANUAL
SECONDARY SEDIMENTATION AREA

RAS PUMP STATION

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FIGURE 2.4-3
CAD REF. NO. I30M FIG 2.4-3

XREFS: \\TLBLK.dwg IMAGES: \\pro\\1991037\\Q&M schematics\\images\\fig2.4-4.jpg User: Dong Spec: PIRNIE STANDARD File: \\pro\\1991037\\Q&M schematics\\I3OM FIG 2.4-4.DWG Scale: 1:1 Date: 03/03/2011 Time: 15:44 Layout: Blank



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OPERATION AND MAINTENANCE MANUAL
SECONDARY SEDIMENTATION AREA

WAS PUMP STATION

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FIGURE 2.4-4
CAD REF. NO. I3OM FIG 2.4-4



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OPERATION AND MAINTENANCE MANUAL
SECONDARY SEDIMENTATION AREA
SECONDARY SKIMMINGS
PUMP STATION

XREFS: \\TLB\dwg IMAGES: \\pro\1991037\Q&M schematics\images\Fig2.4-6.jpg User: Dong Spec: PIRNIE STANDARD File: \\pro\1991037\Q&M schematics\I3OM FIG 2.4-6.DWG Scale: 1:1 Date: 03/03/2011 Time: 16:37 Layout: Blank



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OPERATION AND MAINTENANCE MANUAL
SECONDARY SEDIMENTATION AREA
TANK DRAINAGE PUMP

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FIGURE 2.4-6
CAD REF. NO. I3OM FIG 2.4-6

XREFS: \\TLBLK.dwg IMAGES: I:\pro\1991037\Q&M schematics\images\Fig2.4-7.jpg User: Dong Spec: PIRNIE STANDARD File: I:\pro\1991037\Q&M schematics\I3OM FIG 2.4-7.DWG Scale: 1:1 Date: 03/03/2011 Time: 16:39 Layout: Blank



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OPERATION AND MAINTENANCE MANUAL
SECONDARY SEDIMENTATION AREA

SUMP PUMP

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FIGURE 2.4-7
CAD REF. NO. I3OM FIG 2.4-7

2.5 CHLORINATION, DECHLORINATION AND NON-POTABLE WATER FACILITIES

2.5.1 Purpose

The purpose of the Chlorination, Dechlorination and Non-Potable Water Facilities is as follows:

- The Chlorination Facility is used for disinfection of plant effluent, and for in-plant uses including pre-chlorination of plant influent flows for hydrogen sulfide control, chlorination of primary sludge before discharge to the USSTs to avoid the production of methane gas, chlorination of non-potable water and chlorination of RAS to help control the growth of filaments.
- Under original Advance Primary Treatment Plant phase of the South Bay IWTP the Dechlorination Facility was used for removing chlorine residual from the primary effluent prior to discharging the South Bay Land Outfall (SBLO) and the South Bay Ocean Outfall (SBOO). Dechlorination of secondary effluent is not available for the secondary treatment plant.
- The Non-Potable Water (NPW) Facilities provide non-potable water for plant uses and maintain a minimum header pressure of approximately 70 psi.

2.5.2 Process Description

The chlorination, dechlorination and non-potable water facilities originally installed consisted of sodium hypochlorite storage and pumping facilities, and sodium bisulfite storage and pumping facilities for de-chlorination at the EBS. These facilities have been modified somewhat for the newly constructed secondary treatment plant.

The current facilities for the secondary treatment plant maintain the original sodium hypochlorite storage and pumping facilities with additional pumps for NPW chlorination. Chlorine application points for the existing pumps were modified to allow for RAS chlorination and secondary effluent disinfection. The sodium hypochlorite pumping scheme was also modified to provide an additional pre-chlorination addition point at the Canyon Collector/Tank Drain Junction Structure.

Two separate pump stations are available to supply non-potable water (NPW) demands at the plant. NPW Pump Station No. 1 can be supplied with potable water from the City of San Diego Water System or reclaimed water from the City of San Diego South Bay Water Reclamation Plant via an air-gap connection. NPW Pump Station No. 2 is

supplied with secondary effluent. Under normal operating conditions, NPW Pump Station No. 2 will be used to satisfy the plant's non-potable water demands, and NPW Pump Station No. 1 will remain as an emergency back-up system.

2.5.2.1 Chlorination Facilities

The sodium hypochlorite (NaOCl) supply system is located to the north of the primary sedimentation tanks, and consists of two (2) bulk storage tanks and three (3) sets of sodium hypochlorite addition metering pumps. Each set of metering pumps include two (2) pumps. One set of metering pumps is dedicated to effluent chlorination, the second set is dedicated to intermittent chlorination needs (RAS, primary sludge, etc), and the third set is dedicated for chlorination of NPW.

Chlorine in the form of sodium hypochlorite is used for the following uses:

- Intermittent pre-chlorination at the Headworks Inlet Junction Structure and Canyon Collector/Tank Drain Joint Structure for odor control;
- Intermittent chlorination of primary sludge for hydrogen sulfide control and methane control in the USSTs;
- Chlorination of the RAS to provide sludge bulking control;
- NPW Pump Station No.2 wet well to control algal growth in the NPW distribution system; and
- Post-chlorination of secondary at the EBS for disinfection.

A photograph of the Chlorination Facilities is presented in Figure 2.5-1.

Pre-chlorination

Sodium hypochlorite (NaOCl) is applied intermittently at the Canyon Collector/Tank Drain Junction Structure and the Headworks Inlet Junction Structure for odor control. A remote chlorine diffuser is provided at each injection point. The maximum dosage rate is 10 mg/l at peak flow of 100 MGD.

Chlorination of Return Activated Sludge

Chlorine can be applied at the RAS header via the RAS Chlorination Vault to control filamentous bacteria in the activated sludge process. The maximum chlorine dosage is 0.2 lbs chlorine per 100 pounds of RAS suspended solids. (Assuming a RAS concentration of 5,000 mg/L suspended solids and a sodium hypochlorite “neat” solution strength of 12.5%, the maximum dosage of “neat” sodium hypochlorite will be 65 mg/L to obtain a dosage of 0.2 pounds of chlorine per 100 pounds of RAS suspended solids).

Chlorination of Non-Potable Water Pump Station No.2

Two chlorination pumps supply sodium hypochlorite to NPW Pump Station No. 2 discharge pipeline to control algal growth throughout the NPW distribution system. Chlorine addition for the NPW system is manually controlled via control valves and a rotameter located in the RAS Chlorination Vault. The design dosage rate is 15 mg/l.

A photograph of the NPW Chlorination Pumps is presented in Figure 2.5-2.

Chlorination of Primary Sludge

Sodium hypochlorite should be added on a regular intermittently basis to the primary sludge line suppress the growth of methane forming bacteria in the USSTs. The maximum dosage rate is 5 mg/l.

Effluent Chlorination

Sodium hypochlorite is added at the Effluent Blending Structure (EBS) for continuous disinfection of secondary effluent. The post chlorination supply system is designed to deliver a maximum dosage of 15 mg/l for secondary effluent. Both primary and secondary effluent can flow to the EBS but under normal operating conditions, primary effluent will not be discharged. Chlorine is applied through a remote injector and an in-line diffuser with the aid of a chlorine dilution water pump at the discharge of the Effluent Blending Structure. The South Bay Land Outfall (SBLO) is used to provide chlorine residual contact time for effluent disinfection.

2.5.2.2 Dechlorination Facilities

The sodium bisulfite storage and addition facilities that were installed under the original primary treatment plant phase of the South Bay IWTP are described below but will **not** be used to de-chlorinate secondary effluent.

Sodium bisulfite can be used for dechlorination to eliminate chlorine residual toxicity which is harmful to aquatic life in the receiving waters. The sodium bisulfite supply system is sized to deliver a dosage of up to 25.5 mg/l of sodium bisulfite at peak flow of 100 MGD, to remove up to 17 mg/L of residual chlorine with a 0.5 mg/l excess of sodium bisulfite. Sodium bisulfite can be added continuously at the Effluent Blending Structure and was used when primary effluent was disinfected and discharged from the plant. Under normal operating conditions, when the treatment plant is producing secondary effluent, the dechlorination facilities cannot be used because the chlorination and dechlorination diffusers are both located in the Effluent Blending Structure and would not provide sufficient contact time for effluent disinfection. The dechlorination system consists of two storage tanks, two metering pumps, and dechlorination controls as well as a remote diffuser located in the Effluent Blending Structure. The system also includes a sodium bisulfite dilution water pump, a diffuser and an ORP chlorine residual analyzer which is located at the Effluent Metering Structure for dechlorination control.

A photograph of the Dechlorination Facilities is presented in Figure 2.5-3.

2.5.2.3 Non-Potable Water Pump Station No. 1

NPW Pump Station No.1 (NPWPS1) incorporates the delivery of potable water from the City of San Diego's water system or reclaimed water from the City's South Bay Water Reclamation Plant via an air-gap connection.

The NPWPS1 system consists of four vertical turbine pumps, an ASME steel hydro-pneumatic tank, a dual-compressor make-up air system with receiver system, and pressure-based controls. NPW Pump Station No.1 maintains a minimum header pressure of 75 psi. A photograph of the NPW Pump Station No. 1 Facilities is presented in Figure 2.5-4.

2.5.2.4 Non-Potable Water Pump Station No. 2

When the treatment plant is producing secondary effluent, non-potable water (secondary effluent) from the secondary sedimentation effluent channel is supplied via NPW Pump Station No.2 (NPWPS2) which will be used to satisfy the following non-potable water demands:

- Cl2 Ejector
- AST Foam Spray
- BFP Wash Water
- BFP polymer make-up water
- WAS Thickening polymer make-up water
- Hose Bibs
- Seal water

The NPWPS2 system located adjacent to the SST effluent channel consists of five open line shaft vertical turbine pumps; three main pumps (two operating and one standby) and two jockey pumps (one operating and one standby). All pumps are VFD driven. A photograph of the NPW Pump Station No.2 Facilities is presented in Figure 2.5.-5.



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OPERATION AND MAINTENANCE MANUAL
CHLORINATION/DECHLORINATION/NPW AREA
CHLORINATION FACILITIES

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FIGURE 2.5-1
CAD REF. NO. I30M FIG 2.5-1



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OPERATION AND MAINTENANCE MANUAL
CHLORINATION/DECHLORINATION/NPW AREA
NPW NO 2
CHLORINATION PUMPS

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FIGURE 2.5-2
CAD REF. NO. I3OM FIG 2.5-2

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OPERATION AND MAINTENANCE MANUAL
CHLORINATION/DECHLORINATION/NPW AREA
DECHLORINATION FACILITIES

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FIGURE 2.5-3
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OPERATION AND MAINTENANCE MANUAL
CHLORINATION/DECHLORINATION/NPW AREA
NPW PUMP STATION NO.1
FACILITIES

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FIGURE 2.5-4
CAD REF. NO. I30M FIG 2.5-4



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OPERATION AND MAINTENANCE MANUAL
CHLORINATION/DECHLORINATION/NPW AREA
NPW PUMP STATION NO.2
FACILITIES

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FIGURE 2.5-5
CAD REF. NO. I30M FIG 2.5-5

2.6 WASTE ACTIVATED SLUDGE THICKENING FACILITIES

2.6.1 Purpose

The purpose of the waste activated (WAS) thickening facilities is to concentrate the waste activated sludge before it is pumped to the unstabilized storage tanks (USSTs). WAS is pumped by the WAS pumps (see Section 2.4.2.4) to the dissolved air flotation (DAF) units. Thickened waste activated sludge (TWAS) is then subsequently pumped to the USSTs.

2.6.2 Process Description

The WAS thickening facilities consist of two DAF units with support facilities and two DAF air compressors. Each DAF unit is complete with a pressurization and air injection system (pressurization pump, pressurization tank, back-pressure control valve, and an air control panel), a TWAS pumping and metering system (TWAS pump and common TWAS flow meter), and a polymer addition system (polymer storage and mix tanks, a polymer transfer pump, and polymer feed pumps).

2.6.2.1 Dissolved Air Flotation (DAF) Tanks

WAS is pumped from the RAS/WAS pump station to the center discharge hopper in each DAF tank, after mixing with polymer and pressurized DAF underflow. In each DAF unit, a drive mechanism with a gear reducer and a manually adjustable, variable speed drive rotate the sludge collector arms and scrapers. The rotating surface skimmers push the floated thickened waste activate sludge (TWAS) into a TWAS float box where it is removed via a TWAS pump and conveyed to the unstabilized storage tanks (USSTs).

A photograph of the DAF Tank is shown in Figure 2.6-2.

2.6.2.2 Pressurization and Air Injection System

In each pressurization and air injection system, compressed air is supplied by an air compressor located in the Compressor Room of the DAF Control Structure via an air control panel. The air is dissolved in recycled, pressurized DAF underflow inside a pressurization tank. The recirculation and pressurization of DAF underflow is conveyed by a pressurization pump. In the event that the pressurization pump is taken out of service, high pressure (60-70 psi) non-potable water is provided in lieu of pressurized underflow for air dissolution.

The pressurized, recycled flow, containing dissolved air, is mixed with the WAS and polymer solution before distribution to the DAF unit via a back pressure control valve.

Dissolved air is then released in the DAF unit. Solids are lifted by the air bubbles and rise to the surface, where they form a concentrated sludge blanket. As the TWAS solids accumulate on the surface, underflow from each unit flows over a notched peripheral weir. The underflow is either recycled to the pressurization tank by the pressurization pump, or is conveyed by gravity to the activated sludge influent channel.

A photograph of the Pressurization and Air Injection System is shown in Figure 2.6-3.

2.6.2.3 TWAS Pumping and Metering System

When the float box is full, a TWAS pump conveys the thickened sludge to the USSTs. The TWAS pumps are controlled by level in the TWAS wet well via a bubbler level control panel dedicated to each DAF.

A secondary suction line draws settled sludge from the bottom of the DAF unit, and is periodically pumped to the unstabilized sludge storage tanks using the TWAS pump and manually opening and closing the appropriate valves.

A photograph of the TWAS Pumping and Metering System is shown in Figure 2.6-4.

2.6.2.4 DAF Polymer Addition System

The polymer conditioning system is composed of a neat polymer bulk storage tank with a bulk polymer transfer pump, which transfers the concentrated polymer to the polymer mix tank. The makeup water and neat polymer are added to the polymer mix tank

an on-demand “continuous batching” basis. When polymer is required, mix tank level sensors control the activation and deactivation of the polymer solution makeup capabilities. The polymer solution makeup process provides a minimum of 60 minutes of detention time for polymer activation and conditioning. The polymer solution is pumped to each DAF unit by a dedicated polymer feed pump.

A photograph of the DAF Polymer Addition System is shown in Figure 2.6-5.

A Polymer Dosage Calculation Spreadsheet has been developed to assist Plant Operators in adjusting polymer dosage rates based on the measured characteristics of the waste activated sludge. This spreadsheet is password protected, and remains on file with Veolia at IBWC. An image of the spreadsheet appearance is provided for reference below:

International Boundary & Water Commission - South Bay Wastewater Treatment Plant			
DAF Operational Data			
INPUT VALUES			
WAS Concentration =	4,000	mg/l	
WAS Flowrate =	300	gpm	
DAF Polymer Dosage Rate =	4	dry lbs/DT WAS SS	
Neat Polymer Activity =	3.4	% activity	
DAF Polymer Solution Strength =	0.0625	% solution	
Polymer Mix Tank "Make-up" Height =	2.0	feet	
Bulk (Neat) Polymer Flowrate =	0.34	gpm	Note: During field tests using bulk polymer feed, polymer transfer pump capacity tests yielded an average flowrate of 0.34 gpm @ the maximum SCR speed control setting of 10. To adjust flowrate, update field tests shown in "Bulk Polymer Pump Capacity Test" spreadsheet.
Air to Solids Ratio =	0.03	lbs air/lb dry SS	
Air Density (adjust only for extreme temp. events) =	0.0749	lbs mass/Cu Ft @ STP	
POLYMER FEED PUMP, MAKE-UP WATER & AIR FLOW SETTINGS			
DAF Polymer Solution Flowrate =	3.8	gpm	
"Make-up" Water Flowrate =	18.2	gpm	
Pump No. 1 Remote Setting =	26.1	%	
Pump No. 2 Remote Setting =	17.8	%	
Air Flow Rate =	4.0	d/m	
CALCULATED VALUES			
WAS Suspended Solids Loading to Thickening =	14412	dry lbs/day	
WAS Suspended Solids Loading to Thickening =	7.21	dry tons/day	
DAF Suspended Solids Loading Rate =	1.05	dry lbs/hr sq.ft.	
DAF Hydraulic Loading Rate =	0.52	gpm/sq.ft.	
Neat Polymer Active Concentration =	0.284	active dry lbs/gal	
Neat Polymer Dilution Rate =	0.0052	lbs/gal makeup water	
Neat Polymer Dilution Rate =	0.0184	gal/gal makeup water	
Active Dry Lbs. Polymer Addition Rate =	23.8	dry lbs/day	
Polymer Mix Tank "Make-up" Volume =	184.1	gallons	
Polymer Mix Tank "Make-up" Time =	12.6	minutes	
Total "Make-up" Water Volume =	228	gallons	
Active Polymer Needed in "Batch" Mix =	1.19	active dry lbs in batch	
Volume Neat Polymer Needed in "Batch"	4.19	gallons	
FIXED VALUES (DO NOT CHANGE)			
DAF Tank Diameter =	27	feet	
DAF Tank Surface Area =	573	sq. ft.	
Polymer Mix Tank Diameter =	47.5	inches	

2.6.3 Design and Performance Criteria

The following criteria were utilized for design of the WAS thickening facilities:

Annual Average Plant Flow	25 MGD (95,000 m ³ /day)
Maximum DAF Flow Rate/DAF	390 gpm (2,126 m ³ /day)
Maximum DAF Hydraulic Loading Rate/DAF	1.46 gpm/ft ²
DAF Influent Solids Concentration/DAF	0.2 – 0.6 % TS
Maximum Solids Loading Rate/DAF	1.5 lbs SS/hr- ft ²
Maximum Underflow Total Suspended Solids/DAF	150 mg/l
Air/Solids ratio/DAF	0.03 lbs/lbs TSS – 0.05 lb/ lb TSS
Polymer Load Rate per dry ton of WAS Suspended Solids/DAF	4 dry lb/ dry ton TSS
Minimum Thickened Float Sludge Concentration/DAF	3.5% TS



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OPERATION AND MAINTENANCE MANUAL
WASTE ACTIVATED SLUDGE THICKENING AREA
DAF TANK

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FIGURE 2.6-2
CAD REF. NO. I3OM FIG 2.6-2

XREFS: \\TLBLK.dwg IMAGES: \\pro\\1991037\\Q&M schematics\\images\\fig2.6-3.jpg User: Dong Spec: PIRNIE STANDARD File: \\pro\\1991037\\Q&M schematics\\I3OM FIG 2.6-3.DWG Scale: 1:1 Date: 03/04/2011 Time: 11:04 Layout: Blank



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OPERATION AND MAINTENANCE MANUAL
WASTE ACTIVATED SLUDGE THICKENING AREA
**PRESSURIZATION AND
AIR INJECTION SYSTEM**

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FIGURE 2.6-3
CAD REF. NO. I3OM FIG 2.6-3



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OPERATION AND MAINTENANCE MANUAL
WASTE ACTIVATED SLUDGE THICKENING AREA
**TWAS PUMPING AND
METERING SYSTEM**

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FIGURE 2.6-4
CAD REF. NO. I30M FIG 2.6-4



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OPERATION AND MAINTENANCE MANUAL
WASTE ACTIVATED SLUDGE THICKENING AREA
DAF POLYMER
ADDITION SYSTEM

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FIGURE 2.6-5
CAD REF. NO. I30M FIG 2.6-5

2.7 UNSTABILIZED SLUDGE STORAGE FACILITIES

2.7.1 Purpose

The purpose of the Unstabilized Sludge Storage Tanks (USSTs) is to provide storage and mixing of unstabilized primary sludge, thickened waste activated sludge and skimmings from the primary and secondary sedimentation tanks. The storage facilities also provide a wet well for the sludge feed pumps of the sludge dewatering facilities and serve to equalize the sludge load to the sludge dewatering facilities.

Sludge should not be stored in the USSTs for more than four (4) days to reduce the potential for generating methane gas, and chlorination of the primary sludge flows should be done a regular basis to further reduce the potential for generating methane gas by eliminating the growth of methane forming bacteria in the USSTs.

2.7.2 Process Description

The unstabilized sludge storage facilities consist of two storage tanks (USST 1 and USST 2). Each USST is equipped with an external pump recirculation mixing system, and each USST is ventilated to common odor reduction station. A photograph of the Unstabilized Sludge Storage Facilities is presented in Figure 2.7-1.

2.7.2.1 Unstabilized Sludge Storage Tanks

Unstabilized primary sludge, thickened waste activated sludge, and skimmings from the primary and secondary sedimentation tanks are delivered to the sludge storage facilities via their respective pumping facilities. Each sludge and skimming source is delivered to the sludge storage tanks via a separate glass lined ductile iron pipe that enters the storage tanks at an elevation above the high operating level.

The sludge and skimmings feed lines to each storage tank are equipped with a manually operated plug valve for selection of the in-service storage tanks and isolation of each tank as selected by the plant operator.

2.7.2.2 Recirculation Mixing System

Each storage tank is provided with a dedicated external pump recirculation mixing system to minimize stratification in the tank and to optimize the consistency of the combined sludge and skimmings flow to the downstream sludge dewatering facilities located in the Sludge Dewatering Building.

2.7.2.3 Unstabilized Sludge Storage Odor Reduction Station

Each sludge storage tank is covered and the atmosphere beneath the cover is ventilated and delivered to the Unstabilized Sludge Storage Odor Reduction Station. This station consists of a single stage counter current packed column and exhaust fans to provide a slight negative pressure within the tank(s).

The scrubber is a closed vessel in which a scrubber solution (sodium hypochlorite (NaOCl), sodium hydroxide (NaOH), and water) is continuously recirculated to the top of the scrubber where it is distributed over plastic media. The media, or packing, inside the scrubber provides a large amount of surface area to facilitate the transfer of odorous compounds to be oxidized/absorbed into the scrubber solution. Fresh chemicals (NaOCl and NaOH) and make-up water are added to the scrubber solution which displaces spent scrubber solution (blowdown) into an overflow drain. This blowdown overflow drain returns to the Headworks via the tank drainage system.

A photograph of the Unstabilized Sludge Storage Odor Reduction Station is presented in Figure 2.7-2.

To assist in reducing odors, the unstabilized sludge storage tanks are provided with ferric chloride supply to reduce the generation of sulfides. The ferric chloride also minimizes the formation and deposition of struvite in the tanks and the sludge lines. Ferric chloride is added to the primary sludge feed lines to the unstabilized sludge storage tanks.

2.7.3 Design and Performance Criteria

The following criteria were utilized for design of the Unstabilized Sludge Storage (USS) Facilities:

Storage Time at Annual Average Design Loading	4 days
Mixing Turnover Time at Normal Operating Level	25 minutes (at Side Water Depth = 10.5 ft)
Air Change to Odor Reduction at 50% Capacity	6 per hour
Air Change to Odor Reduction at Empty Tank	3 per hour
H ₂ S Scrubber Design Loading	50 ppm



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OPERATION AND MAINTENANCE MANUAL
UNSTABILIZED SLUDGE STORAGE AREA
UNSTABILIZED SLUDGE
STORAGE FACILITIES

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FIGURE 2.7-1
CAD REF. NO. I30M FIG 2.7-1



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OPERATION AND MAINTENANCE MANUAL
UNSTABILIZED SLUDGE STORAGE AREA
ODOR REDUCTION STATION

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FIGURE 2.7-2
CAD REF. NO. I30M FIG 2.7-2

2.8 SLUDGE DEWATERING FACILITIES

2.8.1 Purpose

The purpose of the Sludge Dewatering Facilities is to condition and dewater the unstabilized sludge to create a relatively dry sludge cake with a concentration of 22 - 25%. The water is removed mechanically by a belt filter press. Polymer conditioning is provided to enhance sludge dewaterability. An Odor Reduction Station is provided to control the odors at the Sludge Dewatering Facilities.

2.8.2 Process Description

Unstabilized sludge from the unstabilized sludge storage tanks flows by gravity to the belt filter press (BFP) sludge feed pumps located south of the Sludge Dewatering Building. One (1) sludge grinder is provided prior to the BFP sludge feed pumps to grind the sludge and therefore improve dewatering capability of the sludge.

The sludge is pumped to the feed end of the four (4) belt filter presses located on the first floor of the Sludge Dewatering Building. One BFP sludge feed pump is provided for each belt filter press. Polymer is injected into the feed manifold upstream of each belt filter press with sufficient reaction time to enhance the dewatering characteristics of the sludge.

The polymer conditioning system is composed of polymer bulk storage tanks with bulk polymer transfer pumps which pump the concentrated polymer to the polymer mixing tanks. The makeup water and polymer is added to the mixing facilities on a batch/continuous on demand basis. When polymer is required, mixing tank level sensors control the activation and deactivation of the polymer solution makeup capabilities. The polymer solution makeup process provides a minimum of 60 minutes of detention time to provide polymer activation and conditioning.

The belt filter presses are operationally configured in pairs. The "pair" system (sister/sister) configuration provides interchangeable support equipment and controls within each pair. The layout of the belt filter presses accommodates the pair concept.

Each belt filter press local control panel (LCP-BFP), located on the second floor of the Sludge Dewatering Building, provides complete control capabilities of the polymer feed

pump, sludge feed pump, filter press washwater booster pump, hydraulic system and other process control parameters for the dedicated belt filter press.

A photograph of the belt presses inside the Sludge Dewatering Building is presented in Figure 2.8-1. A photograph of the BFP Sludge Feed Pumping Facilities is presented in Figure 2.8-2. A photograph of the Sludge Dewatering Polymer Conditioning Facilities is presented in Figure 2.8-3.

Odorous air from the Sludge Dewatering Building, Lime Stabilization Facilities, and Truck Loading Building are continuously ventilated and treated by the Solids Processing Odor Reduction Station.

The Solids Processing Odor Reduction Station consists of a two-stage counter current packed columns and exhaust fans to provide a slight negative pressure within the containment areas. The enclosures are configured to allow a "sweep effect" to maximize the containment and collection of the potential odorous compounds.

A two-stage scrubber is provided to remove ammonia (NH_3) and hydrogen sulfide (H_2S). The first stage utilizes sulfuric acid (H_2SO_4) solution to remove ammonia, and the second stage utilizes sodium hypochlorite (NaOCl) and sodium hydroxide (NaOH) solutions to remove hydrogen sulfide. Fresh chemicals and make-up water are added to each scrubber solution to displace spent scrubber solutions (blowdown). Blowdown is returned to the Headworks via the tank drainage system.

A photograph of the Sludge Dewatering Odor Reduction Station is presented in Figure 2.8-4.

2.8.3 Design and Performance Criteria

The following criteria were used for design of the belt filter press dewatering facilities:

Unstabilized Sludge Loads to Belt Filter Presses (With All Units In Service) at Annual Average Design Loads

Solids	650 lbs/hr-m	(300 kg/hr-m)
Hydraulic	50 gpm/meter	(3.2 L/m · s)
Polymer Dosage	10 dry lbs/dry ton	(5 dry g/dry kg)

Dewatered Sludge Concentration	22 - 25%
TSS Capture	95%
Number of Belt Presses	4
Size of Belt Press	(2.2 m)
Time to Evacuate Unstabilized Sludge Storage Tanks	7 days
H ₂ S Scrubber No. 1 Design Loading	10 ppm
H ₂ S Scrubber No. 2 Design Loading	10 ppm
NH ₃ Scrubber No. 1 Design Loading	30 ppm
NH ₃ Scrubber No. 2 Design Loading	<1.0 ppm



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OPERATION AND MAINTENANCE MANUAL
SOLIDS PROCESSING AREA
BELT FILTER PRESS

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FIGURE 2.8-1
CAD REF. NO. I2OM FIG 2.8-1



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OPERATION AND MAINTENANCE MANUAL
SOLIDS PROCESSING AREA
BFP SLUDGE FEED
PUMPING FACILITIES

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FIGURE 2.8-2
CAD REF. NO. I2OM FIG 2.8-2



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OPERATION AND MAINTENANCE MANUAL
SOLIDS PROCESSING AREA
**POLYMER CONDITIONING
FACILITIES**

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FIGURE 2.8-3
CAD REF. NO. I20M FIG 2.8-3



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OPERATION AND MAINTENANCE MANUAL
SOLIDS PROCESSING AREA
ODOR REDUCTION STATION

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FIGURE 2.8-4
CAD REF. NO. I20M FIG 2.8-4

2.9 SLUDGE CONVEYANCE AND LIME STABILIZATION FACILITIES

2.9.1 Purpose

The purpose of the sludge conveyance facilities is to deliver the dewatered unstabilized sludge cake to the lime stabilization facilities, and to deliver the stabilized sludge cake to the truck loading building.

The purpose of the lime stabilization process is to add a sufficient amount of lime to unstabilized sludge to raise the pH to 12 or higher in order to create an environment that is not conducive to the survival of pathogens and therefore to stabilize the sludge and to achieve the pathogens and vector attraction reduction requirements as required by 40 CFR Part 503 Standards for the Disposal of Sewage Sludge.

2.9.2 Process Description

The sludge conveyance and lime stabilization facilities are composed of dewatered sludge (cake) conveyance system, lime storage facilities, lime conveyance facilities, sludge/lime mixer facilities, and a stabilized sludge conveyance/truck loading system.

The Lime Stabilization Facilities are sized such that the initial facilities constructed under Advanced Primary Treatment Plant (CC-2) have the capacity required to process sludge from the Advanced Primary (CC-2) and Secondary Treatment (CC-3) plants. The ultimate facilities will handle a sludge production from the Primary and Secondary Treatment Facilities with an average flow of 100 mgd and peak flows of 200 mgd.

The dewatered sludge (cake) conveyance system is comprised of belt filter press (BFP) conveyors. Two (2) in-line conveyors are provided for each pair of belt filter presses. Each pair of belt filter presses discharges cake on the first respective BFP conveyor that delivers the cake to the second respective incline BFP conveyor that conveys the cake to the Lime Stabilization Facilities located east of the Sludge Dewatering Building.

The lime storage facilities consist of quicklime storage silos and associated dust control equipment. The lime conveyance facilities include volumetric feeders and lime transfer screw conveyors dedicated to the lime storage silos.

A photograph of the Lime Storage Facilities is presented in Figure 2.9-1.

The sludge/lime mixing facilities include sludge/lime mixers to mix dewatered sludge with lime to provide pH of sludge above 12 as required by 40 CFR Part 503 Standards for the Disposal of Sewage Sludge.

Each sludge/lime mixer discharges the stabilized sludge onto the respective truck loading conveyor that transports sludge to the Truck Loading Building. The Truck Loading Building is configured to allow two (2) trucks to be loaded concurrently with integrated weighing scales.

Odor Reduction Facilities are described in Section 2.8.

A photograph of the Lime Stabilization Facilities is presented in Figure 2.9-2.

2.9.3 Design and Performance Criteria

The following criteria were utilized for design of the Lime Stabilization Facilities under the Advanced Primary Treatment Plant (CC-2) and the Secondary Treatment Plant (CC-3):

Number of Treatment Trains	2
Lime feed capacity (each train)	32 ft. ³ /hr (0.91m ³ /hr)
Sludge blending capacity (each train)	5.8 tons/hr
Lime Silo Storage Capacity (each train)	90 tons
Quicklime Storage Time (each train)	15 days
Quicklime Dosage (on Dry Weight Basis)	30%
Minimum pH of Sludge (per 40 CFR Part 503 Regulations)	2 hrs @ pH 12 plus 22 hrs @ pH 11.5



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OPERATION AND MAINTENANCE MANUAL
SOLIDS PROCESSING AREA
LIME STORAGE FACILITIES

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FIGURE 2.9-1
CAD REF. NO. I2OM FIG 2.9-1



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OPERATION AND MAINTENANCE MANUAL
SOLIDS PROCESSING AREA
LIME STABILIZATION FACILITIES

2.10 PRIMARY EFFLUENT STRUCTURES

2.10.1 Purpose

The original purpose of the Primary Effluent Structures with only the *Chemically Assisted Advanced Primary Treatment Plant* on line was to collect all flows from the Primary Sedimentation Tanks, to meter this flow, and to direct the primary effluent flow to the flow to the Final Effluent Structures for ultimate disposal to the South Bay land Outfall (SBLO). UNDER NORMAL OPERATION WITH THE *SECONDARY TREATMENT PLANT* ON LINE, ALL PRIMARY EFFLUENT FLOWS UP TO A PEAK FLOW OF 48.74 MGD WILL BE SENT TO THE ACTIVATED SLUDGE SYSTEM AND NO FLOW WILL BE BY-PASSED.

The Primary Effluent Structures consist of the Primary Effluent Channel, the Primary Effluent Bypass Structure, the Primary Effluent Bypass Metering Structure, and the Primary Effluent Bypass Junction Structure. These facilities are sized to accommodate an average flow of 25 MGD; peak flows of 75 MGD with a maximum flow through hydraulic capacity of 100 MGD. These facilities were designed to deliver a constant flow of 25 MGD to the activated sludge system with all flows in excess of 25 MGD by-passed to the Final Effluent Structures.

A photograph of the Primary Effluent Bypass Structure is included in Figure 2.10-1. A photograph of the Primary Effluent Bypass Metering Structure is included in Figure 2.10-2. A photograph of the Primary Effluent Bypass Junction Structure is included in Figure 2.10-3.

2.10.2 Process Description

2.10.2.1 Primary Effluent Channel and Primary Effluent Bypass Structure

Primary effluent from the Primary Sedimentation Tanks (PST) flows through the Primary Effluent Channel to the Primary Effluent Bypass Metering Structure. A primary effluent sampler at the end of the Primary Effluent Channel collects treated primary effluent samples for analyzing and reporting. Mixing air is provided to the channel to prevent deposition of any remaining solids in the channel. Odorous air from the Primary Effluent Channel and Primary Effluent Bypass Structure is continuously ventilated and treated by the PST Odor Reduction Station as described in Section 2.2. The level in the Primary Effluent

Channel is continuously monitored via a bubbler system and the level signal is input to the PLC-PEB and SCADA for indication and for control of the Primary Effluent Flow Control Valves described in Part 2.10.2.2.

In the event a magnetic flowmeter or control valve in the Primary Effluent Bypass Metering Structure needs to be serviced, the primary effluent must be bypassed around the Primary Effluent Bypass Metering Structure through the Primary Effluent Bypass Structure to the Primary Effluent Bypass Junction Structure via a 66-inch cement mortar coated steel pipe, emergency primary effluent bypass line. An overflow weir is provided to direct skimming flows from the Primary Effluent Bypass Structure to the tank drain system. Return flow from the Primary Effluent Bypass Junction Structure to the Primary Effluent Bypass Structure is prevented by a flap valve on the 66-inch emergency bypass line at the Primary Effluent Bypass Junction Structure.

A primary effluent bypass drain pump is provided to pump out the 66-inch line and the Primary Effluent Bypass Structure.

2.10.2.2 Primary Effluent Bypass Metering Structure

The 66-inch primary effluent line splits into a 48-inch and a 24-inch line before entering the Primary Effluent Bypass Metering Structure. Inside the metering structure the 24-inch steel line is provided with two 24-inch isolation knife gate valves, a 24-inch magnetic flowmeter and an 18-inch motor operated control valve associated with it, while the 48-inch line is provided with two 48-inch isolation knife gate valves, a 48-inch magnetic flowmeter, and a 42-inch motor operated control valve. The 18-inch control valve remains in operation until the Primary Effluent Bypass Meter metered flow increases to above 18 MGD.

As plant flow rises above 18 MGD, the 42-inch control valve opens and the 18-inch control valve closes. The 42-inch control valve operates to maintain the level in the Primary Effluent Channel for plant flows above 18 MGD. After exiting the Primary Effluent Bypass Metering Structure, the two lines rejoin into one 66-inch line continuing onto the Primary Effluent Bypass Junction Structure.

2.10.2.3 Primary Effluent Bypass Junction Structure

The Primary Effluent Bypass Junction Structure is located at the intersection of the 66-inch primary effluent line and the 66-inch emergency primary effluent bypass line. Flow exits the structure via a 66-inch cement mortar coated steel line and is directed to the Final Effluent Structures.

Chlorination of primary effluent is accomplished at the Primary Effluent Bypass Junction Structure. Sodium hypochlorite is pumped from the Advanced Primary Chlorination Facility (see Part 2.5) and mixed with primary effluent by use of a primary chlorination dilution water pump prior to being injected into the Primary Effluent Bypass Junction Structure.

2.10.2.4 Primary Effluent Emergency Connection

The primary effluent emergency connection (PEEC) to the PST Primary Effluent Channel was installed to accommodate initial start-up of the original primary treatment portion of the plant. THESE FACILITIES ARE NO LONGER IN SERVICE.

2.10.3 Design and Performance Criteria

The following criteria were utilized for the design of the Primary Effluent Structures:

Annual Average Flow	25 MGD
Peak Flow	75 MGD
Hydraulic Capacity	100 MGD
PEEC Capacity	13 MGD



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OPERATION AND MAINTENANCE MANUAL
PRIMARY EFFLUENT BYPASS
STRUCTURE

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FIGURE 2.10-1
CAD REF. NO. I20M FIG 2.10-1

XREFS: \\TLBUK.dwg IMAGES: \\pro\\1991037\\Q&M schematics\\images\\Fig2.10-2_02.dwg User: LARSON Spec: PIRNIE STANDARD File: \\pro\\1991037\\Q&M schematics\\I2OM FIG 2.10-2.DWG Scale: 1:1 Date: 03/18/2011 Time: 11:02 Layout: Blank



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OPERATION AND MAINTENANCE MANUAL
PRIMARY EFFLUENT BYPASS
METERING STRUCTURE

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FIGURE 2.10-2
CAD REF. NO. I2OM FIG 2.10-2



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OPERATION AND MAINTENANCE MANUAL
PRIMARY EFFLUENT BYPASS
JUNCTION STRUCTURE

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FIGURE 2.10-3
CAD REF. NO. I2OM FIG 2.10-3

2.11 FINAL EFFLUENT STRUCTURES

2.11.1 Purpose

The Final Effluent Structures include the Effluent Blending Structure (EBS), the Effluent Metering Structure (EMS), and the Effluent Distribution Structure (EDS). The effluent structures also include the Primary Effluent By-Pass Structure (PEPBS) and the Primary Effluent Metering Structure (PEMS).

Prior to construction of the secondary treatment plant under the most recent construction contract for the South Bay IWTP, primary effluent was delivered to the PEBPS and PEMS and then discharged by gravity to the EBS prior to discharge to the EBS, the EMS and ultimately to the EDS and the South Bay Land Outfall (SBLO).

With completion of the secondary treatment plant primary effluent flow is delivered to the PEBPS and then conveyed by gravity via a 72" PE pipeline to the activated sludge system inlet channel. Flow from the activated sludge system is then conveyed by gravity to the secondary sedimentation inlet channel and effluent from the secondary sedimentation tanks then conveyed to the EBS via an 84" SE pipeline.

The secondary treatment system is designed to treat an average flow of 25 MGD and a peak flow of 48.75 MGD. Primary effluent flows in excess of 48.75 MGD will by-pass the secondary treatment system via a 66" PE by-pass pipeline that discharges primary effluent to the EBS.

The EBS receives primary effluent flows in excess of 48.75 MGD as identified above and receives secondary effluent flows up to 48.75 MGD via the 84" SE pipeline. Flow from the EBS is then discharged to the EMS and the EDS prior to discharge to the SBLO.

A photograph of the Effluent Blending Structure is included as Figure 2.11-1. A photograph of the Effluent Metering Structure is included as Figure 2.11-2.

2.11.2 Process Description

2.11.2.1 Effluent Blending Structure

The EBS contains motor-operated, isolation slide gates to be able isolate flows primary effluent flows from the PEBPS and secondary effluent flows from the secondary

sedimentation tanks effluent channel. Under normal operation all of the PE and SE isolation gates will be open.

Three motor operated slide gates are provided at the EBS; an 84" x 84" slide gate for the secondary effluent channel connection, a 66" x 66" slide gate for the connection of the primary effluent bypass line, and a 72" connection to the EMS. The EBS contains provisions for future connections of an additional 84" secondary effluent line, an additional 96" plant effluent line, and two 84" connections from potential future Chlorine Contact Tanks.

Three dilution water pumps are located at the EBS to provide facility operations with the capability to either chlorinate or dechlorinate the plant effluent flow. One (1) bisulfate dilution water pump exists for dechlorination; however, under normal operating conditions, this pump will no longer be used. Two (2) chlorine dilution water pumps have been provided to enable chlorination of the final plant effluent flow.

2.11.2.2 Effluent Metering Structure

The EMS contains a 48" magnetic flow meter which measures the South Bay IWTP total plant effluent flows before discharge to the EDS which also receives flow from the City of San Diego South Bay Water Reclamation Plant. The EMS also houses a total chlorine residual analyzer and the plant effluent composite sampler.

2.11.3 Design and Performance Criteria

The following criteria were utilized for the current design of the final effluent structures:

Annual Average Flow	25 MGD
Peak Flow	75 MGD
Peak Hydraulic Capacity	100 MGD



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OPERATION AND MAINTENANCE MANUAL
**EFFLUENT BLENDING
STRUCTURE**

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FIGURE 2.11-1
CAD REF. NO. I30M FIG 2.11-1



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OPERATION AND MAINTENANCE MANUAL

**EFFLUENT METERING
STRUCTURE**

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FIGURE 2.11-2
CAD REF. NO. I30M FIG 2.11-2

2.12 STANDBY POWER GENERATION FACILITIES

2.12.1 Purpose

The Standby Power Generation Facilities consist of two standby generators; two diesel fuel storage tanks; two diesel fuel transfer pump stations with associated day tanks; two overflow return pumps; two overflow return tanks; and a Generator Local Control Center (GEN-LCC) with associated generator switchgear and control panels.

2.12.2 Process Description

2.12.2.1 Standby Generators

The standby generators supply power to some critical facilities automatically and allow other essential facilities to be manually started. Each of the containers includes the generator, grounding resistor, engine, battery and battery charger, cooling system, fuel and lubrication system, and exhaust system with silencer. The container housing has a mobile truck trailer base.

A photograph of the Standby Power Generation Facilities is shown in Figure 2.12-1. A Plant Partial One-Line Diagram is shown in Figure 2.12-2. A Standby Power Partial One-Line Diagram is shown in Figure 2.12-3. A Plant Power Block Diagram is shown in Figure 2.12-4.

2.12.2.2 Diesel Fuel Storage Tanks

The diesel fuel storage tanks are capable of storing 10,000 gallons of No. 2 diesel fuel each. Fuel is added to each of the diesel fuel storage tanks via a NEMA 4X ground level fill assembly, which is provided at each tank. The storage tanks are remotely located above ground and are provided with double wall construction.

A photograph of the Diesel Fuel Storage Tank is presented in Figure 2.12-5.

2.12.2.3 Diesel Fuel Transfer Pump Stations

Fuel is removed from the diesel fuel storage tanks via four gear diesel fuel transfer pumps (two gear diesel fuel transfer pumps per fuel storage tank). The fuel is pumped from each diesel storage tank to its associated 300 gallon diesel fuel day tank. Each day

tank is provided with a 25 gallon overflow tank and one gear return (overflow) pump. The diesel overflow return pump delivers any overflow back to its respective 10,000 gallon diesel fuel storage tank.

A photograph of the Diesel Fuel Transfer Pump Station No. 1 is presented in Figure 2.12-6; and a photograph of the Diesel Fuel Transfer Pump Station No. 2 is presented in Figure 2.12-7. A schematic of the Diesel Fuel Piping is provided in Figure 2.12-8.

2.12.2.4 Standby Power Switchgear

Generator vacuum circuit breakers VCB-G1 and VCB-G2 feed standby power from their respective 12 kV generators to standby generator switchgear SG-GDB in the GEN-LCC Building. Generator tie circuit breaker VCB-AGT or VCB-BGT in the SG-GDB line-up feeds 12 kV standby power to the plant main switchgear MS-1.

A Standby Power Partial One-Line Diagram is presented in Fig 2.12-3.

2.12.2.5 Generator Control Panels

Generator control panels LCP-G1, LCP-G2 and main control panel MCP-GEN provide control, status and alarms for 12 kV generators G1 and G2. The panels are located in the GEN-LCC Building.

2.12.3 Design and Performance Criteria

No. of Generators	2
Generator Output (ea)	2000 kW
Engine Speed (rpm)	1800 rpm
Generator Rating	24 hr. continuous for 30-day duration
Generator Voltage	12KV, 3 Phase, 60 Hertz
Diesel Fuel Storage Tank Capacity	10,000 gal (37.9 m ³)
Diesel Fuel Storage Tank Capacity	75 hours @ 100% Load

Diesel Fuel Day Tank Capacity	300 gal (1.14 m ³)
Diesel Fuel Overflow Tank Capacity	25 gal (95 L)
Diesel Fuel Transfer Pumps:	
Capacity	4 gpm (15 L/min)
Total Head	10 ft H ₂ O (224 mm Hg)
Diesel Fuel Return Pumps:	
Capacity	7 gpm (26 L/min)
Total Head	15 ft H ₂ O (336 mm Hg)
Generator Switchgear:	
Ratings	12 kV, 1200 A, 3 Phase, 3 Wire
Generator Breakers	1 each generator, 12 kV, 1200A, 3P
Generator Tie Breakers	2, 12 kV, 1200A, 3P



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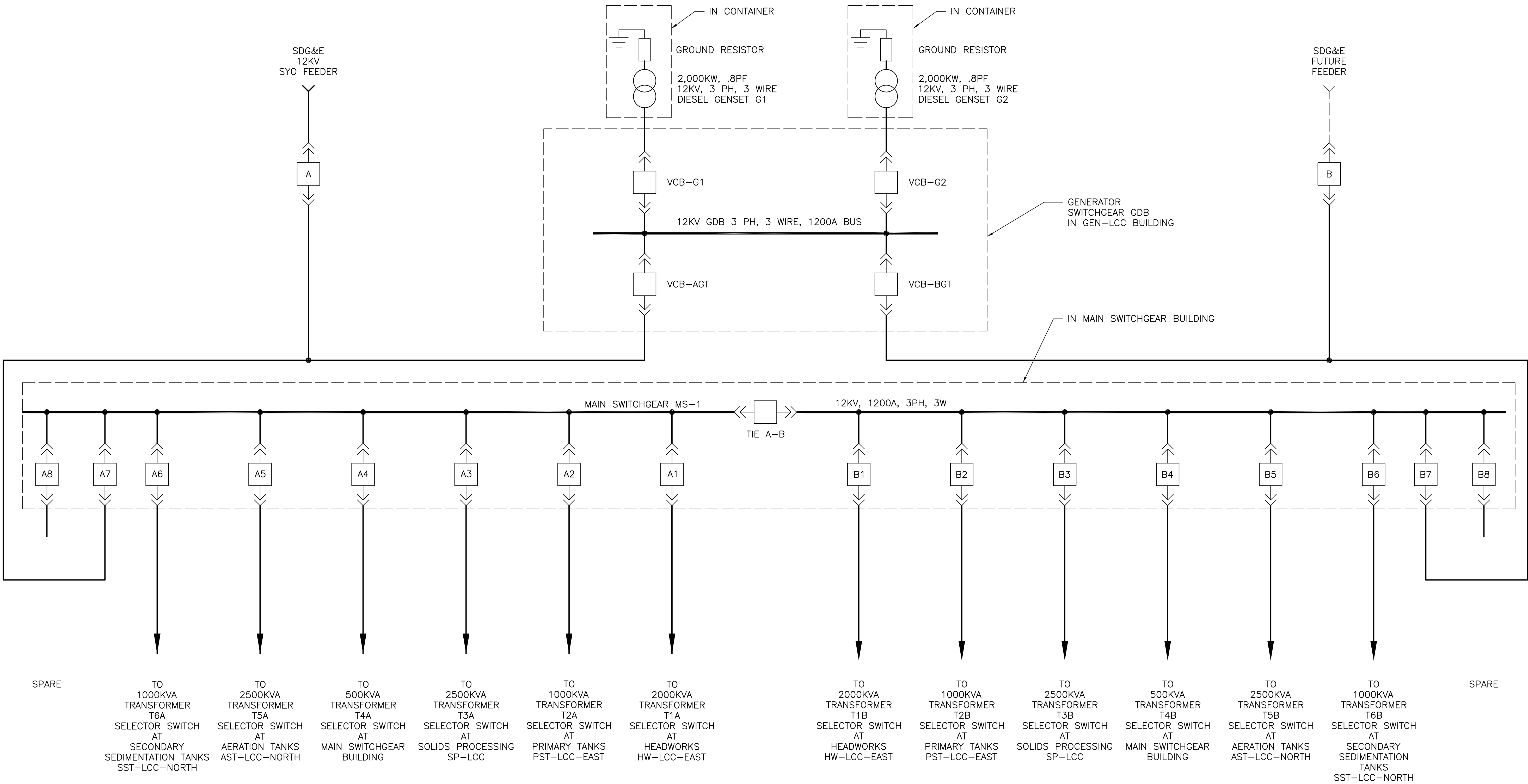


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OPERATION AND MAINTENANCE MANUAL
**STANDBY POWER
GENERATION FACILITIES**

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DATE MARCH 2011
FIGURE 2.12-1
CAD REF. NO. I30M FIG 2.12-1

XREFS: \\TLBLK.dwg IMAGES:None User:CARSON Spec:Pirnie STANDARD File:c:\proj\1991037\Q&M schematics\120M FIG 2.12-2.DWG Scale:1:1 Date:03/17/2011 Time:10:51 Layout:Blank



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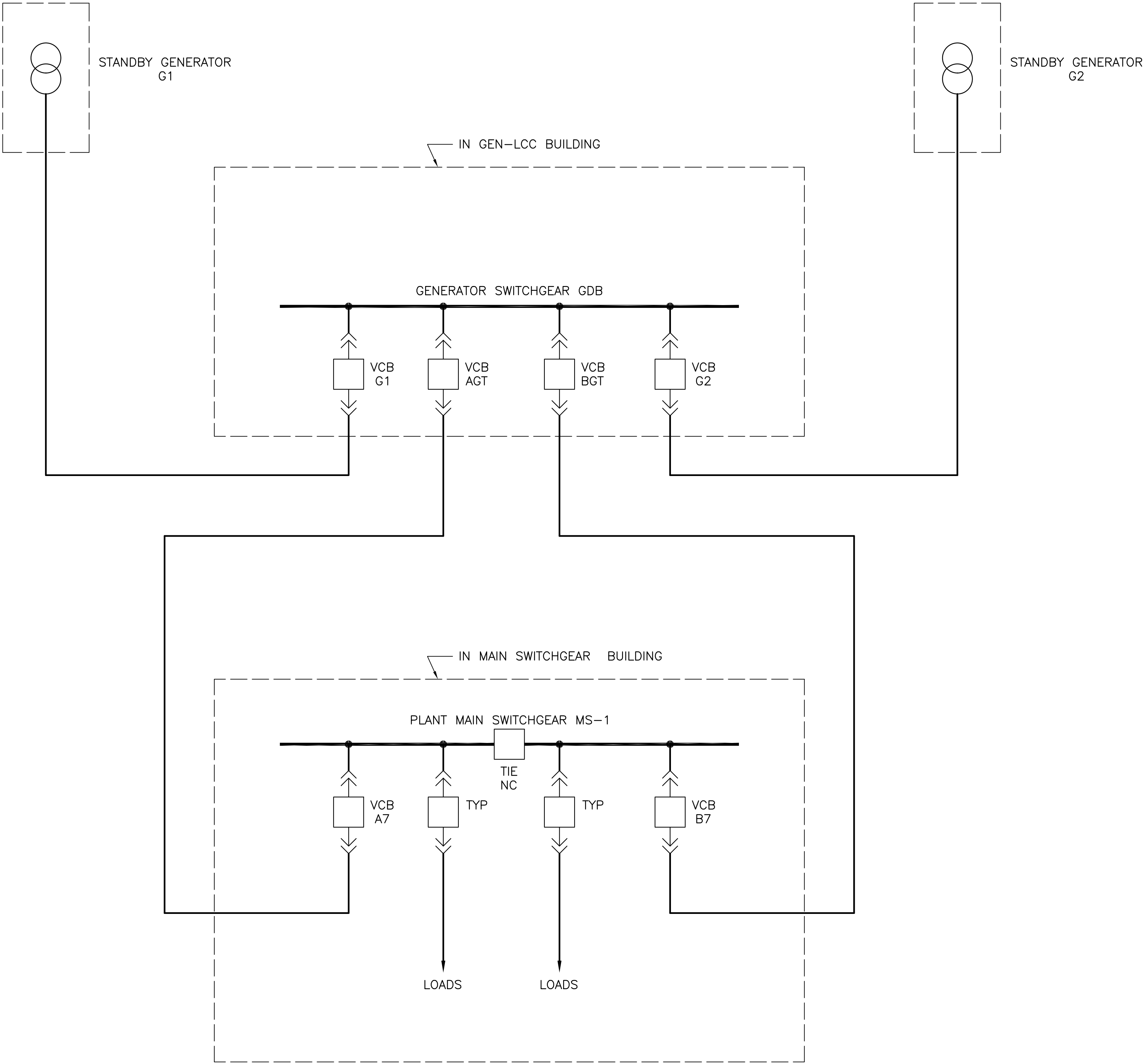
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**PLANT PARTIAL
ONE LINE DIAGRAM**

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FIGURE 2.12-2
CAD REF. NO. 120M FIG 2.12-2

XREFS: \\TLBUK.dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:1:proj\1991037\Q&M schematics\20M FIG 2.12-3.DWG Scale:1:1 Date:03/18/2011 Time:11:09 Layout:Blank



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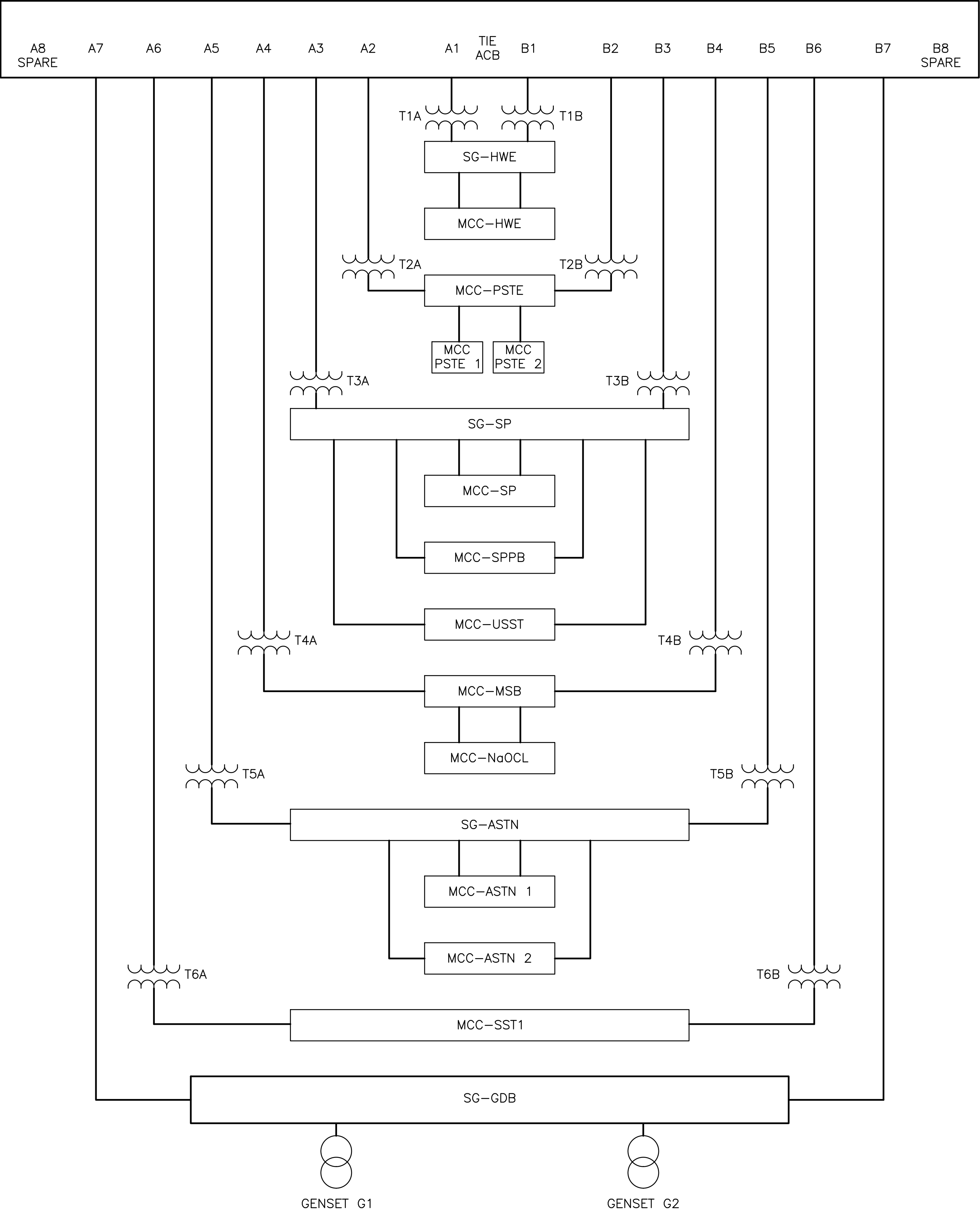
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**STANDBY POWER
PARTIAL ONE LINE DIAGRAM**

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FIGURE 2.12-3
CAD REF. NO. 130M FIG 2.12-3

XREFS: \\TLBLK.dwg IMAGES:None User:CARSON Spec:PIRNE STANDARD File:c:\proj\1991037\3&M schematics\130M FIG 2.12-4.DWG Scale:1:1 Date:03/17/2011 Time:11:28 Layout:Blank



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**PLANT POWER
BLOCK DIAGRAM**

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FIGURE 2.12-4
CAD REF. NO. 130M FIG 2.12-4



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OPERATION AND MAINTENANCE MANUAL
DIESEL FUEL STORAGE TANK

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FIGURE 2.12-5
CAD REF. NO. I30M FIG 2.12-5



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OPERATION AND MAINTENANCE MANUAL
**DIESEL FUEL TRANSFER
PUMP STATION NO.1**

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FIGURE 2.12-6
CAD REF. NO. I3OM FIG 2.12-6



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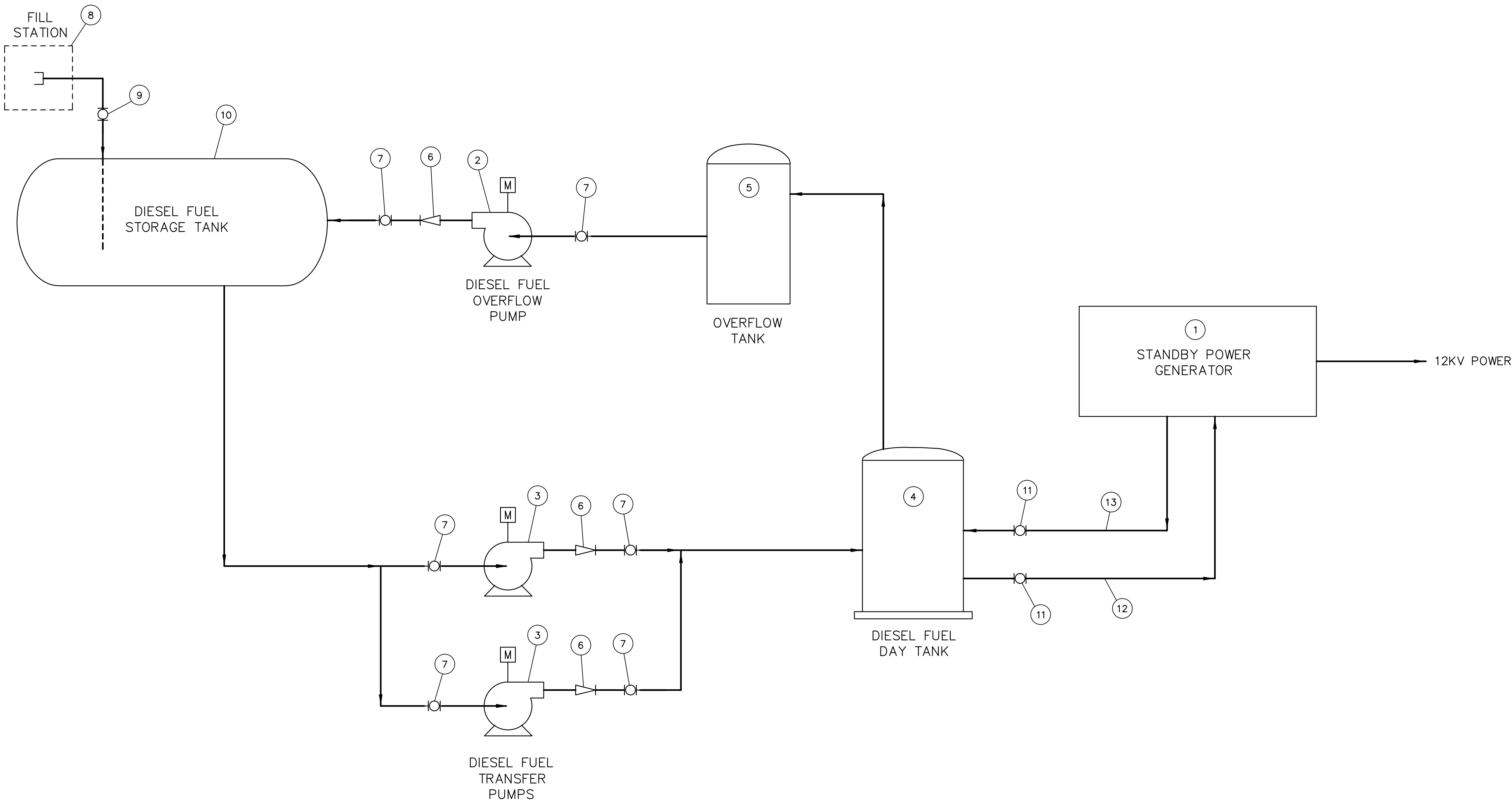
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OPERATION AND MAINTENANCE MANUAL
DIESEL FUEL TRANSFER
PUMP STATION NO.2

XREFS: \\TTLB\K.dwg IMAGES:None User:LARSON Spec:PIRNE STANDARD File: \\proj\1991037\O&M schematics\20M FIG 2.12-8.DWG Scale:1:1 Date:03/17/2011 Time:11:47 Layout:Blank

PARTIAL ASSEMBLY SCHEDULE	
ITEM	DESCRIPTION
1	12KV STANDBY POWER GENERATOR
2	DIESEL FUEL OVERFLOW PUMP, CAPACITY 7 GPM AT TDH = 15 FT, OBERDORFER PUMP MODEL 3000-32
3	DIESEL FUEL TRANSFER PUMP, CAPACITY 4 GPM AT TDH = 10 FT, OBERDORFER PUMP MODEL 922R-65
4	DIESEL FUEL DAY TANK, CAPACITY 300 GALLONS
5	DIESEL FUEL OVERFLOW TANK, CAPACITY 25 GALLONS
6	1 1/4" BRONZE CHECK VALVE
7	1 1/4" BRASS BALL VALVE
8	GROUND LEVEL FILL ASSEMBLY
9	3" BALL VALVE (BY FILL ASSEMBLY MANUFACTURER)
10	DIESEL FUEL STORAGE TANK, CAPACITY 10,000 GALLONS
11	1" BRASS BALL VALVE
12	1" GENERATOR FUEL SUPPLY PIPE, STL
13	1" GENERATOR FUEL RETURN PIPE, STL

NOTE:
SYSTEM SHOWN IS TYPICAL FOR GEN NO 1 AND GEN NO 2.



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**DIESEL FUEL FACILITIES
PROCESS SCHEMATIC**
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FIGURE 2.12-8
CAD REF. NO. 120M FIG 2.12-8

2.13 COLLECTION AND CONVEYANCE FACILITIES

2.13.1 Purpose

The purpose of the Collection and Conveyance Facilities is to collect and transfer raw sewage from the Tijuana, Mexico collection system and from fugitive transboundary wastewater streams to the South Bay IWTP for treatment. Five diversion structures collect transboundary sewage. Gravity sewers, two pump stations, and associated force main sewers convey the sewage to the plant Headworks.

2.13.2 Process Description

Gravity sewers convey sewage from Tijuana's Pumping Plant No. 1 and the International Interceptor to the IWTP Headworks. Three diversion structures, one each at Canyon Del Sol, Silva's Drain, and Stewart's Drain, collect transboundary sewage which is conveyed by gravity sewers to the plant Headworks. An off-site diversion structure at Goat Canyon collects transboundary sewage, which is then conveyed by gravity to the Goat Canyon Pump Station where it is pumped to the Hollister Street Pump Station. An off-site diversion structure at Smuggler's Gulch collects and conveys by gravity, transboundary sewage to the Hollister Street Pump Station which pumps the combined transboundary sewage flows to the tank drain system at the IWTP.

2.13.2.1 Diversion Structures

At each diversion structure, transboundary surface flow is impounded to prevent grit and heavy solids from entering the downstream collection system. Each diversion structure consists of a concrete approach apron, a perforated underdrain, a diversion intake structure with inlet weir, and a storm overflow weir across the main portion of the drainage channel. Stone rip rap protects the structures and adjacent downstream slopes from erosion.

Each diversion intake structure consists of two chambers. The first chamber traps heavy sand and grit that would otherwise enter the downstream collection system. Wastewater passes from the first chamber to the second chamber via a thru wall pipe with a flared elbow. A gravity sewer exits the second chamber carrying flow to the downstream collection system. When the first chamber fills with settled solids, flow through the flared

elbow is blocked, preventing solids carryover into the downstream pipeline. The diversion structure is cleaned manually before being returned to service.

During dry weather, transboundary flow is trapped behind the concrete storm weir across the drainage channel. The flow is collected via a perforated underdrain running parallel and immediately upstream of the storm weir, and is conveyed directly into the second chamber of the diversion structure.

During wet weather, or otherwise high flow conditions, flow will exceed the capacity of the underdrain system and begin to back up further behind the concrete storm weir. The level will rise to the elevation of the inlet weir window, at which point it will spill into the first chamber of the diversion structure. If flow exceeds the capacity of both the underdrain and the weir window, level will continue to rise until it crests over the storm weir and continues down the natural drainage channel.

Photographs of the five diversion structures are included as follows:

- Goat Canyon Diversion Structure - Figure 2.13-1
- Smuggler's Gulch Diversion Structure - Figure 2.13-2
- Canyon Del Sol Diversion Structure - Figure 2.13-3
- Silva's Drain Diversion Structure - Figure 2.13-4
- Stewart's Drain Diversion Structure - Figure 2.13-5

2.13.2.2 Pump Stations

The Goat Canyon Pump Station pumps sewage collected from the Goat Canyon Diversion Structure through two parallel force mains to the Hollister Street Pump Station. The Hollister Street Pump Station pumps combined flows from the Goat Canyon Pump Station and the Smuggler's Gulch Diversion Structure through two parallel force mains to the plant Headworks. Equipment at each pump station includes four submersible pumps, associated valves and appurtenances, surge arresters, an odor reduction station, and an emergency generator.

2.13.2.2.1 Goat Canyon Pump Station

Transboundary sewage from the Goat Canyon Diversion Structure flows through a 24-inch gravity sewer to the Goat Canyon Pump Station. An automatically controlled influent plug valve (MOV-1), located in the line just upstream of the wetwell, is used to isolate the

pump station in the event of a high water level condition in the wetwell. With the plug valve closed, flows will back up in the 24-inch pipeline from the Goat Canyon Diversion Structure, preventing further capture.

Four pumps are provided at the Goat Canyon Pump Station. Smaller capacity Pump Nos. P-1 and P-2 operate in a LEAD-STANDBY mode and are tied into a 12-inch force main. Larger capacity Pump Nos. P-3 and P-4 operate in the DUTY-LEAD mode, and are tied into a 16-inch force main. Both the 12-inch and 16-inch force mains transfer sewage to the Hollister Street Pump Station.

The force mains associated with the Goat Canyon Pump Stations may be subjected to high surge pressure during sudden flow velocity change that may occur due to an interruption in utility power. To handle the surge pressure, a surge arrestor tank is connected to each of the force mains at the Goat Canyon Pump Station. Each surge arrestor tank is approximately half full of water during normal operations. The upper half of the tank contains air that is at the same pressure as the pipeline. In the event of a power failure, the surge arrestors absorb and dampen out resulting pressure surges that occur in the force mains. The surge arrestors at the Goat Canyon Pump Station are equipped with vacuum release valves to allow air to enter the system when negative air pressures occur within the arresters.

The Goat Canyon Pump Station is provided with an odor reduction station to minimize any odors that may otherwise be emitted from the wetwell. Air and odorous gases such as hydrogen sulfide, are drawn from the wetwell into a three-stage scrubber. Air and odorous gases flow up through packing material as a mixture of sodium hydroxide and sodium hypochlorite flows down over the packing, stripping the odorous gases from the air. Make-up chemicals stored on site are automatically added to the sump of the scrubber unit by means of metering pumps. Oxidation Reduction Potential (ORP) and pH sensors on the suction of sump recirculation pumps, signal the need for sodium hypochlorite or sodium hydroxide respectively.

The odor reduction station is not provided with redundancy, as intermittent operation is anticipated and sewage flows are expected to be relatively fresh. Components of the odor control facility can be readily obtained and replaced in the event of failure.

An emergency generator at the pump station site is provided as a backup source of power in the event of utility power service failure. The emergency generator is sized to operate all

pump station equipment and is provided with an in-base diesel fuel tank sized to power all the operating equipment for a period of eight hours.

A photograph of the Goat Canyon Pump Station is included as Figure 2.13-6.

2.13.2.2.2 Hollister Street Pump Station

Transboundary sewage from Smuggler's Gulch Diversion Structure flows through a 30-inch gravity sewer to the Hollister Street Pump Station. Sewage is pumped from the Goat Canyon Pump Station through parallel 12-inch and 16-inch force mains into the 30-inch gravity line and then conveyed to the Hollister Street Pump Station. An automatically controlled influent plug valve (MOV-1), located in the line just upstream of the wetwell, is used to isolate the pump station in the event of a high level condition in the wetwell. With the plug valve closed, flows will back up in the 30-inch pipeline from the Smuggler's Gulch Diversion Structure, preventing further capture. In the event that the 30-inch gravity line is full and the pumps at Goat Canyon Pump Station are operating, flow will surcharge and backflow out of the Smuggler's Gulch Diversion Structure.

Four pumps are provided at the Hollister Street Pump Station. Smaller capacity Pump Nos. P-1 and P-2 are tied into a 16-inch force main and operate in a LEAD-STANDBY mode. Larger capacity Pump Nos. P-3 and P-4 are tied into a 30-inch force main and operate in a LEAD-LAG mode. Both 16-inch and 30-inch force mains convey sewage to the South Bay IWTP tank drain system. Flowmeters, which are located at the South Bay IWTP Canyon Collector Meter Vault, are installed in each of the force mains to monitor the pumped sewage flowrates entering the plant.

The force mains associated with the Hollister Street Pump Station may be subjected to high surge pressure during sudden flow velocity change that may occur due to an interruption in utility power. To handle the surge pressure, a surge arrestor tank is connected to each of the force mains at the Hollister Street Pump Station. Each surge arrestor tank is approximately half full of water during normal operations. The upper half of the tank contains compressed air that is at the same pressure as the pipeline. In the event of a power failure the surge arrestors absorb and dampen out the resulting pressure surges that occur in the force mains. The surge arrestors at the Hollister Street Pump Station are equipped with

an air compressor to introduce air into the system to maintain a desired air blanket.

The Hollister Street Pump Station is provided with an odor reduction station to minimize any odors that may otherwise be emitted from the wet well. Air and odorous gases such as hydrogen sulfide, are drawn from the wetwell into a three-stage scrubber t. Air and odorous gases flow up through packing material as a mixture of sodium hydroxide and sodium hypochlorite flows down over the packing, stripping the odorous gases from the air. Make-up chemicals stored on site are automatically added to the sump of the scrubber unit by means of metering pumps. ORP and pH sensors on the suction of sump recirculation pumps, signal the need for sodium hypochlorite or sodium hydroxide respectively.

The odor reduction station is not provided with redundancy, as intermittent operation is anticipated and sewage flows are expected to be relatively fresh. Components of the odor control facility can be readily obtained and replaced in the event of failure.

An emergency generator at the pump station site is provided as a backup source of power in the event of utility power service failure. The emergency generator is sized to operate all pump station equipment and is provided with an in-base diesel fuel tank sized to power all the operating equipment for a period of eight hours.

A photograph of the Hollister Street Pump Station is included as Figure 2.13-7.

2.13.3 Design and Performance Criteria

2.13.3.1 Diversion Structures

The following criteria were used for design of the diversion structures:

Maximum Surface Overflow Rate 60,000 gpd/sf

Goat Canyon Diversion Structure

Fugitive Flows

Average	2.33 MGD	(8,900 m ³ /day)
Peak	7.00 MGD	(26,600 m ³ /day)

Side Overflow Weir

Length	10.0 feet	(3.05 m)
Depth @ Peak	0.52 feet	(0.16 m)

100 Year Flood		
Flow	1316 cfs	(37.24 m ³ /sec)
Flood Weir Length	110.8 feet	(33.78 m)
Depth Over Weir @ Peak	2.43 feet	(0.74 m)

Smuggler's Gulch Diversion Structure

Fugitive Flows		
Average	4.67 MGD	(17,700 m ³ /day)
Peak	14.00 MGD	(53,200 m ³ /day)

Side Overflow Weir		
Length	20.0 feet	(6.10 m)
Depth @ Peak	0.52 feet	(0.16 m)

100 Year Flood		
Flow	1700 cfs	(48.11 m ³ /sec)
Flood Weir Length	66.25 feet	(20.20 m)
Depth Over Weir @ Peak	4.25 feet	(1.30 m)

Canyon Del Sol Diversion Structure

Fugitive Flows		
Average	0.67 MGD	(2,500 m ³ /day)
Peak	2.00 MGD	(7,600 m ³ /day)

Side Overflow Weir		
Length	5.0 feet	(1.52 m)
Depth @ Peak	0.33 feet	(0.10 m)

100 Year Flood		
Flow	400 cfs	(11.33 m ³ /sec)
Flood Weir Length	30.0 feet	(9.14 m)
Depth Over Weir @ Peak	2.55 feet	(0.78 m)

Silva's Drain Diversion Structure

Fugitive Flows		
Average	0.33 MGD	(1,300 m ³ /day)
Peak	1.00 MGD	(3,800 m ³ /day)

Side Overflow Weir		
Length	5.0 feet	(1.52 m)
Depth @ Peak	0.21 feet	(0.06 m)

100 Year Flood		
Flow	260 cfs	(7.36 m ³ /sec)
Flood Weir Length	20.0 feet	(6.10 m)
Depth Over Weir @ Peak	2.52 feet	(0.77 m)

Stewart's Drain Diversion Structure

Fugitive Flows		
Average	1.67 MGD	(6,300 m ³ /day)
Peak	5.00 MGD	(19,000 m ³ /day)

Side Overflow Weir		
Length	10.0 feet	(3.05 m)
Depth @ Peak	0.38 feet	(0.12 m)

100 Year Flood		
Flow	100 cfs	(2.83 m ³ /sec)
Flood Weir Length	70.8 feet	(21.59 m)
Depth Over Weir @ Peak	0.57 feet	(0.17 m)

2.13.3.2 Conveyance Pipelines

<i>Gravity Sewer Collection Point</i>	<u>Size</u>	<u>Capacity</u>
Goat Canyon Diversion Structure	24" (61 cm)	7.0 MGD (26500 m ³ /d)
Smuggler's Gulch Diversion Structure	30" (76 cm)	14.0 MGD (53000 m ³ /d)
Canyon Del Sol (CDS) Diversion Structure	16" (41 cm)	2.0 MGD (7600 m ³ /d)
Silva's Drain Diversion Structure	12" (30 cm)	1.0 MGD (3800 m ³ /d)
Stewart's Drain Diversion Structure	18" (46 cm)	5.0 MGD (18900 m ³ /d)
Junction Box No.2 (CDS + Silva's Drain)	20" (51 cm)	3.0 MGD (11400 m ³ /d)
Interstate Interceptor	72" (183 cm)	100 MGD (379000 m ³ /d)
Tijuana Pump Plant No.1 Diversion Structure	72" (183 cm)	100 MGD (379000 m ³ /d)

Junction Box No. 1	96" (249 cm)	200 MGD (757000 m ³ /d)
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Force Main Sewer Collection Point

	<u>Size</u>	<u>Capacity</u>
Goat Canyon Pump Station	12" & 16" (30 cm & 41 cm)	7.0 MGD (26500 m ³ /d)
Hollister Street Pump Station	16" & 30" (41 cm & 76 cm)	21.0 MGD (79500 m ³ /d)

2.13.3.3 Pump Stations

Goat Canyon Pump Station

Nominal Pump Station Capacity	7.0 MGD	(26500 m ³ /d)
-------------------------------	---------	---------------------------

Number of Pumps	4
Maximum Number of Pump Starts	6 per hour

Pumps P1 and P2 Design Point @ High Static Head	1835 gpm @ 105' TDH (6.9 m ³ /d @ 32 m)
@ Low Static Head	2435 gpm @ 101' TDH (9.2 m ³ /d @ 31 m)

Pumps P3 and P4 Design Point @ High Static Head	3085 gpm @ 70' TDH (11.7 m ³ /d @ 21 m)
@ Low Static Head	4000 gpm @ 61' TDH (15.1 m ³ /d @ 19 m)

Odor Reduction Station	
Airflow rate	670 cfm
Hydrogen sulfide concentration	25 ppm
Removal efficiency	99%
Packing Height, minimum	11'-9"
Static pressure, maximum	5" w.c.
Recirculation rate	20 gpm @ 20" TDH

Emergency Generator	
Operating Period	8 hours

Hollister Street Pump Station

Nominal Pump Station Capacity	21.0 MGD (79500 m ³ /d)
Number of Pumps	4
Maximum Number of Pump Starts	8 per hour
Pumps P1 and P2 Design Point @ High Static Head	2,660 gpm @ 78' TDH (10.1 m ³ /d @ 24 m)
@ Low Static Head	3,580 gpm @ 60' TDH (13.6 m ³ /d @ 18 m)
Pumps P3 and P4 Design Point (One Pump Running) @ High Static Head	9,751 gpm @ 61' TDH (36.9 m ³ /d @ 19 m)
@ Low Static Head	13,000 gpm @ 48' TDH (49.2 m ³ /d @ 15 m)
Pumps P3 and P4 Design Point (Two Pumps Running) @ High Static Head	11,850 gpm, 71' TDH (44.9 m ³ /d @ 22 m)
@ Low Static Head	16,950 gpm, 67' TDH (64.2 m ³ /d @ 20 m)
Odor Reduction Station	
Airflow rate	1000 cfm
Hydrogen sulfide concentration	25 ppm
Removal efficiency	99%
Packing Height, minimum	11'-9"
Static pressure, maximum	8" w.c.
Recirculation rate	20 gpm @ 20" TDH
Emergency Generator	
Operating Period	8 hours



XREFS: \\TLBUK.dwg IMAGES: \\pro\\1991037\\Q&M schematics\\images\\fig 2.13-1_Goat Canyon05.jpg
User: Dong Spec: PIRNIE STANDARD File: \\pro\\1991037\\Q&M schematics\\20M FIG 2.13-1.DWG Scale: 1:1 Date: 04/06/2011 Time: 08:58 Layout: Blank

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FIGURE 2.13-1
CAD REF. NO. I20M FIG 2.13-1



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FIGURE 2.13-2
CAD REF. NO. I2OM FIG 2.13-2



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FIGURE 2.13-3
CAD REF. NO. I20M FIG 2.13-3



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FIGURE 2.13-4
CAD REF. NO. I2OM FIG 2.13-4



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FIGURE 2.13-5
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PUMP STATION

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FIGURE 2.13-6
CAD REF. NO. I2OM FIG 2.13-6



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OPERATION AND MAINTENANCE MANUAL
HOLLISTER STREET
PUMP STATION

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FIGURE 2.13-7
CAD REF. NO. I20M FIG 2.13-7

Chapter 3

EQUIPMENT DESCRIPTION

NOTICE AND CAUTIONS TO USERS OF THIS O&M MANUAL

This O&M Manual provides a general overview only of the South Bay International Wastewater Treatment Plant (SBIWTP).

This O&M Manual relies on information obtained from the various equipment manufactures and the Construction Contractors that were involved in construction of the SBIWTP. The information obtained from equipment manufacturers and construction Contractors was reviewed by Malcolm Pirnie only for general compliance with the submittal requirements specified in construction Contract Documents.

All USERS of this O&M Manual shall be required to consult the detailed O&M Manuals provided by the equipment manufactures and Construction Contractors and to understand and follow the directions given therein for safe operation and maintenance of all equipment and systems prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all safety manuals published and provided by their employer(s) and to understand and follow all directions given therein, including but not limited to *Personnel Protective Equipment (PPE)*, *Electrical Lock-Out Procedures*, *Fall Prevention Procedures* and *Confined Space Entry Procedures* prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all “record” drawings and to understand how equipment and systems are intended to be operated and controlled prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to understand and acknowledge that the SBIWTP contains chemicals and equipment that if not operated and/or maintained in a responsible and safe manner can result in serious injury or death.

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3.1 HEADWORKS

3.1.1 Screenings Facilities

Influent sewage flows to the Screenings Facilities are delivered via a 96-inch gravity line that extends from Junction Box No. 1 and via a 48-inch gravity tank drainage line. Junction Box No. 1 contains a 96-inch x 96-inch heavy duty, cast iron, motor-operated sluice gate manufactured by Hydro Gate Corporation, Series 501. The sluice gate is driven by a Limitorque Actuator, L-120 Series, Type 40, Model B320-70, 25 lbs/ft load, 3.2 hp, 3 phase, 60 Hz, 460 v.

The initial Screening Area consists of three (3) mechanically cleaned climber screens and three (3) manually cleaned bar screens for bypass of the mechanical screens. One (1) of the manual screens is installed at a future mechanical screen location. Each of the six (6) screens is located in a 4 ft wide x 8 ft deep channel which is covered with fiberglass checkplate, and provided with 4 ft by 6 ft 316L stainless steel isolation slide gates manufactured by Golden Harvest Inc., Model GH-45, upstream and downstream of the screen. The gates are designed for 6 ft of seating head and 0 ft of unseating head and may be operated manually or with a portable hydraulic operator manufactured by Golden Harvest, Model GH-1050E, 80 lbs/ft maximum torque with Baldor Electric, 2 hp, 1 phase, 60 Hz, 230 v TEFC motor. The three manually cleaned screens are isolated at all times unless a mechanical bar screen is out of service and additional screening capacity is required. The maximum water depth in the screening channels is 5.2 ft, and the total peak flow per screen is 34.7 MGD. For ultimate conditions, an additional six (6) screens will be provided in the mirror image Headworks Facility expansion.

3.1.1.1 Mechanical Bar Screens

The mechanical bar screens which consist of a bar rack, a rake arm mounted on a drive mechanism, and a screening discharge chute, are manufactured by Fairfield Service Company, Model RPFF-S. The manual bar racks are manufactured by Faben Industries. Each screen is four (4) ft wide. The mechanical screen clear opening width is 5/8-inch and the manual screen clear opening width is 1-1/2 inches. Each screen is angled 80 degrees

from horizontal and has a total height of the screen mechanism from the screening channel invert to the top of the screen housing of approximately 54 ft.

Each mechanical screen is equipped with a U.S. Electrical Motor, Model No. G98728, 5 hp, 1750 rpm, 3 phase, 60 Hz, 460 v, explosion-proof motor. Debris is removed from the bar rack by a 304 stainless steel rake assembly designed to mesh with the bar rack. The rake transports screenings from the bar rack up to the Screenings Discharge Area and is capable of lifting a minimum load of 250 lbs/ft of rake per cycle at minimum travel speed of 40 ft per minute. A bubbler differential level sensing system is provided in order to monitor the water surface elevations upstream and downstream of the screens. The bubbler system overrides the timer control system if the difference between the upstream and downstream elevations rises above a preset level.

A nonpotable water eductor is used to dewater screenings channels which have been isolated on both ends. The eductor discharges to the IPS Wetwell. A rock pit is provided at the influent end of each screening channel in order to prevent large rocks from reaching the mechanical screens and interfering with operation of the mechanical rake arms. A boom truck is used to remove bins lowered into the screenings channels to remove bins used to collect rocks.

A process schematic for the Headworks Facilities is presented in Figure 3.1-1.

3.1.1.2 Conveyors

Two (2) horizontal, 24-inch wide, Geirlich-Mitchel, Inc., BELTWALL belt conveyors are provided. Each conveyor is driven by a Baldor Electric Motor, Model 06, 1 1/2 hp, 3 phase, 60 Hz, 460 v, motor.

Each conveyor is capable of handling screenings at a rate of 5 tons per hour at a maximum belt speed of 50 ft per minute. Screenings removed from the influent flow stream are lifted by the mechanical screens and discharged to the conveyors at the Screenings Discharge Area which is located approximately 9 ft above grade on a platform which spans the Screening Area. Each conveyor discharges to either one of two roll-off type storage bins located in the Storage Bin Area.

The mechanical screens are staggered such that each conveyor ultimately carries screenings for two mechanical screens. Conveyor No. 1 services Screen No. 1 and Screen

No. 3, while Conveyor No. 2 services Screen No. 2 and future Screen No.4. Each conveyor is furnished with an electrically operated, Type 304 stainless steel deflector plow which diverts the screenings material over the side of the conveyor belt through a 304 stainless steel discharge chute into the first storage bin. Screenings material which is not diverted into the first storage bin travels to the end of the conveyor where a fixed deflector plow diverts the material through a 304 stainless steel discharge chute to the second storage bin.

The Storage Bin Area is sized to accommodate two (2) roll-off type screenings and grit disposal containers, having dimensions of 7 ft high including the tarp cover in a fully retracted position, 8 ft wide and 22 ft long. Four (4) storage bins are provided with two (2) serving as standby storage capacity. Two (2) single container roll-off type semi trailers, having an overall length of 38 ft - 6 in, are provided to haul off the screenings and grit and are designed to pull the bins out of the Bin Storage Area and onto the truck bed via a truck mounted winch system. Each of the two semi-trailers has two trailer-mounted winches. The retrieving electrical winch (line force is 10 tons) is located at the rear of the trailer and is provided to pull the container from the Bin Storage Area. The front-mounted hydraulic winch (line pull force is 25 tons) is provided to pull the bin onto the truck bed.

The Bin Storage Area is provided with two Transport Winches and two Positioning Winches sized for a maximum bin weight of 20 tons (one set of winches for each bin loaded bay). When a bin is returned from the disposal facilities, it is brought back into the Storage Bin Area via a Transport Winch. When a bin is brought completely into the building, the Transport Winch is disconnected and the Positioning Winch is connected to the bin. The Positioning Winch is then used to evenly distribute grit and screenings discharge to the bin by changing the position of the bin and eliminating piles.

The Transport and Positioning winches are manufactured by Thern, Models 4WS3M-S3 and 4WS3M10-S, respectively, and sized to pull in and reposition a 40,000 lb load (line pull force required is 2,400 lbs). Both winches are driven by 3 hp, explosion proof, 3 phase, 60 Hz, 460 v Baldor Electric motors.

Each trailer/container arrangement has a capacity of approximately 30.5 cubic yards and is emptied every 1.65 days assuming a combined grit and screenings production rate of 500 cubic feet per day. IBWC sludge trucks/tractors are used to connect to and drive the

grit/screenings hauling equipment for disposal. Each truck/tractor is three-axle, diesel driven, 6 cylinder and 300 hp.

3.1.2 Influent Pump Station

3.1.2.1 Wetwell

Under the Advanced Primary Treatment Plant (CC-2), the IPS Wetwell was constructed to provide flows to the influent pumps. The wetwell is 60 ft (18.3m) long, 14 ft (4.3 m) wide with a maximum sidewater depth (SWD) of 12.67 ft (4.0 m). The operating volume is 82,000 gallons. For ultimate conditions a mirror image wetwell will be provided.

The initial IPS is sized to deliver a peak flow of 100 MGD plus recycle to the Aerated Grit Chamber. Screened plant influent enters the IPS from the influent channel through six (6), 24-inch, square openings. Flow to the IPS Wetwell can be directed to either the east or west portion for maintenance or low flow conditions. In order to direct flows to the western portion of the IPS Wetwell, a 5 ft x 9 ft 316 SS stop plate is inserted into the IPS influent channel shutting off flow to the eastern portion of the wetwell. In order to direct flows to the eastern portion of the IPS wetwell, the three (3) 2 ft x 2 ft influent slide gates in the western portion of the wetwell are closed. A 6 ft x 9 ft 316 SS wetwell isolation stop plate is installed in the wetwell divider wall when isolating either portion of the IPS wetwell.

The isolation 2 ft x 2 ft slide gates are manufactured by Golden Harvest, Model GH-45, 316 stainless steel. The gates are designed for 8 ft of seating and unseating head and are handwheel operated.

In order to allow floatable material to pass from the IPS influent channel to the IPS wetwell, each portion (eastern and western) of the IPS wetwell is provided with one 3 ft x 4 ft, 316 SS, downward-opening Golden Harvest, Model GH-65 weir slide gate that is operated manually or with a portable hydraulic operator. The gates are designed for maximum seating head of 0 ft and maximum unseating head of 4 ft.

3.1.2.2 Pumping Equipment

Five (5) Fairbanks Morse, Model VTSH-AWF vertical turbine solids handling (VTSH) pumps, three (3) furnished with variable frequency drives and two (2) furnished with

constant speed drives, are supplied to meet the initial design condition flow requirements. Provisions are made for the installation of a future constant speed pump. Each constant speed pump is capable of delivering 18,000 gpm at an estimated total dynamic head (TDH) of 60 feet and each variable speed pump is capable of delivering 7,000-18,000 gpm at an estimated TDH of 43 ft to 60 ft. In order to meet the initial peak flow requirement of 100 MGD plus recycle flows, two (2) variable speed and two (2) constant speed pumps are in operation with the remaining variable speed pump serving as a standby unit. Each pump is furnished with a 1-inch NPW seal water supply connection and flow meter. Each pump is driven by a 350 hp, U.S. Electrical Motors, 720 rpm, 3 phase, 60 Hz, 460 v, explosion proof motor equipped with a reduced voltage starter.

The influent pumps discharge into a 60-inch cement mortar lined ductile iron header which carries influent flows to the aerated grit chamber. This line is equipped with a 60-inch magnetic flow meter located in the Influent Meter Vault. The meter is manufactured by Fischer & Porter Co., Model 10DX3111. It is a flanged tube type, polyurethane lined with 316 SS electrodes. The meter is capable of reading and indicating a flow range of 0 to 75,000 gpm.

The influent metering arrangement is completed with two isolation 60-inch plug valves and a bypass line with a 60-inch isolation plug valve.

3.1.3 Grit Removal Facilities

3.1.3.1 Grit Chamber

Under the Advanced Primary Treatment Plant (CC-2), one (1) Aerated Grit Chamber was constructed having six (6) hoppers. The grit chamber is 72 ft (21.9 m) in length, 28 ft (8.5 m) wide with a sidewater depth of 14 ft (4.3 m).

Influent wastewater enters the grit chamber via a 60-inch CLDI pipeline from the influent meter vault. Three (3) 6 ft by 9 ft manually operated isolation stop plates are provided to direct flows either through the Aerated Grit Chamber or through the bypass channel.

3.1.3.2 Grit Removal Equipment

Grit pumps are located in the grit pump gallery on the east side of the grit chamber. For the initial facilities, six (6) pumps, one for each grit hopper, are provided. Each pump is a constant speed, recessed impeller centrifugal type supplied by Wemco, Model C. Each grit pump is sized to deliver 160 gpm against TDHs of 121 ft, 80 ft, and 55 ft, at design, intermediate and minimum capacity, respectively, to the Grit Classifier/Separator units located in the Grit Dewatering Area of the Headworks Building. Each pump is driven by a Reliance Electric, Model P32G3320, 40 hp, 1800 rpm, 460 v, 3 phase, 60 Hz, TEFC-XEX enclosure, high efficiency, severe duty motor.

The grit pumps discharge into two 6-inch headers that lead to the grit dewatering equipment. One header is provided for pumps 1, 2, and 3 and another one for pumps 4, 5 and 6. Both headers are provided with 6-inch magnetic flow meters manufactured by Fischer & Porter Co., Model 10DX3111. Each meter is a flanged tube, teflon PTFE lined, with 316 SS electrodes. The meters are capable of reading and indicating a flow range of 0 to 460 gpm.

For ultimate conditions, an additional, mirror image grit chamber module will be constructed containing six (6) pumps for an ultimate total of twelve (12) grit pumps.

3.1.3.3 Grit Classifier/Separators

Three (3) grit classifier/separator units are installed in the Grit Dewatering Area of the Headworks Area Structure for the initial facilities. Two (2) grit classifier/separators are in service for initial design conditions and one (1) unit serves as standby. Each classifier/separator consists of a Wemco, Model 1500C, WEMCLONE separator and a Wemco, Model 18F, 18-inch diameter screw type dewatering grit classifier. Each grit classifier/separator is sized for a maximum capacity of 500 gpm at an inlet pressure of 8 psig.

Each grit Classifier/Separator is supplied with a Baldor Electric, 1 hp, 1750 rpm, 460 v, 3 phase, 60 Hz, explosion proof motor.

A one (1) ton manual trolley hoist is provided in order to remove the cyclone separator or the grit classifier for maintenance as required.

3.1.3.4 Aerated Grit Chamber Blowers

Air is supplied to the grit chamber by two (2) blowers located at the north end of the grit pump gallery. One (1) blower is in operation while the other will serve as a standby unit. The blowers are manufactured by Sutorbilt, Type 6ML-RHC, Model GAFMDL (A). Each blower is capable of supplying an air flow rate of 440 cubic feet per minute at a discharge pressure of 10 psig. Each blower is equipped with a U.S. Electric, Model 7972, 40 hp, 1775 rpm, 3 phase, 60 Hz, 460 v, TEFC, constant speed motor. A set of sheaves is provided for maximum and minimum design speeds of 2000 rpm and 1400 rpm, respectively, which will allow for a flow range of 290 to 530 cubic feet per minute.

3.1.4 Odor Reduction Station

The objective of the Headworks Odor Reduction Station is to remove hydrogen sulfide (H₂S) and other odorous compounds from the following locations:

Process Areas	Type of Containment
Headworks Inlet/Junction Structures	Covered
Screening Area (channels)	Covered
Influent Pump Station - Wet well	Covered
Storage Bin/Grit Dewatering Areas	Building

The Headworks Odor Reduction Station consists of odor reduction station (ORS) exhaust fans, ORS scrubber, ORS pH and ORP controllers, ORS recirculation pumps, ORS chemical feed systems, ORS NaOH and NaOCl metering pumps, ORS NaOH and NaOCl chemical storage tanks, ORS water softening system, Storage Bin/Grit Dewatering Areas ventilation system, and Screening Discharge and IPS wetwell ventilation system. Process and air flow schematics for the headworks odor reduction facilities are presented in Figures 3.1-2 and 3.1-3, respectively.

3.1.4.1 Odor Reduction Station Scrubber Exhaust Fans

Two (2) exhaust fans, OREF1 and OREF2, are provided as part of the CC-2 Advanced Primary Treatment Plant portions of the South Bay IWTP to ventilate the screening channels, IPS wetwell, and Storage Bin/Grit Dewatering Areas. One exhaust fan is

a standby unit. The screening channels IPS wetwell and the Headworks Inlet and Junction structures are ventilated at a rate of six (6) air changes per hour. The Storage Bin/Grit Dewatering Areas are ventilated at a rate of twelve (12) air changes per hour.

The two fiberglass, belt driven centrifugal type fans are located adjacent to the ORS scrubber tower. The fans are manufactured by Ceilcote Air Pollution Control, Inc., Model CLUB 3650. Each of the fans has a 36-inch diameter wheel which produces a measured 16,531 cfm at a static pressure of about 11.8 inches of water at 1480 rpm.

Each fan is driven by a constant speed, explosion proof corrosive duty, solid shaft, Reliance, Duty Master, 50 hp, 1775 rpm, 460 v, 3 phase, 60 Hz motor.

3.1.4.2 Odor Reduction Station Scrubber

The single fiberglass one-stage counter current odor scrubber tower is manufactured by R.J. Environmental, Inc., and is located south-east of the Influent Pump Station. The 30 feet high tower has a bed of packing which consists of 3 1/2-inch polyethylene Lanpac packing as manufactured by Lantee Products. Above the packing is a manifold with seven 2-inch teflon fog nozzles manufactured by Bete which distribute scrubber solution over the bed. Above the scrubber solution manifold is a mist eliminator manufactured by Kimre Inc., Model B-GON to minimize liquid droplets exiting through the discharge of the tower. Above the mist eliminator is an acid distribution header with seven 1-inch teflon fog nozzles manufactured by BETE which is used in the cleaning of the scrubber. The scrubber is designed to meet the following:

Flow rate (cfm)	16,200
Number of systems	1
Number of tower/system	1
Total residence time (sec)	1.5 to 1.7
Inlet H ₂ S concentration (ppm)	25
System efficiency (%)	99
Vessel size:	
Diameter (ft)	7
Side wall height (ft)	30

3.1.4.3 Odor Reduction Station pH and ORP Controllers

The scrubber solution is continuously monitored for pH and ORP. The two separate analyzers are installed in a bypass line which runs between the recirculation pump suction and discharge piping. The pH and ORP analyzers are both Great Lakes Instruments, Model 692P3F5A7N and 692R3F5A7F, respectively. The pH probe is a Model 6028P0 with a measurement range of 0.0 to 14.0 pH. The ORP probe is a Model 2028R0 with a measurement range of -2000 to 2000 mV.

3.1.4.4 Odor Reduction Station Recirculation Pumps

Scrubber solution is continuously re-circulated by recirculation pumps from the scrubber sump to the distribution manifold. The scrubber solution flows by gravity through the packing media to the sump. Two (2) fiberglass, end suction, centrifugal, frame mounted recirculation pumps are located adjacent to the odor reduction scrubber tower. The pumps are manufactured by Fybroc, Model 1500. Each pump has a 4-inch inlet, 3-inch outlet and 8 1/2-inch impeller which provide a design flow of 240 gpm, at 65 ft TDH. The pumps are equipped with T. B. Woods No. 7, motor-to-pump flexible couplings, Duramatalic ROX double mechanical seals, and seal water flush. Each pump is driven by a constant speed, TEFC, Siemens Model RG2ESD, 7 1/2 hp, 1800 rpm, 460 v, 3 phase, 60 Hz motor.

3.1.4.5 Odor Reduction Station Sodium Hydroxide (NaOH) Metering Pump

Two (2) NaOH double diaphragm, positive displacement type metering pumps are located at the odor reduction station adjacent to the NaOH storage tank within the corresponding containment area. Each is manufactured by PalsaFeeder, Model 680-S-AE, and is capable of delivering 0.3 to 3.0 gallons per hour at a maximum pressure of 125 psig and a maximum stroke speed of 44 strokes per minute. Each pump is driven by a totally enclosed, chemical duty, Baldor, 1 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor. The motor is connected to the pump shaft by a flexible coupling. The output volume of the pump is adjustable over a range of 10:1 with an Elma, 240 v, single phase, 60 Hz electric stroke length actuator. Additionally each pump is provided with a pulsation dampener, pressure relief valve, calibration column, back pressure control valve, and a conductivity sensor for detection of diaphragm leakage. One pump is a standby unit.

3.1.4.6 Odor Reduction Station Sodium Hypochlorite (NaOCl) Metering Pump System

Two (2) NaOCl double diaphragm, positive displacement, type metering pumps are located at the odor reduction station adjacent to the NaOCl storage tank within the corresponding containment area. Each is manufactured by PulsaFeeder, Model 880-S-AE, and is capable of delivery 3.1 to 23.0 gallons per hour at a maximum pressure of 125 psig and a maximum stroke speed of 58 strokes per minute. Each pump is driven by a totally enclosed, chemical duty, Baldor, 1 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor. The motor is connected to the pump shaft by a flexible coupling. The output volume of the pump is adjustable over a range of 10:1 with an Elma, 240 v, single phase, 60 Hz electric stroke length actuator. Additionally, each pump is provided with a pulsation dampener, pressure relief valve, calibration column, back pressure control valve, and a conductivity sensor for detection of diaphragm leakage. One pump is a standby unit.

3.1.4.7 Odor Reduction Station NaOH Storage Tank

The NaOH tank is located just south of the scrubber tower and provides 30 days of storage capacity. The tank is manufactured of fiberglass reinforced plastic using Derakane 411 resin, with an interior nexus veil corrosion-resistant barrier also fabricated with Derakane 411 resin. The tank is provided with a dished head and a ladder for access to the top. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as pressure relief, overflow pipe, and drain pipe, are provided. The tank is enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

The tank is 5 ft in diameter with a 7 ft straight shell height, 1000 gallons, and is manufactured by Belco Manufacturing Company.

The NaOH tank is designed for 1.53 specific gravity and is provided with 2-inches of polyurethane thermal insulation. Electric heat tracing which provides heating of the tank and operates on 240 VAC is manufactured by Thermon.

3.1.4.8 Odor Reduction Station NaOCl Storage Tank

The NaOCl tank is located just south of the scrubber tower and due to the natural degradation of the NaOCl solution, provides only 14 days of storage capacity. The tank is manufactured of fiberglass reinforced plastic using Derakane 411 resin, with an interior nexus veil corrosion-resistant barrier, also fabricated with Derakane 411 resin. The tank is provided with a dished head and a ladder for access to the top. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as pressure relief, overflow pipe, and drain pipe, are provided. The tank is enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

The tank is 8 ft in diameter with a 14 ft-6-inch straight shell height, has a capacity of 5,400 gallons and is manufactured by Belco Manufacturing Company. The NaOCl tank is designed for 1.22 specific gravity.

3.1.4.9 NaOH and NaOCl Containment Sump Pumps

To control spills, rainwater, and washwater within the sodium hydroxide and sodium hypochlorite containment areas, each area is provided with a sump and one (1) totally enclosed Barnes 3SE1544DS submersible simplex pump with a 1.5 hp, 1750 rpm, 460 v, 3 phase, 60 hz motor with a double mechanical seal. The sump pump is manually controlled.

3.1.4.10 Water Softening System

An automatic water softening system, ion exchange type, is provided to treat make-up water for the scrubber. The water softener is located just east of the scrubber tower and is manufactured by Culligan, Model 9000, and is capable of producing a maximum flow of 6 gpm and daily capacity of 2,900-3,000 gallons. The unit includes two softening ion exchange vessels and a brine tank. The unit is provided with automatic controls to alternate tanks, and regulate the regeneration cycles. The control system operates on 120 v, single phase, 60 Hz electrical current. A calcium analyzer manufactured by Jenco Instruments, model J3675 is provided to monitor water hardness.

3.1.4.11 Storage Bin/Grit Dewatering Areas Ventilation System

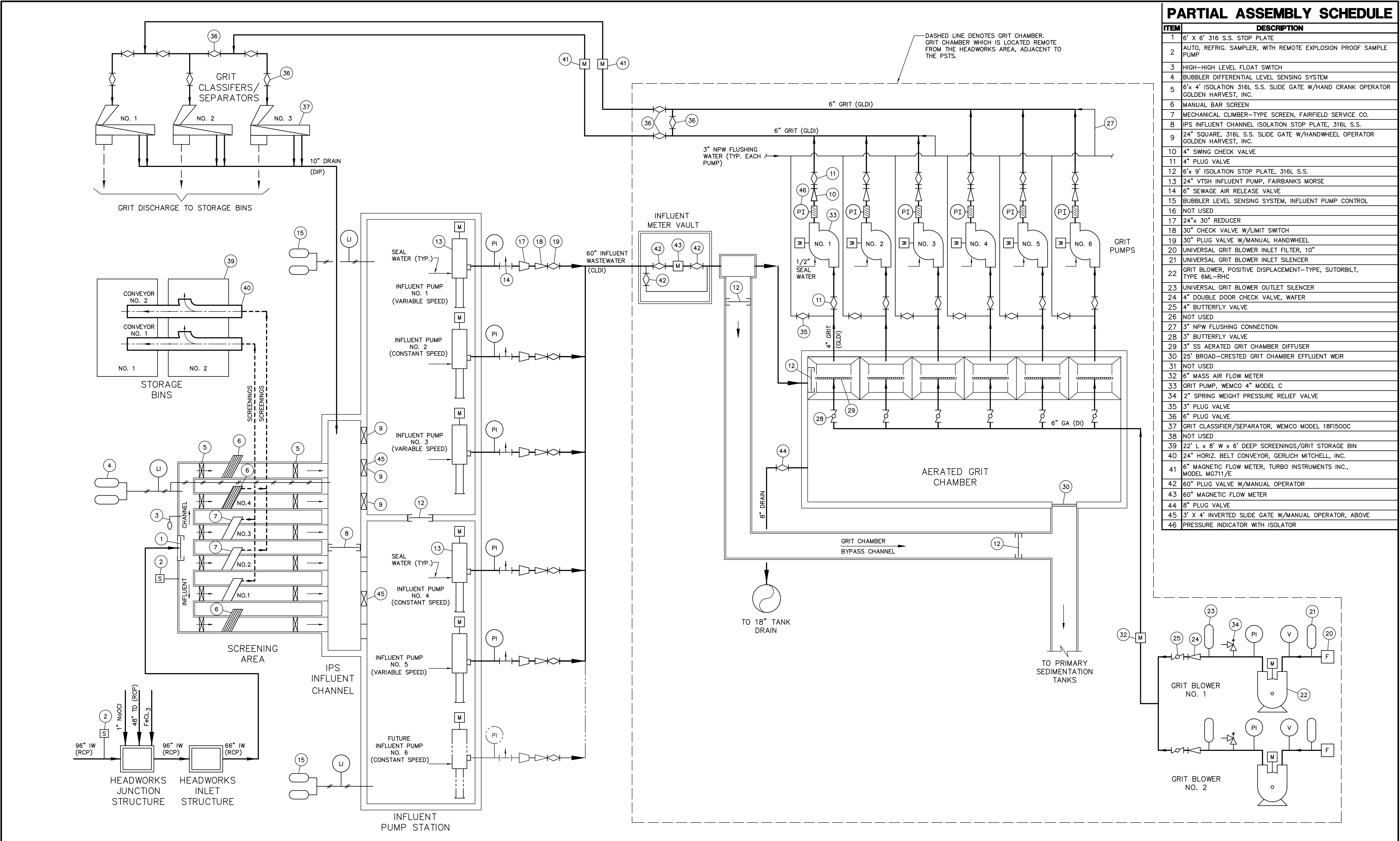
The Storage Bin/Grit Dewatering Areas are ventilated at twelve (12) air changes per hour. One (1) air supply fan, SF1, is provided to supply a positive flow of fresh air within the storage bin/grit dewatering areas. The fiberglass, in-line, belt driven, axial, air supply fan, Hartzell, Model 35-32EN3, located on the roof and just south of the center of the Grit Dewatering Area, is 32 inches in diameter and provides 15,203 cfm at a static pressure of 1.52 inches of water and fan speed of 1594 rpm. The air supply fan is driven by an explosion proof, Reliance, 10 hp, 1800 rpm, 460 v, 3 phase, 60 Hz motor.

In addition, two (2) exhaust fans, EF1 and EF2, fiberglass, belt driven, axial, upblast roof exhausters manufactured by Hartzell, Model 37-24FWK3 are also provided to ventilate the Storage Bin/Grit Dewatering Areas in the event of an ORS scrubber exhaust fan failure. Exhaust Fan No. 1 is located on the roof on the north end of the Grit Dewatering Area, and is 24 inches in diameter providing 7,875 cfm at a static pressure of about 0.5 inches of water and fan speed of 1932 rpm. Exhaust Fan No. 2 is located on the roof of the Grit Dewatering Area just south of Exhaust Fan No. 1 and provides 7,852 cfm at a static pressure of about 0.5 inches in water and fan speed of 1875 rpm. The exhaust fans are both driven by explosion proof, Reliance, 3 hp, 1800 rpm, 460 v, 3 phase, 60 Hz motors.

3.1.4.12 Screening and Wetwell Ventilation System

The Screening and IPS Wetwell Areas are ventilated at six (6) air changes per hour. One (1) exhaust fan, EF3, is provided to ventilate the Screening and IPS Wetwell Areas in the event of the ORS scrubber failure. Exhaust Fan No. 3 is a fiberglass, belt driven, inline centrifugal type fan, Hartzell, Model 40-15GK3, located on the northern side of the east wall, within the Lower Screenings Area, and is 15-inches in diameter providing 1,175 cfm at a static pressure of 4.8 inches of water and fan speed of 2757 rpm. The exhaust fan is driven by an explosion proof, Reliance, 3 hp, 1800 rpm, 460 v, 3 phase, 60 Hz motor.

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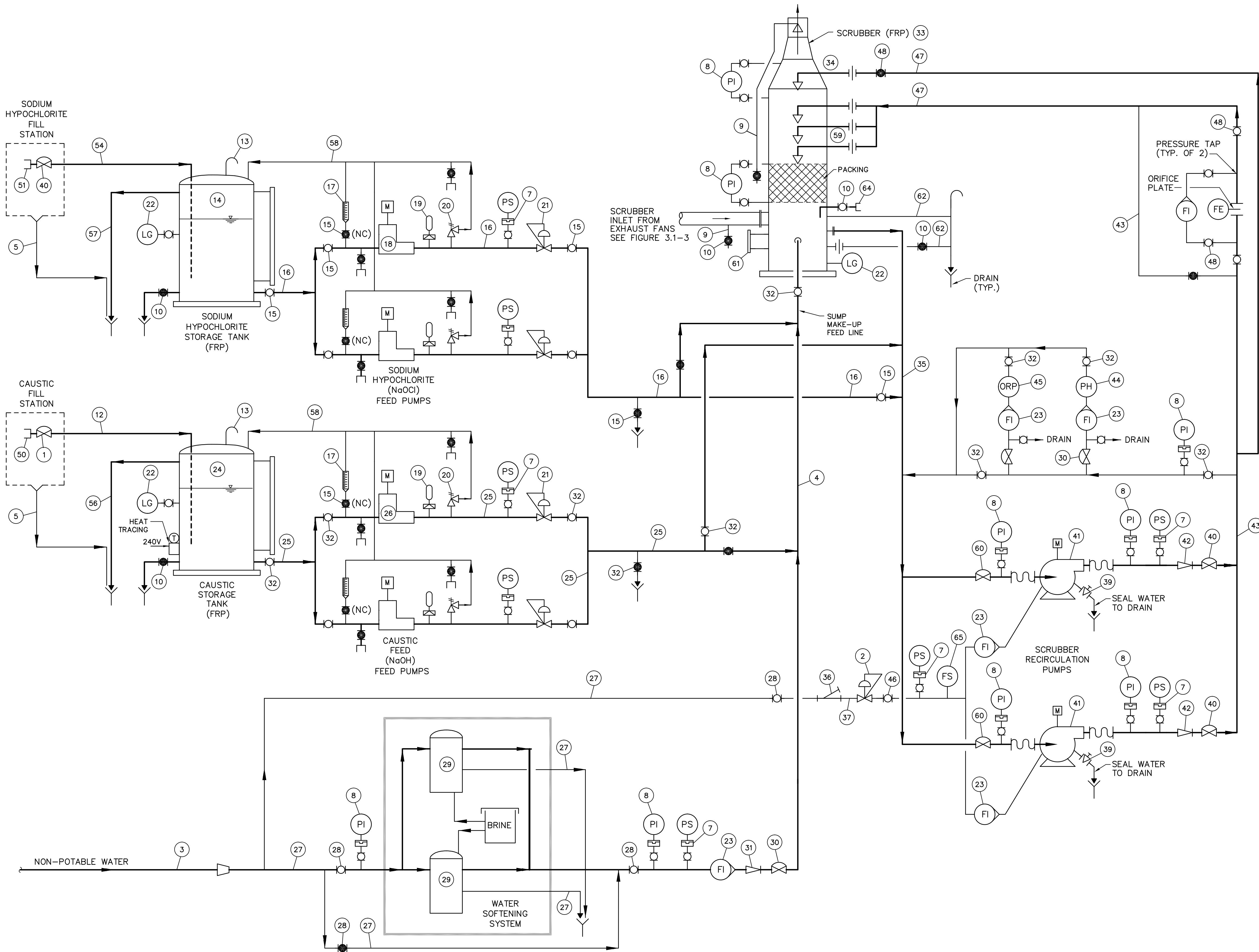
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South Bay International Wastewater Treatment Plant

HEADWORKS AREA PROCESS SCHEMATIC

NOT TO SCALE

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FIGURE 3.1-1
CAD REF. NO. I2OM FIG 3.1-1

XREFS: \\TLBLK.dwg IMAGES:None
User:CARSON Spec:Pirnie STANDARD File:c:\proj\1991037\Q&M schematics\I2OM FIG 3.1-2.DWG Scale:1:1 Date:03/18/2011 Time:11:39 Layout:Blank



PARTIAL ASSEMBLY SCHEDULE	
ITEM	DESCRIPTION
1	2" DIAPHRAGM VALVE
2	1/2" PRESSURE REDUCING VALVE
3	2" POTABLE WATER PIPE (PVC)
4	1" SOFTENED WATER PIPE (CPVC)
5	1/2" PANEL DRAIN PIPING
6	NOT USED
7	DIAPHRAGM SEAL WITH SHUTOFF VALVE (CPVC)
8	DIFFERENTIAL PRESSURE INDICATOR
9	2" AIR SAMPLING LINE
10	2" BALL VALVE (CPVC)
11	2" CHECK VALVE (CPVC)
12	2" CAUSTIC FILL PIPE (CPVC)
13	4" VENT (CPVC)
14	NaOCl STORAGE TANK (FRP)
15	1/2" BALL VALVE (CPVC)
16	1" NaOCl PIPE (CPVC)
17	CALIBRATION CYLINDER
18	NaOCl FEED PUMP
19	PULSATION DAMPENER
20	RELIEF VALVE (CPVC)
21	BACKPRESSURE SELF-REGULATING VALVE (CPVC)
22	PRESSURE TRANSDUCER
23	FLOW INDICATOR (ROTOMETER)
24	NaOH STORAGE TANK (FRP)
25	1/2" NaOH PIPE (CPVC)
26	NaOH FEED PUMP
27	1" NON-POTABLE WATER PIPE (PVC)
28	1" BALL VALVE (PVC)
29	WATER SOFTENER
30	1" THROTTLING VALVE (PVC)
31	1" CHECK VALVE (CPVC)
32	1" BALL VALVE
33	SCRUBBER (FRP)
34	ACID CLEANING MANIFOLD
35	6" RECIRCULATION PUMP SUCTION (CPVC)
36	1/2" PVC STRAINER, 20 MESH
37	1/2" POTABLE WATER PIPE (PVC)
38	NOT USED
39	1/2" NEEDLE VALVE (PVC)
40	4" DIAPHRAGM VALVE (CPVC)
41	RECIRCULATION PUMP
42	4" CHECK VALVE
43	4" RECIRCULATION PUMP DISCHARGE PIPE (CPVC)
44	PH ANALYZER AND TRANSMITTER
45	ORP ANALYZER AND TRANSMITTER
46	1/2" BALL VALVE (PVC)
47	4" SCRUBBER SOLUTION FEED PIPE (CPVC)
48	4" BALL VALVE (CPVC)
49	AIR SUPPLY FAN (FRP)
50	2" QUICK DISCONNECT COUPLING
51	4" QUICK DISCONNECT COUPLING
52	NOT USED
53	4" CHECK VALVE
54	4" HYPOCHLORITE FILL PIPE (CPVC)
55	SITE LEVEL GAUGE W/SWITCHES
56	4" OVERFLOW PIPING (CPVC)
57	6" OVERFLOW PIPING (CPVC)
58	1/2" RELIEF PIPING
59	RECIRCULATION MANIFOLD
60	6" DIAPHRAGM VALVE (CPVC)
61	SITE LEVEL GAUGE
62	2" BLOWDOWN AND SCRUBBER DRAIN PIPING (CPVC)
63	NOT USED
64	ACID FILL CONNECTION - 2" QUICK DISCONNECT (CPVC)
65	LOW FLOW SWITCH

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DWN MP
OKD LDT

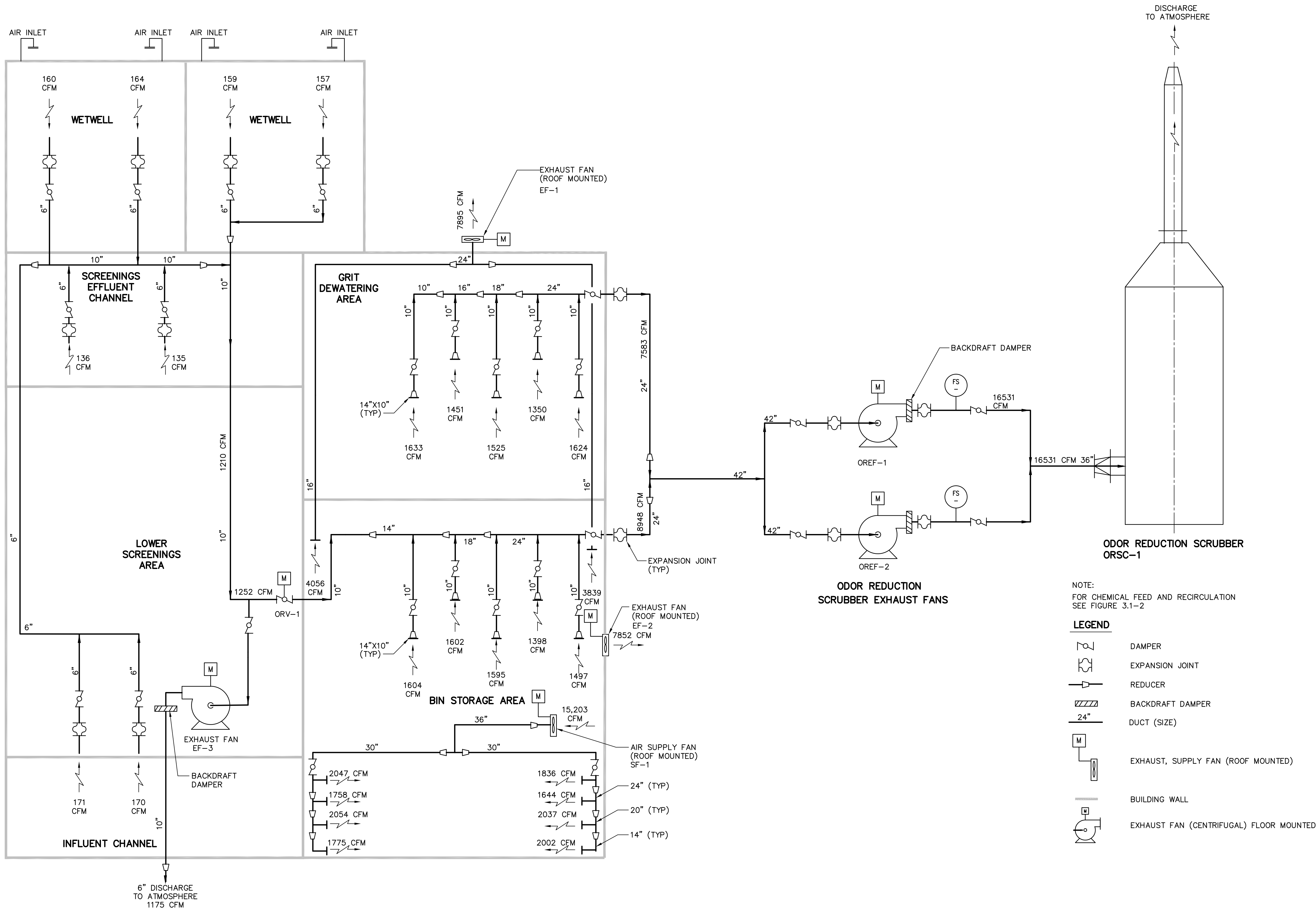


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HEADWORKS AREA
ODOR REDUCTION
PROCESS SCHEMATIC
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FIGURE 3.1-2
CAD REF. NO. I2OM FIG 3.1-2

XREFS: \\TLBLK.dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:t:\proj\1991037\Q&M schematics\20M FIG 3.1-3.DWG Scale:1:1 Date:03/18/2011 Time:11:51 Layout:Blank



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DES TN/MW/SP
DWN MP
CKD LDT



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HEADWORKS AREA ODOR REDUCTION AIR FLOW SCHEMATIC NOT TO SCALE

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FIGURE 3.1-3
CAD REF. NO. I20M FIG 3.1-3

3.2 PRIMARY SEDIMENTATION FACILITIES

3.2.1 Primary Sedimentation Tanks

Five primary sedimentation tanks (PST) are to be provided for the Advanced Primary Treatment Plant (CC-2). Each tank is a 240 ft (73.15 m) long by 21.33 ft (6.48 m) wide, with an average side water depth of 13.5 ft (4.1 m). Flow is introduced to each sedimentation tank from the rapid mix chamber through two pressure slide gates into the 2 ft wide weir box extending the full width of the PST. The weir boxes are located below the sedimentation tank water surface for improved flow distribution.

Five (5) primary sedimentation tanks are provided for the Advanced Primary Treatment Plant (CC-2). For ultimate conditions, an additional 20 tanks of the same dimensions as above would be installed for a total of 25 tanks.

The primary effluent overflows adjustable sharp crested weirs at the effluent end of the tanks, drops into concrete troughs and flows by gravity into the primary sedimentation effluent channel. Each tank is provided with three separate weir/launders structures manufactured by Warminster Fiberglass Company (WFWB1000 specification). The weirs are constructed of fiberglass reinforced polyester resin. Each structure is 42.5 feet long by three feet wide, with sharp crested weirs on each side, the total weir plate length 255 feet per tank. The total weir length at elevation 59.5 feet, which controls the water level in the PST, is 208.5 feet per tank. The weir section of the launders ends approximately eight feet from the effluent end of the tank. This prevents the overflow of solids which might rise to the surface of the tanks by the relatively turbulent uplift conditions at the end of the tank.

A schematic presenting the Primary Sedimentation Facilities is shown in Figure 3.2-1.

3.2.2 Channel Aeration Facilities

Two channel air blowers are positive displacement blowers and are located at the Blower Room which is the lower level of PST-LCC-EAST. The blowers are manufactured by Sutorbilt, Type 8LP, Model GAHL-DPA. Each unit is sized at 1,900 scfm capacity at a discharge pressure of 5.5 psig. Each blower operates at a shaft speed of 1,340 rpm with sheaves provided for 1,525 rpm and 845 rpm for operation at high (2,200 scfm) and low

(1,100 scfm) flow rates, respectively. Each blower is driven by a constant speed, TEFC, U.S. Electrical Motors, 75 hp, 1800 rpm, 460 v, 3 phase, 60 Hz motor. One blower operates as the duty blower and the other as a standby.

The Primary Influent and Effluent Channels are provided with 440 coarse bubble, diaphragm diffusers to keep solids from settling in the channels. The diffusers are manufactured by EnviroQuip International Inc., Model "Snap-Cap Plus 5", Number 750-T-10. Each diffuser has maximum capacity of 10 cfm at a pressure loss of 0.25 psig.

Two (2) air supply fans are duct axial fans and are located on the east wall of the Blower Room. Each fan is manufactured by Hartzell Fan Inc. Model 59-20FWF4. Each fan is sized for 3,275 scfm capacity. The air supply fan is driven by a constant speed, TEFC, Reliance Electric, 1/2 hp, 1200 rpm, 460 v, 3 phase, 60 Hz motor. One fan is operates as the duty fan and the other as a standby.

Additionally, two (2) PST exhaust fans are duct axial fans and are located at the southeast corner of the PST Gallery for ventilation. Each fan is manufactured by Hartzell Fan Inc. Model 29-24EF5. Each fan is sized for 4,000 scfm capacity. The PST exhaust fan is driven by a constant speed, TEFC, Reliance Electric, 1/2 hp, 850 rpm, 460 v, 3 phase, 60 Hz motor. One fan is operates as the duty fan and the other as a standby.

A schematic presenting the Channel Aeration System is shown in Figure 3.2-2.

3.2.3 Rapid Mix Chamber

Under the Advanced Primary Treatment Plant (CC-2), a total of five rapid mix chambers are constructed, one for each PST. Each rapid mix chamber is 8 ft wide (2.44 m) by 9 ft (2.74 m) long with a 10.5 ft (3.20 m) side water depth (SWD) cast-in-place concrete structure with common walls shared with the PST influent channel and the primary sedimentation tanks. Each rapid mix chamber has a one (1) minute detention time at annual average flows.

Each rapid mix chamber (RMC) is provided with two 24-inch x 24-inch pressure slide gates located on the north side of the RMC next to the PST and two 316 SS stop plate(s) with guides located on the south side of the RMC. Should a sedimentation tank need to be isolated, the operator would close the two 24-inch pressure slide gates or insert the two 2 ft x 15 ft stop plates in the stop plate frames mounted on the exterior wall of the RMC.

The 24-inch pressure slide gates are manufactured by Golden Harvest, Inc. Model GH-100. The gates are fully wedged type 316SS, with ultra high molecular weight polyethylene seats and designed for 60 feet of seating head and 15 feet of unseating head. The gate is of the non-rising stem type with a wall bracket mounted 2-inch square nut operator. The gate may be operated manually or with a portable hydraulic operator.

A manually operated slide gate is also provided on the inlet and outlet side of each RMC at the wastewater level to accommodate scum removal from each RMC. Each 24-inch x 24-inch square, 316SS, downward-opening, non-rising stem Golden Harvest Model GH-65 weir slide gate is operated by a 2-inch square nut. The gates are designed for 2 ft seating and unseating head.

Both the 24-inch pressure slide gate and the 24-inch slide gate for scum removal may be operated manually or with two (2) portable hydraulic operators. Each portable hydraulic operator is manufactured by Golden Harvest, GH Model 1050E. The operator delivers a maximum torque of 80 ft-lbs to the gate operator drive shaft. Each operator has a relief valve which limits the torque to 50 lbs of torque at 120 rpm. The operator is provided with a constant speed, TEFC-XP, Baldor, 2 hp, 1800 rpm, 230 v, 1 phase, 60 Hz motor.

The RMC pumps provide rapid mixing in each chamber and are located in the PST Gallery. Each pump is an end suction vertical, non-clog, centrifugal, chopper pump and is manufactured by Vaughan, Model VDP4P6S-118. Each pump is rated for 850 gpm capacity at a total dynamic head of 30 ft. Each pump is driven by a constant speed, Reliance Electric, 15 hp, 1170 rpm, 3 phase, 60 Hz, 230/460 v motor. The motor is connected to the pump shaft by a flexible coupling. Each pump is equipped with a 6-inch isolation plug valve on the suction pipe and a 4-inch swing check valve with limit switch and a 4-inch ball valve on the discharge side. In addition, each pump has inlet and outlet 1-inch high pressure non-potable water (NPW) flushing connections, each equipped with 1-inch ball valve.

The 8-inch discharge diffuser/manifold with 3-inch nozzles at 1 foot on center provide the rapid mixing in the RMC. Ferric chloride is added to the RMC pump discharge, and polymer is added to the RMC via a diffuser.

To control spills within the PST Gallery, any excess liquids drain into a sump which is located in the southwest corner of the PST. The sump contains a duplex sump pumping

station. Each sump pump is a totally enclosed Barnes 3SE1544DS submersible pump with a 1.5 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor with a double mechanical seal. The duplex sump pump station is operated either automatically or manually.

3.2.4 Sludge Collection and Pumping Facilities

3.2.4.1 Sludge Collectors

Each PST is provided with plastic flight and chain sludge collectors manufactured by NRG Company. The principal items of sludge collection equipment, and materials of construction of these items, are as follows:

- Flights - 3-inch x 8-inch nominal size, 21 ft-2-inch long fiberglass @ 10 ft intervals.
- Wear Shoes - 3-inch x 1/2-inch x 5-1/2-inch made of ultrahigh molecular weight (UHMW) polyethylene.
- Steel floor rails and return rails - 3-inch x 5-inch x 3/8-inch, A36 carbon steel, with UHMW wear strips and wear shoes.
- Anchoring Material - Type 316 stainless steel.
- Collector Chain - Type 720 contoured sidebar non-metallic loop chain, sized for a working load of 3100 pounds.
- Sprocket - Split case, constructed of cast nylon tooth sections with cast iron hubs.
- Bearings - Self-aligning, split type with babbitt bearings. All bearings are equipped with grease fittings and extensions accessible from the walkways above the tank covers.
- Drive Assembly - Manufactured by Stearling Electric, Model "Cast Fe Max" Number RBY054FCA. The motor is a squirrel cage induction type, TEFC, 1/2 hp, 1800 rpm, 230/460 v, 3 phase, 60 Hz motor.
- Flexible coupling - grease lubricated intermediated bearings; driving sprockets with shear pin hubs, and shear pins. Drive assembly is mounted a minimum of 18 inches above tank covers.
- Drive Chain - No. NH78 mill non-metallic chain, working load 1750 pounds.

- Limit Switch - Standard double pole, 2 NO-2NC, 9 terminal, rotary adjustable spring return, Cutler-Hammer Model E50BR1.

Each sludge hopper is provided with three sludge sample ports to manually sample to determine the sludge concentration at various depths in the hopper. The operator can purge the sample ports directly to the tank drainage piping before sampling.

3.2.4.2 Primary Sludge Pumping

Each sedimentation tank has two sludge hoppers with six-inch diameter glass-lined ductile iron (GLDI) suction piping and six-inch quarter turn non-modulating motor-operated plug valves to each hopper. The suction pipes from each two (2) tanks are manifolded together and piped to the suction side of a single primary sludge pump.

Three pumps were installed in the PST Gallery under the Advanced Primary Treatment Plant (CC-2). Each primary sludge pump is a heavy duty simplex plunger type and manufactured by Komline-Sanderson Model KS-11-1. Each pump operates at a constant speed of 50 rpm, with a capacity of 115 gpm at a total dynamic head (TDH) of 95 ft. Each pump has dual suction and discharge valves, a suction and discharge air chamber, and a discharge 2-inch Dezurik sampling valve. An additional sludge pump is furnished as an off-the-shelf replacement.

Each pump is driven with a constant speed, TEFC, Baldor Model 0753M-213TC, 7.5 hp, 1750 rpm, 230/460 v, 3 phase, 60 Hz motor. Each motor is provided with a horizontal reducer. Each reducer is manufactured by Sumitomo Machinery Corp. of America Model "SM-Cyclo" Number 3165. Each reducer decreases the motor speed of 1750 rpm to the speed of 50 rpm at the pump. The motor is connected to the pump shaft by a flexible coupling manufactured by Falk Coupling, "Steelflex" Model 1080T20.

Each pump is equipped with an oiler manufactured by Lubriquip "Manzel" Model 55 box lubricator. The oiler has a three pint capacity and is driven by a Lubriquip "Manzel" Model 88 pump.

A flanged 4-inch magnetic flowmeter manufactured by Fischer & Porter Co. Model 10DX3111 measures the discharge of each pump for local indication of instantaneous and totalized flow. The meter serves to give the operator an indication of potential clogging in the pump suction and discharge piping. The flowmeters are 4-inch flanged tubes, teflon

PTFE lined, with 316 SS electrodes, and are capable of reading and indicating a range of 0 to 115 gpm (maximum capacity of primary sludge pump is 115 gpm).

Each pump is equipped with 6-inch isolation plug valves on the suction and discharge pipes. Manual NPW flushing connections are provided on the upstream and downstream piping of each primary sludge pump, each equipped with a plug valve or ball valve.

The primary sludge discharge line is a 6-inch diameter GLDI pipeline which conveys the pumped primary sludge from the primary sludge pump gallery to the USSTs.

The common sludge discharge line is provided with a double-shaft grinder located in the PST Access Gallery. The grinder is manufactured by Franklin Miller Model “Task Master” TM8516-06. The grinder has 6-inch flanged connections and a capacity of 600 gpm at a pressure loss of less than 12 inches. The grinder is driven by a constant speed, TEFC, Baldor, 3 hp, 1750 rpm, 460 v, 3 phase, 60 hz motor. Additionally, the motor is equipped with a Nord Model SK-42 Unibase helical, vertical mount, 29.29:1 ratio reducer and flexible coupling. The sludge grinder is provided with a manual bypass. One grinder is furnished as an off-the-shelf replacement for all three grinders at the plant.

A total primary sludge flow magnetic flowmeter manufactured by Fischer & Porter Co. Model 10DX3111 is provided on the common primary sludge discharge line. The meter is a 6-inch flanged tube, teflon PTFE lined, with 316 SS electrodes. The meter is capable of reading and indicating a flow range of 0 to 460 gpm.

Additionally, ferric chloride and sodium hypochlorite are added to the sludge discharge line at a point outside the PST Access Gallery.

3.2.5 Primary Skimmings Processing Facilities

3.2.5.1 Surface Skimmers

The sludge collectors in each tank skim the water surface and move any floating material to the effluent end of the tank where it is removed by a motor operated rotary skimmer. One skimmer is provided in each tank. The surface skimmers are manufactured by NRG Company. The skimmer is constructed of black steel and has an outside diameter of 18 inches. Each skimmer is operated by a dedicated drive.

The principal items of equipment for surface skimmer are as follows:

- Skimmer - 18-inch diameter 20 ft - 8-inch long black steel pipe with 60° slots, equipped with worm and worm gearing.
- Operator - TEFC electric motor-actuator with reversing control manufactured by Limitorque Model L120-10-3-1800, declutching device, and handwheel bypass for manual operation. Actuator is mounted at a minimum of 18-inches above the tank cover.
- 2-inch Surface Spray Motor Operated Valve (explosion-proof).
- Mounting Hardware - 316 SS.

3.2.5.2 Skimmings Pump Station

Skimmings from each sedimentation tank discharge by gravity to an 18-inch GLDI gravity line to a Skimmings Wet Well located on the northeast corner of the Primary Sedimentation Tanks. The wet well is 30 ft x 11 ft x 14 ft SWD and is designed to operate in an automatic mode to pump subnatant back to the primary sedimentation influent channel, and concentrated skimmings to the unstabilized sludge storage tanks (USST).

The Skimmings Dry Well has interior plan dimensions of 30 ft x 23 ft-8-inches, and contains two skimmings pumps and a grinder. Each pump is a two-speed centrifugal non-clog pump with a recessed impeller manufactured by Wemco Model C 4 x 4. The capacity and head ratings are as follows:

Function	Pump Speed (rpm)	Q (gpm)	TDH (ft)
Subnatant Pumping	965	290	49 ft
Skimmings Homogenization	965	475	44 ft
Skimmings Pumping	1450	500	108 ft

Each skimmings pump is driven by a two-speed, horizontal, TEFC, Reliance Electric motor, 50 hp, 1800/1200 rpm, 460 v, 3 phase, 60 Hz motor. The motor has squirrel-cage induction and is connected to the pump by a constant speed V-belt drive. Each pump has a double mechanical seal with a NPW seal water connection. Each pump is equipped with 8-inch and 6-inch isolation plug valves on the suction and discharge pipes, respectively.

At low speed the pump is capable of delivering subnatant back to the primary influent channel through a 6-inch GLDI pipeline at 290 gpm, or recirculating (homogenizing)

skimmings through a 4-inch GLDI recirculation line at approximately 475 gpm. At high speed, the pump is capable of delivering homogenized skimmings to the USST facilities through a 8-inch GLDI pipeline at a rate of approximately 500 gpm. Each separate line is provided with a quarter turn non-modulating motor-operated plug valve.

Flow from the skimmings pump station is not metered, as this flow is only a minor part of the USST influent flow. Should the operators wish, they could estimate skimmings flow based on pumped volume and the number of pumping cycles.

As the skimmings are pumped to the USSTs, the skimmings line is provided with a double shaft grinder on the downstream side of the motor-operated valve, located in the Skimmings Dry Well. The grinder is manufactured by Franklin Miller Model “Task Master” TM8516-06. The grinder has 6-inch flanged connections and a capacity of 600 gpm at a pressure loss of less than 12 inches. The grinder is driven by a constant speed, TEFC, Baldor, 3 hp, 1750 rpm, 460 v, 3 phase, 60 hz motor. Additionally, the motor is equipped with a Nord Model SK-42 Unicas helical, vertical mount, 29.29:1 ratio reducer and a flexible coupling. The skimmings grinder is provided with a manual bypass. One grinder is furnished as an off-the-shelf replacement for all three grinders at the plant.

A quick connect coupling is provided to remove scum directly from the Skimmings Wet Well via vacuum truck. Additionally, provisions for manual caustic addition to the wetwell and piping are installed.

To control spills within the Skimmings Dry Well, any excess liquids drain into a sump which is located in the Skimmings Dry Well. The sump contains a duplex sump pumping station. Each sump pump is a totally enclosed. Barnes 3SE1544DS submersible pump with a 1.5 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor with a double mechanical seal. The duplex sump pump station operates either automatically or manually.

A schematic of the Primary Skimming Processing Facilities is presented in Figure 3.2-3.

3.2.6 Chemical Addition Facilities

To control spills within the polymer bulk storage, ferric chloride bulk storage, and the chemical mixing area, three (3) sumps have been provided. Any spill drains into a respective sump which contains a totally enclosed Barnes 3SE1544DS simplex submersible pump with a 1.5 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor with a double mechanical seal. The sump pumps are mechanically controlled.

3.2.6.1 Polymer Addition System

The rapid mix polymer addition facilities consist of bulk polymer storage, bulk polymer transfer, polymer mixing and addition facilities.

A schematic of the PST Polymer Addition Facilities is presented in Figure 3.2-4.

Polymer Bulk Storage

The two (2) bulk liquid polymer storage tanks are manufactured of fiberglass reinforced plastic Derakane 411 with an interior c-veil/chop corrosion resistant barrier fabricated with Derakane 411. The tanks are provided with dished heads, and with ladders for access to the top. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as a 2-inch clear sight gauge, pressure relief, overflow pipe, vent, and drain pipe, are provided for each tank. The tanks are enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

Each tank is 8 ft in diameter with a 9 ft straight shell height with a 3300 gal nominal capacity and is manufactured by Belco Manufacturing Company.

Bulk Polymer Transfer Pumps

Two (2) bulk transfer pumps are provided to deliver the bulk solution from a dedicated bulk tank to one of two polymer mixing tanks.

Each of the transfer pumps is a single-stage progressive cavity pump from Moyno, Model 1L3 SSQ SBB. Each pump is capable of delivering 30 - 120 gallons per hour of bulk polymer at a maximum pressure of 20 psig at a maximum pump speed of 400 rpm. The pumps have manual speed adjustment. Each pump is driven by a SCR, variable speed, TEFC, Reliance Electric, 1.5 hp, 1750 rpm, 90V, DC motor. The pumps have side mounted suction and are connected to the driver with a piggyback belt and pulley configuration. Each pump is

equipped with isolation ball valves and NPW quick connections on the suction and discharge pipes. Additionally, each pump is provided with a pressure gauge, pressure control valve, and a back pressure valve on the discharge side.

Polymer Mixing Tank

The two (2) polymer mixing tanks are manufactured of fiberglass reinforced plastic Derakane 411 with an interior c-veil/chop corrosion resistant barrier fabricated with Derakane 411. The tanks are provided with an open top and with a clamp pad for the mixer. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as overflow pipe and drain pipe, are provided for each tank. The tanks are enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

Each tank is 5 ft in diameter with a 6 ft straight shell height with a 880 gal nominal capacity and an active volume of 147 gal, and is manufactured by Belco Manufacturing Company.

Two (2) portable, top entry clamp mount mixers are provided for the polymer mixing tanks. One mixer for each tank. Each mixer is manufactured by Chemineer, Inc., Model 5 JTC. Each mixer is driven by a constant speed, TEFC, Reliance Electric, 2 hp, 1750 rpm, 230/460 v, 3 phase, 60 Hz motor.

Polymer Addition Pumps

Five (5) polymer addition pumps are provided to deliver the polymer solution (0.05%) from either mixing tank to a dedicated rapid mix diffuser located in each respective rapid mix chamber.

Each of the addition pumps is a two-stage progressive cavity type from Moyno, Model 2L3 SSQ SBB. Each pump is capable of delivering 45 - 330 gallons per hour at a maximum pressure of 30 psig at a maximum pump speed of 697 rpm. Each pump has automatic or manual speed adjustment. Each pump is driven by a SCR, variable speed, TEFC, Reliance Electric, 1.5 hp, 1750 rpm, 90V, DC motor. The pumps have side mounted suction and are connected to the driver with a piggyback belt and pulley configuration. Each pump is equipped with isolation ball valves and NPW quick connections on the suction and discharge pipes. Additionally, each pump is provided with a pressure relief valve and a back pressure control valve on the discharge pipe.

3.2.6.2 Ferric Chloride Addition System

The ferric chloride addition facilities consist of bulk ferric chloride storage, bulk ferric chloride transfer, ferric chloride mixing and addition facilities.

A schematic of the PST Ferric Chloride Addition Facilities is presented in Figure 3.2-5.

Ferric Chloride Bulk Storage

The two (2) ferric chloride bulk storage tanks are manufactured of fiberglass reinforced plastic Derakane 411 with an interior c-veil/chop corrosion resistant barrier fabricated with Derakane 411. The tanks are provided with dished heads, and with ladders for access to the top. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as a 2-inch clear sight gauge, pressure relief, overflow pipe, vent, and drain pipe, are provided for each tank. The tanks are enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

Each tank is 14 ft in diameter with a 20 ft straight shell height with a 23,000 gal nominal capacity and is manufactured by Belco Manufacturing Company.

Bulk Ferric Chloride Transfer Pumps

Two (2) bulk transfer pumps are provided to deliver bulk solution from a dedicated bulk tank to one of two ferric chloride mixing tanks. Each of the transfer pumps is double diaphragm, positive displacement metering type from PulsaFeeder, Model 7660-S-AE. Each pump is capable of delivering 200 to 830 gallons per hour of bulk ferric chloride at a maximum pressure of 45 psig and a stroke speed of 116 strokes per minute. Each pump is driven by a variable speed, TEFC, Baldor, 2 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor. The pumps have manual stroke length adjustment. The output volume is adjustable over a range of 4.15:1 with a Pulsamatic (straight automatic) NEMA 4 Model 6EAD actuator. Additionally, each pump is equipped with 3-inch and 2-inch isolation ball valves and 3-inch and 2-inch NPW quick connections on the suction and discharge pipes, respectively. Each pump is provided with a pulsation dampener, pressure relief valve, calibration column, back pressure control valve, and a Chemalarm leak detection system. A flow switch is provided

on the discharge of the pump to detect a “no flow” condition when the pump is called to operate.

Ferric Chloride Mixing Tank

The two (2) ferric chloride mixing tanks are manufactured of fiberglass reinforced plastic Derakane 411 with an interior c-veil/chop corrosion resistant barrier fabricated with Derakane 411. The tanks are provided with an open top, and with a clamp pad for the mixer. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as overflow pipe and drain pipe, are provided for each tank. The tanks are enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

Each tank is 5 ft in diameter with a 6 ft straight shell height with an 880 gal nominal capacity and an active volume of 147 gal, and is manufactured by Belco Manufacturing Company.

Two (2) portable, top entry clamp mount mixers are provided for the ferric chloride mixing tanks. One mixer for each tank. Each mixer is manufactured by Chemineer, Inc., Model 5 JTC-0.5. Each mixer is driven by a constant speed, TEFC, Reliance Electric, 1/2 hp, 1750 rpm, 230/460 v, 3 phase, 60 Hz motor.

Ferric Chloride Addition Pumps

Five (5) PST ferric chloride addition pumps are provided to deliver the 10 % ferric chloride solution to five rapid mix discharge lines for delivery to the rapid mix chamber from either mixing tank.

Each of the PST addition pumps is double diaphragm, positive displacement metering type from PulsaFeeder, Model 7660-S-AE. Each pump is capable of delivering 26 to 195 gallons per hour at a maximum pressure of 65 psig at a maximum stroke speed of 58 strokes per minute. Each pump is driven a SCR, variable speed, TEFC, Baldor, 1 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor. Each pump has automatic or manual stroke length adjustment. The output volume is adjustable over a range of 7.5:1 with a Pulsamatic (straight automatic) NEMA 4 Model 6EAD actuator. Additionally, each pump is equipped with 2-inch NPW quick connection on the suction pipe. Each pump is provided with a pulsation dampener, pressure relief valve, calibration column, back pressure control valve, and a Chemalarm leak

detection system. A flow switch is provided on the discharge of the pump to detect a “no flow” condition when the pump is called to operate.

Both of the USST addition pumps are double diaphragm, positive displacement metering type from PulsaFeeder, Model 7120-S-AE. Each pump is capable of delivering 2 to 20 gph at a maximum pressure of 125 psig and a maximum stroke speed of 70 strokes per minute. Each pump is driven by a SCR, variable speed, TEFC, Baldor, 1 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor. Each pump has manual stroke length adjustment. The output volume is adjustable over a range of 10:1 with a Pulsamatic (straight automatic) NEMA 4 Model 6EAD actuator. Additionally, each pump is equipped with 3-inch and 2-inch NPW quick connections on the suction and discharge pipes, respectively. Each pump is provided with a pulsation dampener, pressure relief valve, calibration column, back pressure control valve, and a Chemalarm leak detection system. A flow switch is provided on the discharge of the pump to detect a “no flow” condition when the pump is called to operate.

3.2.7 Odor Reduction Station

The PST Odor Reduction Station is designed to remove hydrogen sulfide (H₂S) and other odorous compounds from the following locations:

Process Areas	Type of Containment
Grit Chamber	Covered
PST Influent Channel	Covered
PST Launder	Covered
PST Effluent Channel	Covered
Skimming Station	Covered

The PST Odor Reduction Station consists of odor reduction station (ORS) exhaust fans, ORS scrubber, ORS recirculation pumps, ORS chemical feed systems, ORS chemical storage tanks and ORS water softening system.

The heart of the system is the scrubber which is a closed vessel in which a scrubber solution of sodium hypochlorite, NaOCl; sodium hydroxide, NaOH; and water is continuously re-circulated to the top of the scrubber and distributed over plastic media. The media, or packing, inside the scrubber provides a significant amount of surface area to facilitate the transfer of odorous compounds to be oxidized/absorbed into the scrubber

solution. Fresh chemicals (NaOCl and NaOH) and make-up water are added to the scrubber solution which displaces spent scrubber solution (blowdown) into an overflow drain. This overflow drain is returned to the headworks via the tank drainage system.

The PST Odor Reduction Station Process and Air Flow Schematics are presented in Figure 3.2-6 and 3.2-7, respectively.

3.2.7.1 Odor Reduction Station Scrubber Exhaust Fans

Two (2) exhaust fans, OREF3 and OREF4, are provided as part of the CC-2 Advanced Primary Treatment Plant portions of the South Bay IWTP to ventilate areas listed above. One exhaust fan is a standby unit.

The two fiberglass, belt driven centrifugal type fans are located adjacent to the ORS scrubber tower. The fans are manufactured by Ceilcote Air Pollution Control, Inc., Model CLUB 3650. Each of the fans has a 36-inch inside diameter wheel which produces 16,200 cfm at a static pressure of about 10.5-inches of water at 1460 rpm.

Each fan is driven by a constant speed, explosion proof corrosive duty, solid shaft, Reliance, Duty Master, 50 hp, 1775 rpm, 460 v, 3 phase, 60 Hz motor.

3.2.7.2 Odor Reduction Station Scrubber

The fiberglass one-stage counter current odor scrubber tower is manufactured by R.J. Environmental, Inc. and is located out-of-doors just south of the east end of the PST Pipe Gallery. The 30 ft high tower has a scrubbant sump at the base of the unit with a bed of packing which consists of 3 1/2-inch polyethylene lanpac packing as manufactured by Lantee Products. Above the packing is a manifold with seven 2-inch teflon fog nozzles manufactured by Bete which distribute scrubber solution over the bed. Above the scrubber solution manifold is a mist eliminator manufactured by Kimre Inc., model number B-GON to minimize liquid droplets exiting through the discharge of the tower. Above the mist eliminator is an acid distribution header with seven 1-inch Teflon fog nozzles manufactured by Bete which is used in the cleaning of the scrubber.

The scrubber is designed to meet the following:

Flow rate (cfm)	15,300
Number of systems	1
Number of tower/system	1
Total residence time (sec)	1.5 to 1.7
Inlet H ₂ S concentration (ppm)	34
System efficiency (min)(%)	99
Vessel size:	
Diameter (ft)	7
Side wall height (ft)	30 (max)

3.2.7.3 Odor Reduction Station pH and ORP Controllers

The scrubber solution is continuously monitored for pH and ORP. The two separate analyzers are installed in a bypass line which runs between the recirculation pump suction and discharge piping. The pH and ORP analyzers are both Great Lakes Instruments, Model 692P3F5A7N and 692R3F5A7N, respectively. The pH probe is a Model 6028P0 with a measurement range of 0.0 to 14.0 pH. The ORP probe is a Model 2028R0 with a measurement range of -2000 to 2000 mV.

3.2.7.4 Odor Reduction Station Recirculation Pumps

Scrubber solution is continuously re-circulated by recirculation pumps from the scrubber sump to the distribution manifold. The scrubber solution flows by gravity through the packing media to the sump. Two (2) fiberglass, end suction, recirculation pumps manufactured by Fybroc, model 1500, with 3-inch inlet, 2-inch outlet and 8 1/2-inch impeller which provides with the odor reduction package at a design capacity of 240 gpm, 65 ft TDH. The pumps are equipped with T.B. Woods, No. 7 motor-to-pump flexible couplings Duramatalic ROX double mechanical seals, and water flush. Each pump is driven by a constant speed, TEFC, Siemens Model RG2ESD, 7-1/2 hp, 1800 rpm, 460 v, 3 phase, 60 Hz motor.

3.2.7.5 Odor Reduction Station Sodium Hydroxide (NaOH) Metering Pump

Two (2) NaOH double diaphragm, positive displacement type metering pumps are located at the odor reduction station adjacent to the NaOH storage tank within the corresponding containment area. Each is manufactured by PulsaFeeder, Model 680-S-AE, and is capable of delivering 0.3 to 3.0 gallons per hour at a maximum pressure of 45 psig and a maximum stroke speed of 44 strokes per minute. Each pump is driven by a totally enclosed, chemical duty, Baldor, 1 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor. The motor is connected to the pump shaft by a flexible coupling. The output volume of the pump is adjustable over a range of 10:1 with an Elma, 240 v, single phase, 60 Hz electric stroke length actuator. Additionally each pump is provided with a pulsation dampener, pressure relief valve, calibration column, back pressure control valve, and a conductivity sensor for detection of diaphragm leakage. One pump is a standby unit.

3.2.7.6 Odor Reduction Station Sodium Hypochlorite (NaOCl) Metering Pump

Two (2) NaOCl double diaphragm, positive displacement, type metering pumps are located at the odor reduction station adjacent to the NaOCl storage tank within the corresponding containment area. Each is manufactured by PulsaFeeder, Model 880-S-AE, and is capable of delivery 3.1 to 23.0 gallons per hour at a maximum pressure of 45 psig and a maximum stroke speed of 58 strokes per minute. Each pump is driven by a totally enclosed, chemical duty, Baldor, 1 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor. The motor is connected to the pump shaft by a flexible coupling. The output volume of the pump is adjustable over a range of 10:1 with an Elma, 240 v, single phase, 60 Hz electric stroke length actuator. Additionally, each pump is provided with a pulsation dampener, pressure relief valve, calibration column, back pressure control valve, and a conductivity sensor for detection of diaphragm leakage. One pump is a standby unit.

3.2.7.7 Odor Reduction Station NaOH Storage Tank

The NaOH tank is located just southeast of the scrubber tower and provides 30 days of storage capacity. The tank is manufactured of fiberglass reinforced plastic using Derakane 411 resin, with an interior nexus veil corrosion-resistant barrier also fabricated with Derakane 411 resin. The tank is provided with a dished head and a ladder for access to the

top. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as pressure relief, overflow pipe, and drain pipe, are provided. The tank is enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

The 1000 gallon tank is 5 ft in diameter with a 7 ft straight shell height, and is manufactured by Belco Manufacturing Company.

The NaOH tank is designed for 1.53 specific gravity and is provided with 2-inches of polyurethane thermal insulation. Electric heat tracing which provides heating of the tank and operates on 240 VAC and is manufactured by Thermon.

3.2.7.8 Odor Reduction Station NaOCl Storage Tank

The NaOCl tank is located just northeast of the scrubber tower and due to the natural degradation of the NaOCl solution, provides only 14 days of storage capacity. The tank is manufactured of fiberglass reinforced plastic using Derakane 411 resin, with an interior nexus veil corrosion-resistant barrier also fabricated with Derakane 411 resin. The tank is provided with a dished head and a ladder for access to the top. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as pressure relief, overflow pipe, and drain pipe, are provided. The tank is enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

The tank is 8 ft in diameter with a 17 ft-3-inch straight shell height, 6400 gallons, and is manufactured by Belco Manufacturing Company. The NaOCl tank is designed for 1.22 specific gravity.

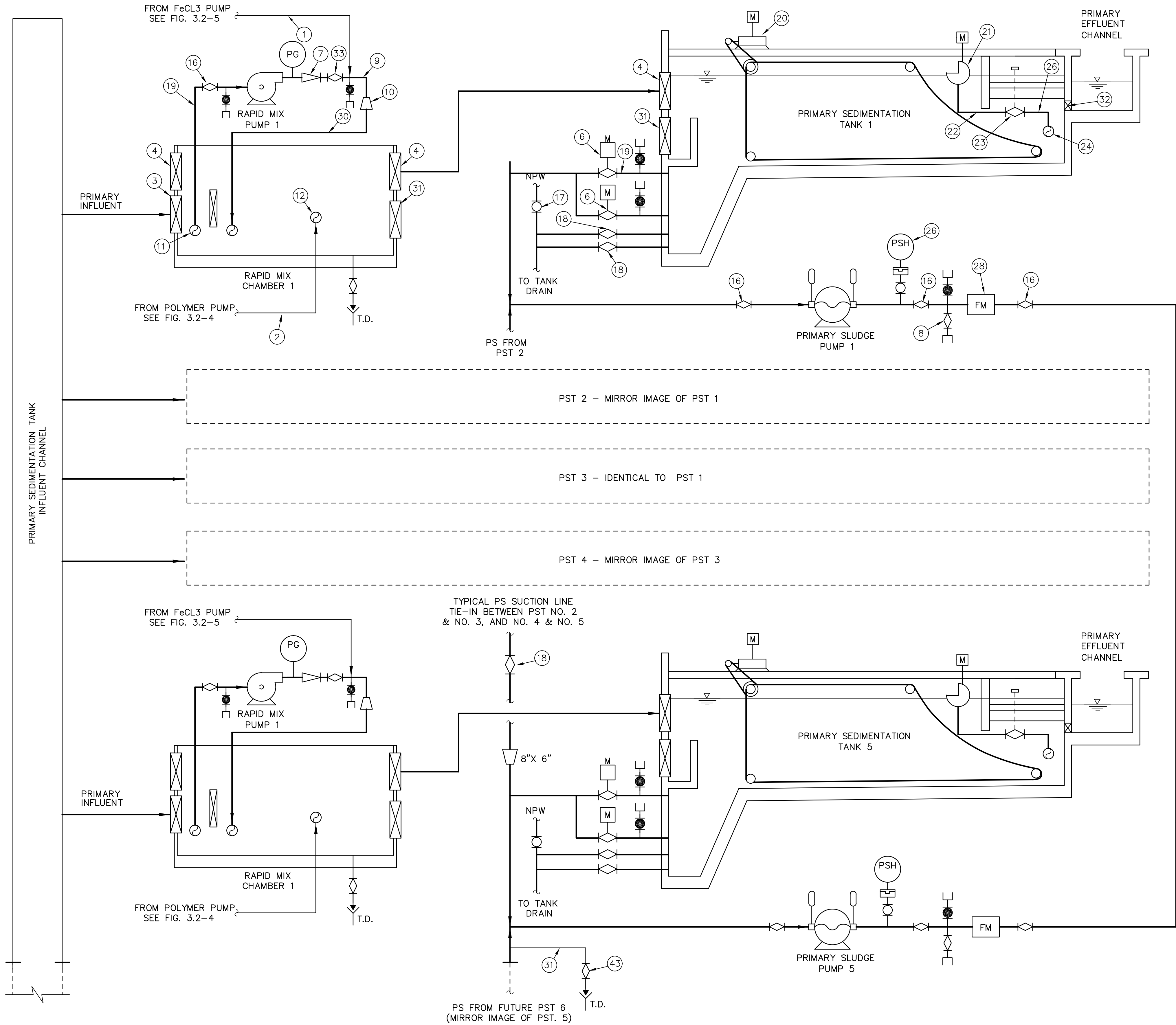
3.2.7.9 NaOH and NaOCl Containment Sump Pumps

To control spills, rainwater, and washwater within the sodium hydroxide and sodium hypochlorite containment areas, each area is provided with a sump and one (1) totally enclosed Barnes 3SE1544DS submersible simplex pump with a 1.5 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor with a double mechanical seal. The sump pump is manually controlled.

3.2.7.10 Water Softening System

An automatic water softening system, ion exchange type, is provided to treat make-up water for the scrubber. The water softener is located on the north side of the NaOCl Tank containment wall. The water softener is manufactured by Culligan, Model SMS-91/9000, and is capable of producing a maximum flow of 6 gpm and daily capacity of 2,900-3,000 gallons. The unit includes two softening ion exchange vessels and a brine tank. The unit is provided with automatic controls to alternate tanks, and regulate the regeneration cycles. The control system operates on 120 v, single phase, 60 Hz electrical current. A calcium analyzer manufactured by Jenco Instruments, model J3675 is provided to monitor water hardness.

XREFS: \\TLBLK.dwg IMAGES:None User:LARSON Spec:PIRNE STANDARD File: \\pro\\1991037\\O&M schematics\\20M FIG 3.2-1.DWG Scale:1:1 Date:03/18/2011 Time:12:03 Layout:Blank



PARTIAL ASSEMBLY SCHEDULE

ITEM	DESCRIPTION
1	3/4" PVC FeCL3 SUPPLY
2	1" PVC POLYMER SUPPLY
3	(2) 24" X 24" OPENINGS W/316 SS ISOLATION STOP PLATES
4	2' X 2' DWN OPG SCUM SLIDE GATE W/NUT OPERATORS
5	(2) 6" D.I. PIPE FLG
6	6" PLUG VALVES W/MOTOR OPERATOR
7	4" PVC CHECK VALVE, FLG W/LEVER, LIMIT SWITCH
8	4" PVC PLUG VALVE, FLG
9	4" PVC LINE
10	8" X 4" REDUCER
11	(2) 6" D.I. CAST IN PLACE WALL FLG
12	TO DIFFUSER
13	1" PVC FLG POLYMER W/(7) 1/2" NOZZLES @ 1'-0" O.C.
14	(2) 18" D.I. CAST IN PL @ IE 49.0' W/24" 316SS ISO SL GATE GUIDES
15	6" D.I. PIPE
16	6" PLUG VALVE
17	3" PVC BALL VALVE
18	8" PLUG VALVE
19	6" GLDI
20	COLLECTOR DRIVE MOTOR MTD, MIN 18 ABOVE SLAB
21	18" D.I. ROTARY SKIMMER PIPE WITH ACTUATOR
22	8" GLDI
23	8" PLUG VALVE
24	18" GLDI PSK
25	PRESSURE SWITCH LOW
26	PRESSURE SWITCH HIGH
27	6" FLOW METER
28	4" FLOW METER
29	SLUDGE GRINDER
30	8" PVC
31	24" X 24" PRESSURE SLIDE GATES
32	10" CANAL GATE VALVE FOR FILL AND DRAW OPERATIONS
33	4" PVC BALL VALVE

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PRIMARY SEDIMENTATION AREA
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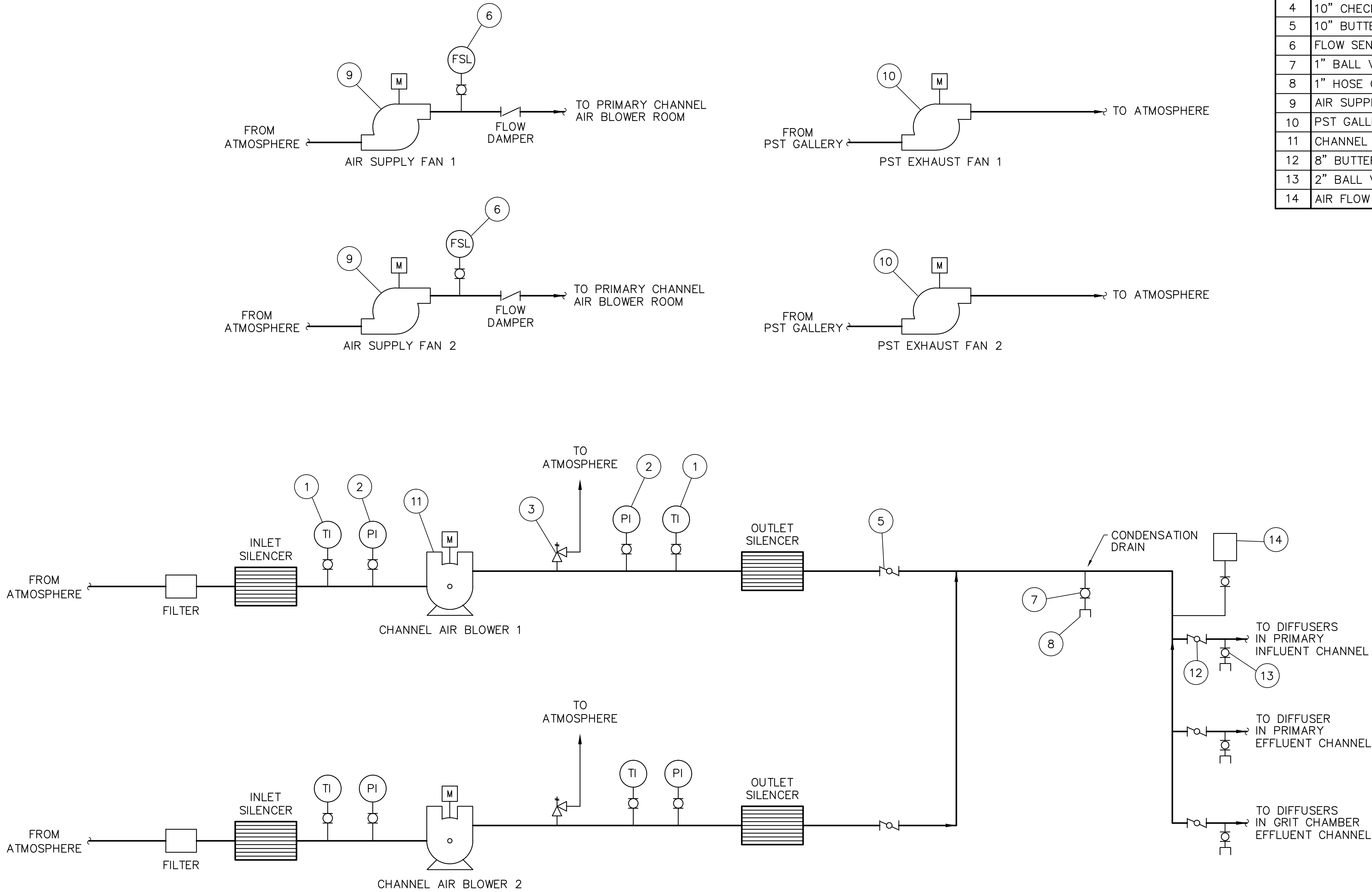
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FIGURE 3.2-1
CAD REF. NO. I20M FIG 3.2-1

XREFS: \\TLBUK.dwg IMAGES:None
User:CARSON Spec:Pirnie STANDARD File:c:\proj\1991037\Q&M schematics\120M FIG 3.2-2.DWG Scale:1:1 Date:03/21/2011 Time:15:30 Layout:Blank

PARTIAL ASSEMBLY SCHEDULE

ITEM	DESCRIPTION
1	TEMPERATURE INDICATOR
2	PRESSURE INDICATOR
3	PRESSURE RELIEF VALVE
4	10" CHECK VALVE
5	10" BUTTERFLY VALVE
6	FLOW SENSOR
7	1" BALL VALVE
8	1" HOSE CONNECTION
9	AIR SUPPLY FAN, FRP, BY HARTZELL FAN INC.
10	PST GALLERY EXHAUST FAN, FRP, BY HARTZELL FAN INC.
11	CHANNEL AIR BLOWER, ROTARY POSITIVE DISPLACEMENT, SUTROBILT, 8LL-RHC
12	8" BUTTERFLY VALVE
13	2" BALL VALVE
14	AIR FLOW METER



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CHANNEL AIR
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FIGURE 3.2-2
CAD REF. NO. 120M FIG 3.2-2

XREFS: \\TLBUK.dwg IMAGES:None User:CARSON Spec:PIRNE STANDARD File:t:\proj\1991037\3&M schematics\I2OM FIG 3.2-3.DWG Scale:1:1 Date:03/21/2011 Time:15:29 Layout:Blank

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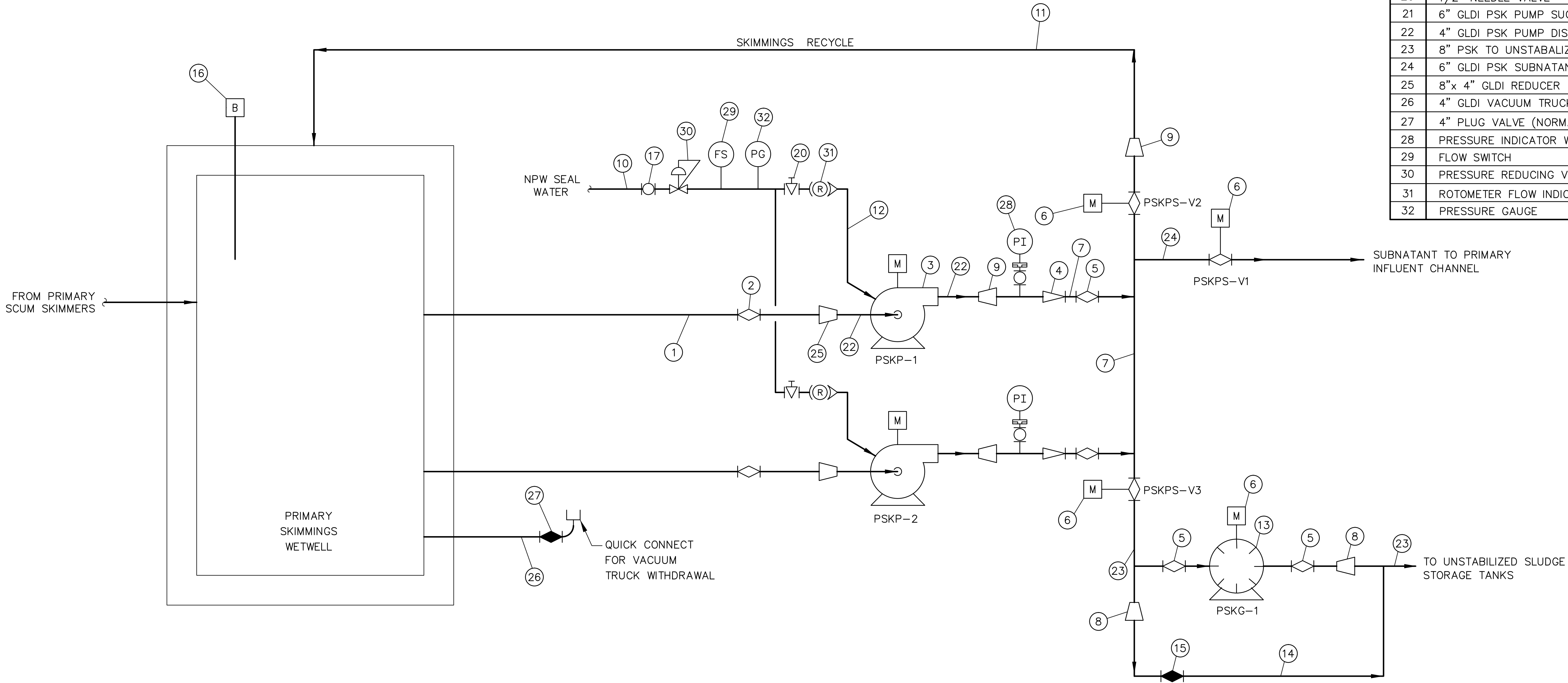
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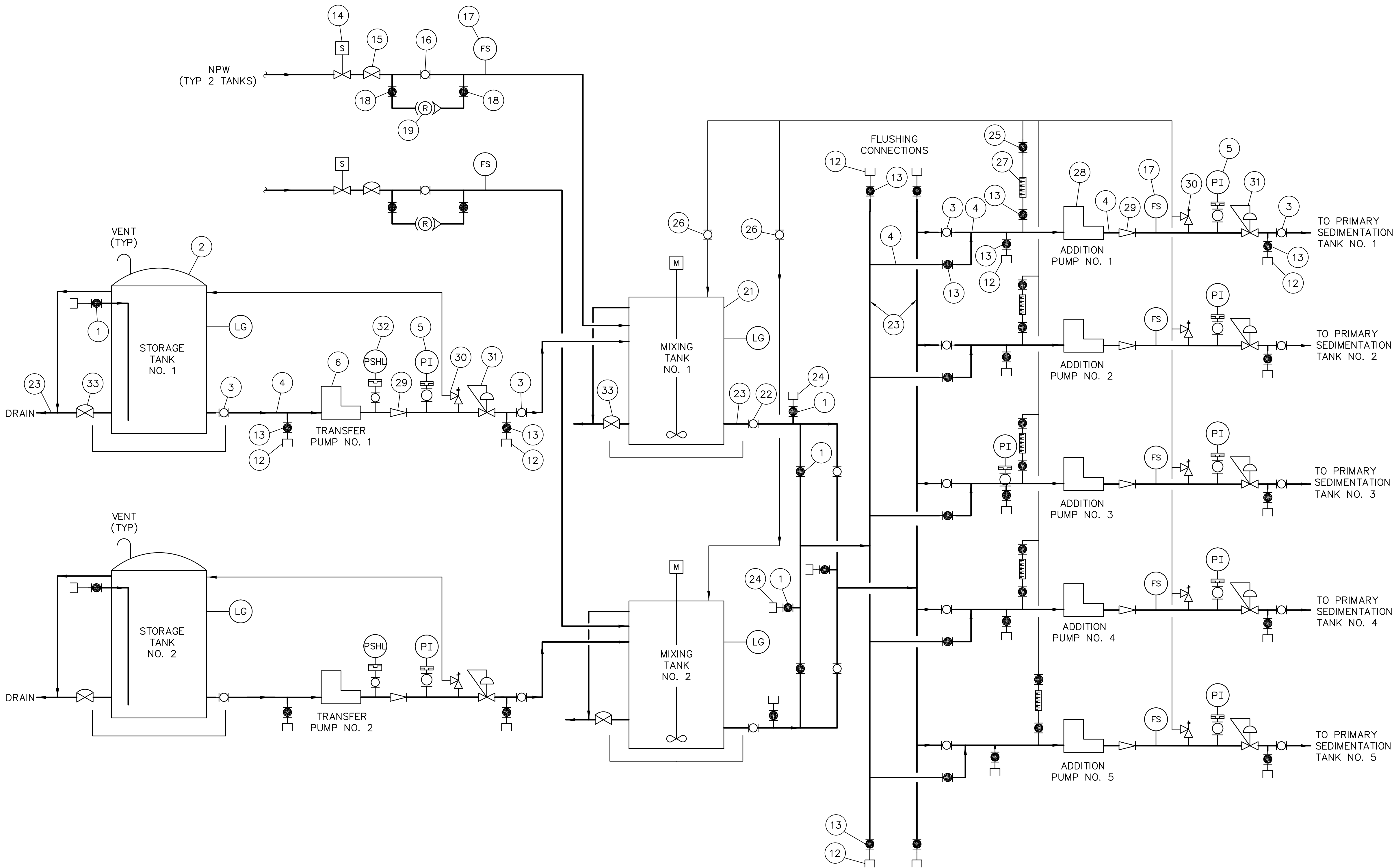
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FIGURE 3.2-3
CAD REF. NO. I2OM FIG 3.2-3

PARTIAL ASSEMBLY SCHEDULE

ITEM	DESCRIPTION
1	8" GLDI PSK PUMP SUCTION
2	8" PLUG VALVE
3	SKIMMINGS PUMP – RECESSED IMPELLER, CENTRIFUGAL
4	6" SWING CHECK VALVE
5	6" PLUG VALVE
6	6" MOTOR OPER PLUG VALVE WITH ACTUATOR
7	6" GLDI PSK DISCHARGE
8	8"x 6" GLDI REDUCER
9	6"x 4" GLDI REDUCER
10	NUMBER NOT USED
11	4" GLDI PSK RECYCLE
12	1/2" NON-POTABLE SEAL WATER
13	PSK GRINDER
14	8" GLDI PSK GRINDER BYPASS
15	8" PLUG VALVE(NORMALLY CLOSED)
16	LEVEL SENSOR
17	1/2" BALL VALVE
18	1/2" SEAL WATER SOLENOID VALVE
19	1/2" BALL VALVE (NORMALLY CLOSED)
20	1/2" NEEDLE VALVE
21	6" GLDI PSK PUMP SUCTION
22	4" GLDI PSK PUMP DISCH
23	8" PSK TO UNSTABILIZED SLUDGE STORAGE TANKS
24	6" GLDI PSK SUBNATANT TO PRIMARY INF CHANNEL
25	8"x 4" GLDI REDUCER
26	4" GLDI VACUUM TRUCK WITHDRAWAL
27	4" PLUG VALVE (NORMALLY CLOSED)
28	PRESSURE INDICATOR WITH ISOLATOR
29	FLOW SWITCH
30	PRESSURE REDUCING VALVE
31	ROTOMETER FLOW INDICATOR FOR NON-POTABLE WATER
32	PRESSURE GAUGE



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PARTIAL ASSEMBLY SCHEDULE

ITEM	DESCRIPTION
1	3" PVC BALL VALVE (NORMALLY CLOSED)
2	8' DIA. X 9' HIGH STORAGE TANK
3	1" PVC BALL VALVE
4	1" PVC PIPE
5	PRESSURE INDICATOR WITH ISOLATOR
6	TRANSFER PUMP, PROGRESSIVE CAVITY TYPE
7	2" PVC CHECK VALVE
8	2" PRESSURE RELIEF VALVE
9	2" PVC PIPE
10	2" BACKPRESSURE REGULATOR VALVE
11	2" PVC BALL VALVE
12	1" QUICK CONNECT (FLUSHING)
13	1" BALL VALVE (NORMALLY CLOSED)
14	1 1/2" NPW SOLENOID VALVE
15	1 1/2" DIAPHRAGM VALVE
16	1 1/2" BALL VALVE
17	FLOW SWITCH
18	1 1/2" BALL VALVE (NORMALLY CLOSED)
19	ROTOMETER WITH 1 1/2" END CONNECTIONS
20	2" PVC BALL VALVE (NORMALLY CLOSED)
21	5' DIA. X 6' HIGH MIXING TANK
22	3" PVC BALL VALVE
23	3" PVC PIPE
24	3" QUICK DISCONNECT
25	3/4" PVC BALL VALVE (NORMALLY CLOSED)
26	3/4" PVC BALL VALVE
27	CALIBRATION COLUMN
28	ADDITION PUMP, PROGRESSIVE CAVITY TYPE
29	1" PVC CHECK VALVE
30	1" PRESSURE RELIEF VALVE
31	1" BACKPRESSURE REGULATOR VALVE
32	HIGH/LOW PRESSURE SWITCH WITH DIAPHRAGM SEAL
33	3" DIAPHRAGM VALVE

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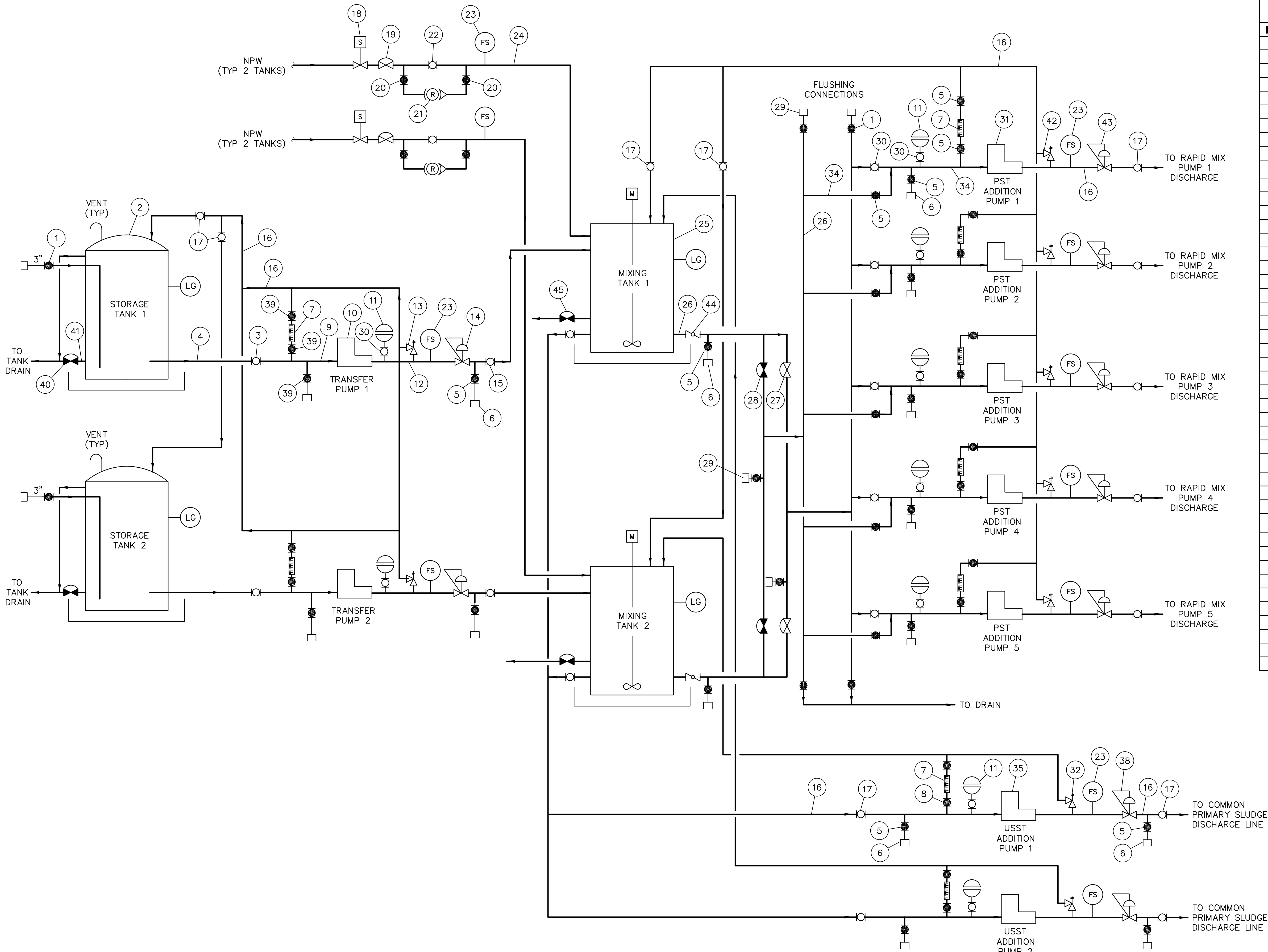
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FIGURE 3.2-4
CAD REF. NO. I2OM FIG 3.2-4

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PARTIAL ASSEMBLY SCHEDULE

ITEM	DESCRIPTION
1	3" PVC BALL VALVE (NORMALLY CLOSED)
2	14' DIA. X 20' HIGH STORAGE TANK
3	3" PVC BALL VALVE
4	3" PVC PIPE
5	1" PVC BALL VALVE (NORMALLY CLOSED)
6	1" QUICK CONNECT (FLUSHING)
7	CALIBRATION COLUMN
8	3/4" PVC BALL VALVE (NORMALLY CLOSED)
9	3" PVC TRANSFER PUMP SUCTION
10	TRANSFER PUMP, DOUBLE DIAPHRAGM METERING PUMP
11	PULSATION DAMPNER
12	2" PVC TRANSFER PUMP DISCHARGE
13	2" PRESSURE RELIEF VALVE
14	2" BACKPRESSURE REGULATOR VALVE
15	2" PVC BALL VALVE
16	3/4" PVC PIPE
17	3/4" PVC BALL VALVE
18	1 1/2" NPW SOLENOID VALVE
19	1 1/2" DIAPHRAGM VALVE
20	1 1/2" BALL VALVE (NORMALLY CLOSED)
21	ROTOMETER WITH 1 1/2" END CONNECTIONS
22	1 1/2" BALL VALVE
23	FLOW SWITCH
24	1 1/2" NPW PIPING
25	5' DIA. X 6' HIGH MIXING TANK
26	6" PVC PIPE
27	6" PVC DIAPHRAGM VALVE
28	6" PVC DIAPHRAGM VALVE (NORMALLY CLOSED)
29	3" QUICK CONNECT (FLUSHING)
30	1" PVC BALL VALVE
31	ADDITION PUMP, DOUBLE DIAPHRAGM METERING PUMP
32	3/4" PRESSURE RELIEF VALVE
33	1" PVC ADDITION PUMP DISCHARGE
34	1" PVC ADDITION PUMP SUCTION
35	ADDITION PUMP, DOUBLE DIAPHRAGM METERING PUMP
36	1" PRESSURE RELIEF VALVE
37	1" BACKPRESSURE REGULATOR VALVE
38	3/4" BACKPRESSURE REGULATOR VALVE
39	2" PVC BALL VALVE (NORMALLY CLOSED)
40	4" DIAPHRAGM VALVE
41	4" PVC PIPE
42	1/2" PRESSURE RELIEF VALVE
43	1/2" BACKPRESSURE REGULATING VALVE
44	6" BUTTERFLY VALVE
45	3" DIAPHRAGM VALVE

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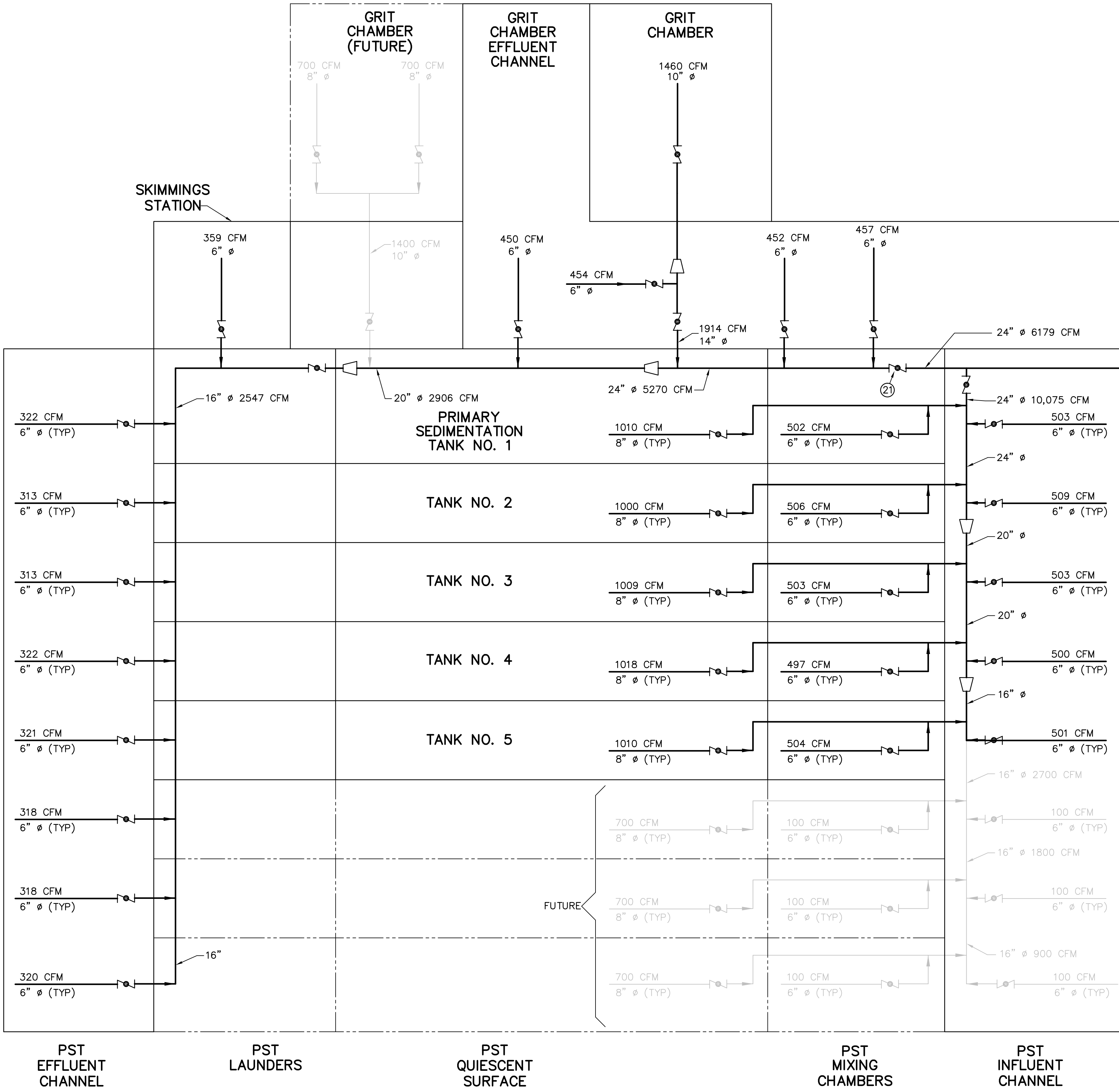


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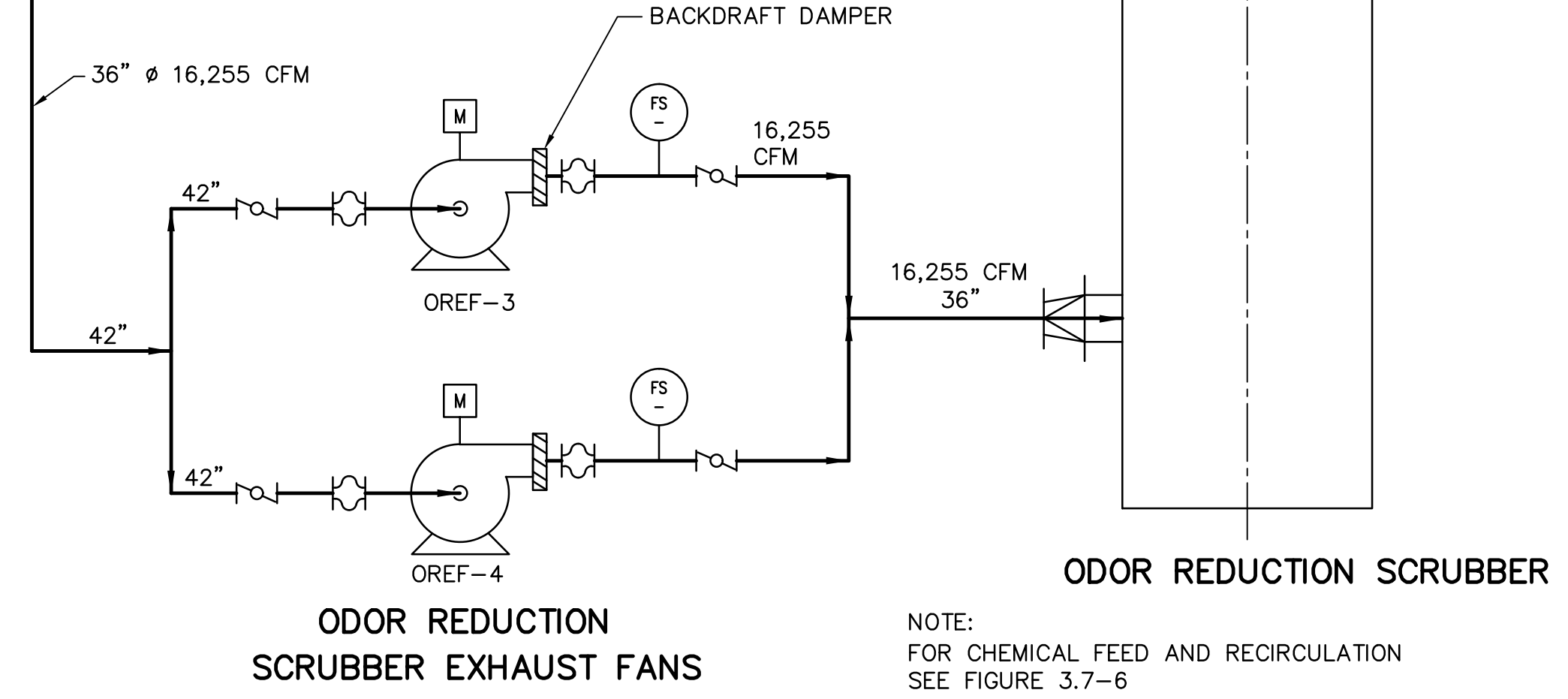
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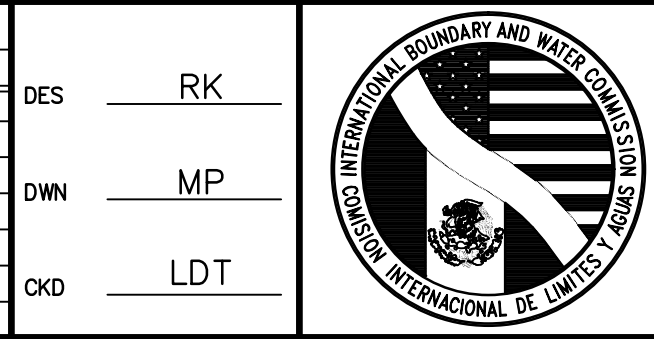
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FIGURE 3.2-5
CAD REF. NO. 120M FIG 3.2-5



- LEGEND**
- DAMPER
 - EXPANSION JOINT
 - REDUCER
 - BACKDRAFT DAMPER
 - DUCT (SIZE)
 - BUILDING WALL
 - EXHAUST FAN (CENTRIFUGAL) FLOOR MOUNTED



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3.3 ACTIVATED SLUDGE FACILITIES

3.3.1 Activated Sludge Tanks

The Activated Sludge Facility (ASF) includes seven (7) Activated Sludge Tanks (ASTs). Each individual AST measures 350-feet in length, 24-feet in width, with has an average sidewall depth of 17.35-feet. Each of the ASTs is divided into six (6) individual treatment cells, identified as Cell "A" through Cell "F"; and three (3) aerobic treatment zones simply identified as Zone 1, 2, and 3. Weir plates at the overflow invert of each AST are set at an elevation of 55.80' to establish the water surface elevation (WSEL) for the design parameters.

Primary Effluent (PE) is conveyed from the existing Primary Sedimentation Tank Effluent Channel to the AST structures via a buried 72" FRP pipe. This pipe connects to a 9' x 11' AST Inlet Junction Structure on the east side of the ASTs, and conveys flow up to the AST Influent Channel for distribution into each of the ASTs. The PE enters each AST via two parallel 24" ductile iron pipes that pass through the first AST treatment cell (Cell "A"), and discharge into the 18" diffuser header located at the front of the second treatment cell (Cell "B"). Flow into each of the 24" inlet pipes is controlled by manually operated gate valves manufactured by DeZURIK/Sartell Valves, Inc. Discharged PE from these diffuser headers is distributed across the width of each tank via six (6) downwardly directed 10" x 6" reducer outlets.

In addition, to permit accumulated skimmings and floating debris to be removed from the AST Influent Channel into the adjacent ASTs, the eastern wall of each AST contains an 18"x 24" opening at invert elevation 56.5'. These openings remain closed under normal operating conditions, but can be manually opened using downward opening slide gates manufactured by Golden Harvest, Inc. Stop plate frames are also provided in the influent channel at each of these wall openings, permit stop plates to be installed over these openings when individual ASTs slide gates need to be taken out of service.

The process flow travels westward through the ASTs in a single pass, moving through various treatment regimes that are commonly referred to as the Selector Zone Mixing System (See Section 3.3.2). At the western end of the ASTs, the process flow spills over FRP weir plates set at an elevation of 55.80', and comingles in the AST Effluent Channel for conveyance to the Secondary Sedimentation Facilities (See Section 3.4). The

FRP weir plates are manufactured by Fiber Tech Engineering, Inc., and span the 24-foot width of each tank.

The general schematic concept of the ASTs is shown by Figure 3.3-1.

3.3.2 Selector Zone Mixing System

The treatment process designed for these ASTs differs from the conventional single-pass treatment system by subdividing each tank into different treatment zones. These different zones create characteristically differing conditions within the process flow, encouraging the development of specific desirable microorganisms and avoiding conditions allowing nuisance microorganisms to thrive. Each AST begins with the Cell “A” pre-anoxic zone (Section 3.3.2.1), followed by the Cell “B” anaerobic zone (Section 3.3.2.2), the Cell “C”, “D”, “E” and “F” anoxic zones (Section 3.3.2.3), and finishing with three aerobic zones (Section 3.3.2.4).

Baffle walls are used between in “A”, “B”, “C”, “D”, “E” and “F” zones to establish the limits of each selector process and to subdivide the anaerobic and anoxic zones into smaller treatment cells. The baffles help to achieve the required detention times for each selector zone cell and minimize short-circuiting of the process flow. Each AST contains six (6) baffle walls that combine to span the width of the tank, and are constructed from vertically stacked 2" x 6" redwood planks. The baffles mount to the side walls of the tank with 304L stainless steel (SS) angles, and attach to two (2) 304L SS columns within the width of the tank. A lockable door constructed of stacked redwood planks is provided in each baffle wall for accessibility during maintenance. These doors are located on the low side of the sloped AST slabs, against the tank sidewall. The bottom elevation of each baffle wall is set level at an approximate elevation of 38.50', leaving a gap ranging from about 2 ½" to 6" across the bottom of each channel. This gap allows process flows to drain out beneath the baffle walls whenever tanks are taken out of service, preventing differential pressure from developing on the opposing sides of baffle walls. The upper planks of the baffle walls are notched to an elevation of 55.80' (matching the set elevation of the AST discharge weirs), forcing the process flows to overtop baffle walls when entering the adjacent cell or treatment zone. Square openings in the baffle walls are provided to allow process piping to pass through.

Mixing is provided in the treatment zones (“A” through “F”) to ensure that the process flow remains completely mixed and microorganisms remain in suspension. The three aerobic zone of the AST obtains its oxygen and mixing energy from air bubbles emitted from fine air bubble diffuser grids (See Section 3.3.2.4.1 for air diffusers), while the remaining zones (“A” through “F”) are equipped with submersible mechanical mixers. These submersible mixers are all Model 4640 heavy duty, direct drive mixers, as manufactured by ITT Flygt Corporation. Electrical power is delivered to the 4 hp electric, submersible, squirrel cage motors via submersible cable. The motors are rated for 460-Volt, 3-phase, 60-Hz power, are cooled by surrounding media, protected by Class H insulation, have a service factor of 1.10, and operate at a steady rate of 855 rpm. For mixing, each motor drives a three (3) bladed, SS propeller that is designed with smooth, wide, back swept blades to optimize mixing efficiency and avoid clogging. The propeller blades have varying pitch angles to optimize mixing within the various zones, resulting in mixing flows ranging from 4,030 to 4,490 gpm.

Each mixer attaches to a 316 SS guide rail support assembly that is used to guide it to its mounting location at the channel invert. A 316 SS cable and crane arm assembly mounted to the deck aids in removing or replacing the mixers as required for service or maintenance activities. A single portable hand-held power drive that attaches to the winch assemblies is used to ease the removal or reinstallation of the AST mixers.

Intermediate Mixed Liquor Return (IMLR) pumps play an integral part in the Selector Zone Mixing System by returning nitrified mixed liquor from the last aeration zone to the front of the treatment process into either cell “B” or cell “D”. These pumps are located at the effluent end of each AST, approximately 6-feet from the discharge weir wall, and discharge mixed liquor into 24" piping that can discharge to two (2) locations- one (1) at the head of the anaerobic cell (“B”), and one (1) at the head of the first anoxic cell (“D”). Manual butterfly valves in the IMLR piping allow plant operators to select either discharge location, or split the flow between both. A more detailed description of the IMLR pumping system is provided in Section 3.3.2.4.1 below.

The Selector Zone Mixing System is shown schematically in Figures 3.3-1 and 3.3-2.

3.3.2.1 Pre-Anoxic Zone (Cell “A”)

The pre-anoxic zone is the first cell of the ASTs (Cell "A"), delineated by the concrete AST wall on the eastern side and a redwood baffle wall to the west. This zone is approximately 16-feet long and receives only return activated sludge (RAS) from the RAS Pump Station within the Secondary Sedimentation Facilities (See Section 3.4.2.2). The purpose of this treatment zone is to stabilize the RAS prior to introducing the Primary Effluent and removing free oxygen and nitrate prior to the subsequent anaerobic treatment zone (Cell “B”)

A 42" ductile iron pipe conveys the RAS from the RAS Pump Station to the influent end of the ASTs. At the centerline of each AST, 12" x 42" reducing tees divert RAS via reducers into the 10" ductile iron pipes that convey the flow to the head of each pre-anoxic zone (Cell “A”). Inside the AST anaerobic zone (Cell “B”) the RAS inlet pipe tees into a 304 SS 10" stainless steel diffuser that distributes the RAS across the width of the tank via eleven 6" x 3" reducing nozzles directed vertically downward.

RAS flow into each AST is continually monitored by a 10-inch magnetic flow meter (Model # VN04 4 F A 0 A 4 1 3 1 1 2 1 X 0 H 00 0 0 0000) and an associated transmitter (Model # VN31 4 N A 0 4 6 0 0 1 1 0 0 0 0 3) manufactured by Krohne. A 10" eccentric plug valve with a manual chainwheel operator, manufactured by DeZURIK/Sartell Valves, Inc., is located upstream of the flow meter for isolation; and a 10" knife gate valve with a manual handwheel operator is located downstream of this flow meter for isolation and flow control.

A 4 hp mechanical mixer is located in each pre-anoxic zone (Cell “A”) centerline immediately ahead of the baffle wall (See Section 3.3.2), mixing the mixed liquor at approximately 4,030 gpm.

3.3.2.2 Anaerobic Zone (Cells “B” and “C”)

The anaerobic zone is approximately 43-feet long and comprises the next two (2) treatment cells of the ASTs (Cells "B" and "C"), each of which is approximately 21.5-feet long. On the upstream side, the pre-anoxic zone baffle wall serves as the delineator; and the following two (2) baffle walls mark the downstream ends of each of the two anaerobic zone cells. The lack of oxygen in this treatment zone forces the resident microorganisms to absorb BOD directly, and also hydrolyzes some particulate BOD into dissolved BOD for

easier uptake by the microorganisms.

Primary effluent (PE) from the AST Influent Channel discharges into Cell "B" of the anaerobic zone via the two parallel 24-inch ductile iron pipes that connect to a diffuser. The flow through each of these 24-inch conveyance pipes is controlled using gate valves, manufactured by DeZURIK/Sartell Valves, Inc., that are manually operated from the deck surface by a handwheel. Stop plate frames on the inside wall of the AST Influent Channel at each of these pipe openings allow installation of stop plates when ASTs are taken out of service. PE discharging from the diffuser header is distributed across the tank via six (6) downwardly directed 10" x 6" reducer outlets, comingling with RAS that overflows from Cell "A".

Intermediate mixed liquor from the effluent end of the ASTs can be discharged into Cell "B" via the 24" IMLR pipe (See Section 3.3.2.4.2). This pipe runs with a negative slope near the top of the tank wall, discharging at the head of Cell "B" at centerline elevation 54.50'. Two (2) identical mechanical mixers are located in each of the anaerobic zones (Cells "B" and "C"). Each of these anaerobic mixers is powered by a 4 hp motor, completely mixing the RAS and PE within anaerobic Cells "B" and "C" at approximately 4,490 gpm.

The downstream baffle walls of each anaerobic cell provide an opening on one side to allow the IMLR pipe to pass through. These openings occur on the north side of odd numbered tanks, and on the south side of even numbered tanks. To coordinate these pipe openings with the baffle wall support columns, one column is located at the centerline of the tank (12-feet to either side wall), and the other is 4-feet off the tank wall on which the IMLR pipe occurs. The 6-inch redwood planks are removed from the 4-foot baffle wall sections from just below the passing IMLR pipe to the top of the baffle wall. This column configuration also coordinates the center baffle wall support column with the upstream side mixing pump guide rail assembly bracing.

3.3.2.3 Anoxic Zones (Cells "D", "E" and "F")

The anoxic zone is approximately 57-feet long and comprises the final three (3) treatment cells of the ASTs (Cells "D", "E" and "F"), each of which is approximately 19-feet long. On the upstream side, the last anaerobic zone baffle wall serves as the delineator; and the following three (3) baffle walls mark the downstream end of each of the

three anoxic zone cells. Intermediate mixed liquor returned from the effluent end of ASTs can be returned to Cell "D" to increase the nitrogen content in the process stream. The microorganisms use this nitrogen as fuel as they oxidize the BOD, ultimately reducing it to nitrogen gas.

Intermediate mixed liquor from the effluent end of the ASTs can be discharged into Cell "D" via the open end of a 24" IMLR pipe (See Section 3.3.2.4.2). This pipe runs with a negative slope near the top of the tank wall, discharging at the head of Cell "D" at centerline elevation 54.09'. Three (3) identical mechanical mixers are located at the downstream end of each of the anoxic cells, immediately upstream of each baffle wall. Each of these mixers is powered by a 4 hp motor, completely mixing the mixed liquor within this treatment zone at approximately 4,260. In Cell "D" and Cell "F" the mixers are located to the north of the tank centerline, whereas in Cell "E" the mixers are located to the south of the tank centerline.

The downstream baffle wall of each anoxic cell provides an opening on one side to allow the IMLR pipe to pass through. These openings occur on the north side of odd numbered tanks, and on the south side of even numbered tanks. The anoxic zone baffle wall support columns are offset by 6-feet from each AST side wall, resulting in a 12-foot middle span between adjacent support columns. Where the IMLR pipe passes through one side of these baffle walls, 3-inch by 3-inch stainless steel angles frame a 39-inch wide opening for this pipe penetration. In this framed opening, the 6" redwood planks are removed from just below the passing IMLR pipe, to the top of the baffle wall; whereas, for the remaining 33-inches of this wall section, the redwood planks are extended above the water surface. This column configuration coordinates the baffle wall support columns with the upstream side mixing pump guide rail assembly bracing, allowing the staggering of the mixers within the ASTs. A baffle skirt is installed along the bottom of the final baffle wall on the downstream side of Cell "F" to create better separation between the anoxic and the aerobic zones. This baffle skirt is manufactured from ¼-inch 304 SS sheeting, and mounts to the level bottom of each baffle wall section, reducing the clearance between the baffle and AST slab to approximately ½-inch.

3.3.2.4 Aerobic Zone

The aerobic zone is approximately 230-feet long, and provides the final treatment

environment for the ASTs. This zone is delineated by the last baffle wall of the anoxic zone (Cell "F") on the upstream side, and by the western AST wall on the downstream side. Mechanical mixing is not required for the aerobic process, since the mixing energy is provided by three (3) distinct air diffuser grids that divide this area into three (3) zones (See Section 3.3.2.4.1). These diffusers introduce oxygen to the mixed liquor, enabling the microorganisms to rapidly metabolize BOD while oxidizing the organic nitrogen into nitrate. The IMLR pump, located downstream of the last diffuser grid at the western end of the ASTs, returns mixed liquor to the front of Cell "B" and/or Cell "D" via dedicated piping (See Section 3.3.2.4.2). Mixed liquor that does not get recirculated by the IMLR pumps or removed by the Tank Drainage Facilities (See Section 3.3.3), will discharge over the FRP weir plates at the western end of the AST for conveyance to the Secondary Sedimentation Facilities.

3.3.2.4.1 Air Diffusers

The air diffusers comprise three (3) separate diffuser grids located along the channel floor in the aerobic treatment zones of each AST. Process Air (PA) is provided by air compressors located in the North Blower Structure (See Section 3.3.4). These compressors feed air into a 48" header pipe for conveyance to the PA piping branches that feed each ASTs diffuser grids. This header pipe is manufactured from 304L stainless steel, connected by Depend-o-Lok style couplings, and is designed for an ultimate air flow of 37,500 cfm. The PA pipe is elevated approximately 8-feet above the AST deck by a series of 304L stainless steel support structures that use rollers to accommodate pipe movement resulting from thermal expansion.

Above the walkways between odd and even numbered ASTs, reducing crosses branch 16" PA piping eastward and westward and to supply the three (3) diffuser grids. These PA pipe branches are also manufactured from 304L stainless steel, and are elevated above the deck by 304L stainless steel support structures with rollers to accommodate pipe movement resulting from thermal expansion. Victaulic Style 77S flexible couplings, ranging in size from 6" to 16", connect the branching pipe segments to the drop legs of the three (3) diffuser grids.

The eastern pipes branching off the PA header convey air to the Grid 1 diffusers of the Aerobic Zone. These 16" pipes extend approximately 14-feet eastward to

16"x10"x10" reducing crosses that split the air flow northward and southward to the adjacent Grid 1 diffuser assemblies. Once this flow is split, the 10" pipes turn vertically downward until they again turn easterly approximately 3.5-feet above the deck surface. From this point, they run parallel on either side of the walkway for approximately 30-feet. These straight pipe runs are fitted with thermal mass flow meters to continually and individually monitor air flow to the Grid 1 diffusers.

A 10" wafer style resilient seated butterfly valve is located on either side of each flow meter for isolation during service and maintenance. The butterfly valve on the upstream side of the flow meter is manually operated by an 8" handwheel mounted to an AUMA gearbox. On the downstream side of the flow meters, the butterfly valves also serve to control the air flow to the Grid 1 diffusers. Standard, manual handwheels are used to set the air flow, but these valves can automatically open/close using Rotork Model No. IQT1000FA121 actuators with 0.6 hp, 460V/3Ph/60Hz motors. Both 10" butterfly valves are identical wafer type valves, with EPDM seat and seals as manufactured by DeZURIK/Sartell Valves, Inc. The thermal mass flow meters are insertion type, Sierra Instruments Model 640S, and are installed directly into the 10" pipe via welded on ¾" thread-o-lets. These flow meters are hard wired to nearby transmitters for continuous monitoring and local indication of air flow, and for monitoring on SCADA.

Downstream of the Grid 1 diffusers, in ASTs 1, 3, 5 and 7 dissolved oxygen (DO) sensors measure and locally display the DO levels, also continuously monitor the measured DO levels for display on the SCADA system. The DO monitoring systems are manufactured by Hach, and include LDO Probes and SC100 Analyzers. As the PA pipes turn downward to connect with the Grid 1 diffuser drop legs, pressure gauges mounted to the downward elbows provide local indication of the pressure in the diffuser grids. The 10" drop legs conveys PA to the Grid 1 diffusers near the AST channel slab, connecting to the diffuser manifold pipes via rigid, SS Victaulic Style 489 couplings. Supports and hardware for these vertical drop legs and diffuser grids are all manufactured from 316 SS.

At centerline 39.28', approximately 1-foot above the tank invert, the 10" diffuser manifold pipes run horizontally across the tanks, spanning nearly 22-feet. These SS manifold pipes are centered within each Grid 1 diffuser, and have connections for eighteen (18) SDR 33.5 air distributor pipes on the upstream side, and eighteen (18) SDR 33.5 air distributor pipes on the downstream side. The 4-5-5-4 piping configuration of these Grid

1 air distributor pipes results in a 20-foot wide and 86.5-foot long diffuser footprint, and results in three (3) separate 2.5-foot wide pathways for service or maintenance access. Each individual distributor pipe contains 40 diffuser connections for a possible total of 1440 diffusers; however, to meet the design requirements, 112 of these diffusers are plugged and only 1328 are active. The diffusers are 9" diameter, EPDM membrane fine bubble disc diffusers, with PVC membrane support and base plates. Total air supply to the Grid 1 diffusers ranges from 795 to 2,508 SCFM, but is designed to operate at an average condition of 1,827 SCFM. This translates to a range of 0.6 to 1.9 SCFM per diffuser, and 1.38 SCFM per diffuser at the average condition. Opposite the central manifold pipe, the air distributor piping manifold into common SDR 33.5 drain line headers which provide purge sump and assemblies to completely drain these diffuser assemblies.

The western pipes branching off the PA header convey air to the Grid 2 and Grid 3 diffusers of the Aerobic Zone. These 16" pipes extend approximately 17-feet eastward to 16"x8"x8" reducing crosses that split the air flow northward and southward to the adjacent Grid 2 diffuser assemblies. After these pipe crosses, the 16" PA pipe reduces down to 12" for the remainder of this elevated pipe run. Once this flow is split, the 8" pipes turn vertically downward until they again turn easterly approximately 3.5-feet above the deck surface. From this point, they run parallel on either side of the walkway for approximately 15-feet. These straight pipe runs are fitted with thermal mass flow meters to continually monitor air flow to the Grid 2 diffusers.

An 8" wafer style resilient seated butterfly valve is located on either side of each flow meter for isolation during service and maintenance. The butterfly valve on the upstream side of the flow meter is manually operated by an 8" handwheel mounted to an AUMA gearbox. On the downstream side of the flow meters, the butterfly valves also serve to control the air flow to the Grid 2 diffusers. Standard, manual handwheels are used to set the air flow, but these valves can automatically open/close using Rotork Model No. IQT500FA101 actuators with 0.6 hp, 460V/3Ph/60Hz motors. Both 8" butterfly valves are identical wafer type valves, with EPDM seat and seals as manufactured by DeZURIK/Sartell Valves, Inc. The thermal mass flow meters are insertion type, Sierra Instruments Model 640S, and are installed directly into the 8" pipe via welded on ¾"

thread-o-lets. These flow meters are hard wired to nearby transmitters for continuous monitoring and local indication of air flow.

Downstream of the Grid 2 diffusers, in ASTs 1, 3, 5 and 7 dissolved oxygen (DO) sensors measure and locally display the DO levels, also continuously monitoring the measured DO levels for display on the SCADA system. The DO monitoring systems are manufactured by Hach, and include LDO Probes and SC100 Analyzers. As the PA pipes turn downward to connect with the Grid 2 diffuser drop legs, pressure gauges mounted to the downward elbows provide local indication of the pressure in the diffuser grids. The 8" drop legs convey PA to the Grid 1 diffusers near the AST channel slab, connecting to the diffuser manifold pipes via rigid, SS Victaulic Style 489 couplings. Supports and hardware for these vertical drop legs and diffuser grids are all manufactured from 316 SS.

At centerline 39.19', approximately 1-foot above the tank invert, the 8" diffuser manifold pipes run horizontally across the tanks, spanning nearly 22-feet. These SS manifold pipes are centered within each Grid 2 diffuser, and have connections for fourteen (14) SDR 33.5 air distributor pipes on the upstream side, and fourteen (14) SDR 33.5 air distributor pipes on the downstream side. The 3-4-4-3 piping configuration of these Grid 2 air distributor pipes results in a 20-foot wide and 78-foot long diffuser footprint, and results in three (3) separate 3-foot wide pathways for service or maintenance access. Each individual distributor pipe contains 25 diffuser connections for a possible total of 700 diffusers; however, to meet the design requirements, 112 of these diffusers are plugged and only 588 are active. The diffusers are 9" diameter, EPDM membrane fine bubble disc diffusers, with PVC membrane support and base plates. Total air supply to the Grid 2 diffusers ranges from 349 to 1,102 SCFM, but is designed to operate at an average condition of 803 SCFM. This translates to a range of 0.6 to 1.9 SCFM per diffuser, and 1.37 SCFM per diffuser at the average condition. Opposite the central manifold pipe, the air distributor piping manifold into common SDR 33.5 drain line headers which provide purge sump and assemblies to completely drain these diffuser assemblies.

Downstream of the 16"x8"x8" reducing crosses that serve the Grid 2 diffusers, the 16" PA pipes reduce to 12" piping, and continue to run elevated toward the west for approximately 68-feet. At this location, 12"x6"x6" reducing crosses split the air flow northward and southward to the adjacent Grid 3 diffuser assemblies, terminating a short distance later with welded caps. Once this flow is split, the 6" pipes turn vertically

downward until they again turn easterly approximately 3.5-feet above the deck surface. From this point, they run parallel along either side of the walkway for approximately 18.5-feet. These straight pipe runs are fitted with thermal mass flow meters to continually monitor air flow to the Grid 3 diffusers.

A 6" wafer style resilient seated butterfly valve is located on either side of each flow meter for isolation during service and maintenance. The butterfly valve on the upstream side of the flow meter is manually operated by an 8" handwheel mounted to an AUMA gearbox. On the downstream side of the flow meters, the butterfly valves also serve to control the air flow to the Grid 3 diffusers. Standard, manual handwheels are used to set the air flow, but these valves can automatically open/close using Rotork Model No. IQT250FA101 actuators and 0.6 hp, 460V/3Ph/60Hz motors. Both 6" butterfly valves are identical wafer type valves, with EPDM seat and seals as manufactured by DeZURIK/Sartell Valves, Inc. The thermal mass flow meters are insertion type, Sierra Instruments Model 640S, and are installed directly into the 6" pipe via welded on ¾" thread-o-lets. These flow meters are hard wired to nearby transmitters for continuous monitoring and local indication of air flow.

Downstream of the Grid 3 diffusers in ASTS 1, 3, 5 and 7 dissolved oxygen (DO) sensors measure and locally display the DO levels, also continuously monitoring the measured DO levels for display on the SCADA system. Readings from these Grid 3 DO sensors are used to provide a control logic mode of operation capable of automatically adjusting the Process Air Blower output to maintain the required effluent DO level. The DO monitoring systems are manufactured by Hach, and include LDO Probes and SC100 Analyzers. As the PA pipes turn downward to connect with the Grid 3 diffuser drop legs, pressure gauges mounted to the downward elbows provide local indication of the pressure in the diffuser grids. The 6" drop legs convey PA to the Grid 3 diffusers near the AST channel slab, connecting to the diffuser manifold pipes via rigid, SS Victaulic Style 489 couplings. Supports and hardware for these vertical drop legs and diffuser grids are all manufactured from 316 SS.

At centerline 39.10', approximately 1-foot above the tank invert, the 6" diffuser manifold pipes run horizontally across the tanks, spanning nearly 22-feet. These SS manifold pipes are centered within each Grid 3 diffuser, and have connections for eleven (11) equally spaced SDR 33.5 air distributor pipes on the upstream side, and eleven (11)

equally spaced SDR 33.5 air distributor pipes on the downstream side. This piping configuration for the Grid 3 air distributor pipes results in a 20-foot wide and 51-foot long diffuser footprint, terminating approximately 17.5' from the eastern end of the ASTs. Each individual distributor pipe contains 16 diffuser connections for a possible total of 352 diffusers; however, to meet the design requirements, 64 of these diffusers are plugged and only 288 are active. The diffusers are 9" diameter, EPDM membrane fine bubble disc diffusers, with PVC membrane support and base plates. Total air supply to the Grid 3 diffusers ranges from 173 to 547 SCFM, but is designed to operate at an average condition of 398 SCFM. This translates to a range of 0.6 to 1.9 SCFM per diffuser, and 1.38 SCFM per diffuser at the average condition. Opposite the central manifold pipe, the air distributor piping manifold into common SDR 33.5 drain line headers which provide purge sump and assemblies to completely drain these diffuser assemblies.

Air pressure in each diffuser grid can be measured locally using the manufacturer provided Pressure Monitoring System. This system provides pressure sensing tubes that connect into each diffuser grid and terminate at a dedicated connection box located at the deck elevation above. An associated Portable Pressure Monitoring Panel can make connection at any one of these connection boxes to obtain the differential pressures for that grid. This portable panel contains a bubbler/rotameter and pressure taps into both the diffuser holder and the distributor tubing. Differential pressure gauges in the panel are used to quantify the diffuser airflow and evaluate fouling of the diffuser membranes in the field. The instrumentation is manufactured by Dwyer, and is comprised of a Model VFA-3-SSV bubble flow indicator; and Magnehelic 2025 orifice and Magnehelic 2050 diffuser differential pressure indicators. A NEMA 4X, Rob Roy Model RJ1210HLL FRP enclosure provides protection for this instrument assembly.

The air diffusers are shown schematically in Figure 3.3-2.

3.3.2.4.2 Intermediate Mixed Liquor Return

The Intermediate Mixed Liquor Return plays an integral part in the AST Selector Zone Mixing System by returning nitrified mixed liquor from the effluent end of the treatment process to the front of the ASTs. This system is comprised of an Intermediate Mixed Liquor Return (IMLR) pump and the dedicated piping that conveys the mixed liquor flow to its discharge locations. To anchor these pumps and piping at the western

end of each AST, 6-foot wide structural walls are constructed in the middle of the AST channels. These full-height walls structurally tie into the slabs and walkway support beams approximately 5-feet upstream of each channel end, leaving 9-foot openings on either side for the remaining process flow to pass.

To mount the pumps, 30" SS wall pipes are cast into each wall at a centerline elevation of 40.8', and are flanged to discharge connection plates that provide a hooking mechanism for attachment of the IMLR pumps. Stainless steel guide rails mounted to the upstream side of the walls, direct the pumps onto and off their respective connection plates as they are raised and lowered. At walkway elevation, these guide bars are coordinated with crane assemblies that allow safe and efficient remove or installation of the pumps without the need for personnel to enter the tanks. These SS crane assemblies are complete with cable and hooks, and have a winching assembly that is able to lock and hold a pump in any intermediate position during its operation. A 1 hp portable, hand-held power lift, operating on 110VAC power, can be attached to any of the winches to mechanically raise or lower the pumps. The 42" boom arm of the crane contains a number of intermediate lifting points, but guarantees a minimum load carrying capacity of 600 lb at its maximum arm reach. As a load is being lifted the boom arm assembly can be rotated, making it possible to pick or drop a pump from the walkway surface in a single motion.

A total of eight (8) IMLR pumps are provided for this project, one (1) for installation into each AST, and one (1) complete spare unit with all fittings, appurtenances, and specialty items. These IMLR pumps are three (3) blade submersible propeller pumps, operating at a constant 440 rpm, and driven by a 40 hp electric submersible motor rated for 460-Volt, 3-phase, 60-Hz power. The pumps are Model PP4680, manufactured by ITT Flygt Corporation, and convey a steady 9,300 gpm of nitrified mixed liquor to the front of each AST process into Cells "B" and/or "A".

On the downstream, Victaulic couplings connect the wall pipes to 30" ductile iron (DI) piping that conveys the IMLR discharge. This IMLR piping immediately turns via 90-degree elbow and conveys the flow upward at an approximate 45-degree angle toward the side wall of the channel. A second 90-degree elbow at centerline elevation 51.3' at the side of the tank, redirects the flow eastward for approximately 330-feet toward the front of the AST. Approximately 45-feet to the east of this elbow, the 30" pipe reduces to 24" pipe via a flanged eccentric reducer, and continues onward as 24" piping for the remainder of

the run. Victaulic Style 31 couplings or flanged connections are used to connect adjacent segments of piping, and the entire system is supported from the side wall using steel angle brackets. Openings are provided in the baffle walls to accommodate the passage of this IMLR piping as it runs easterly near the water surface elevation in the tanks.

Two (2) discharge locations are provided for the mixed liquor, one (1) at the front of Cell "B", and one (1) at the front of Cell "D". The Cell "B" discharge location is at the end of this pipe, discharging mixed liquor at a centerline elevation 54.5' from a 90-degree elbow directed toward the center of this anaerobic cell. Approximately 43-feet to the west, a flanged tee installed in the IMLR pipe provides a second discharge location at the head of Cell "D", the first anoxic treatment cell. The approximate 3-feet elevation difference between the eastern and western ends of this piping results in a uniform 1% slope toward the west end of the tank.

Flow from these discharge locations are controlled by 24-inch manual, rubber-seated butterfly valves, manufactured by DeZURIK/Sartell Valves, Inc. Manual actuation from the AST walkway surface is provided by an 8" diameter handwheel that connects to the valve via an AUMA gearbox and a totally enclosed, stainless steel extension. These two (2) butterfly valves allow the mixed liquor to be discharged into either the anaerobic (Cell "B") or the anoxic treatment zone (Cell "D"), or the flow to be split between both. Immediately east of the final baffle wall, a 6-inch tapping sleeve is installed on the 24-inch IMLR pipes, and connects to a riser pipe extending above the deck elevation. This riser pipe is accessibly located, and capped with a blind flange and a 1 ¼" flange adapter into which a portable electromagnetic velocity flowmeter can be inserted. The portable flowmeter can be used to provide local reading of the velocity in any of the seven (7) IMLR pipes, and the associated discharge butterfly valve(s) can be throttled to adjust to the IMLR flow accordingly.

The IMLR system is shown schematically in Figure 3.3-1.

3.3.3 Tank Drainage Facilities

The Tank Drainage Facility is located primarily in the gallery below the AST Influent Channel on the eastern side of the ASTs. It is comprised of a single centrifugal pump with all associated piping and appurtenances, and four (4) sump pumps. Each AST slopes at 1.25% toward a drainage trough running along one side wall, and these troughs

slope at 1% to the low point along the eastern tank wall. Mixed liquor that settles out of the process flow accumulates in the drainage trough and is conveyed by gravity to the low point of each tank. The flared ends of 8" ductile iron (DI) pipes are centered approximately 2-½" above each trough low point, and this piping penetrates the tank wall to connect into a common 12" DI Tank Drain (TD) pipe that runs the length of the influent gallery.

An 8" plug valve at the common 12" DI drainage pipe header at each 12" x 8" tee connection allows individual tank drains to be isolated during service and maintenance activities. These manual eccentric plug valves have flanged end connections, and are actuated by handwheel operators. Each is a PEC Style valve, manufactured by DeZURIK/Sartell Valves, Inc. The 12" TD pipe header is capped with a blind flange at the southern end of the influent gallery, allowing future connection during potential build out. At the northern end of the gallery, a centrifugal pump is tied into the 12" TD piping header, and manifolded to pump discharge to either of two (2) locations. Downstream of the pump, the 12" TD header penetrates the wall of the influent gallery to discharge into the existing Tank Drain Junction Structure 14 (TDJS 14) located to the east. The 12" TD discharge into TDJS 14 is below the normal operating water surface of the ASTs, allowing the initial portion of mixed liquor to be discharged at this location without pumping. Mixed liquor discharged into TDJS 14 is recycled back to the front of the facility via an existing 42-inch TD pipe.

Alternately, an 8" branch of TD pipe allows the mixed liquor to be conveyed around the western side of the ASTs, requiring pumping to discharge into the AST Effluent Channel. This 8" TD penetrates the northern wall of the influent gallery below grade and turns westerly, increasing from 8" to 10" DI TD as it runs buried along the north side of the ASTs. At the west end of the ASTs, it turns vertically upward to discharge into the effluent channel, allowing the biologic solids of the mixed liquor to be conserved and processed through the Secondary Sedimentation Facilities. A 12" plug valve in the TD pipe header downstream of the pump provides control of the initial gravity flow discharging into TDJS 14, but this valve must be closed whenever pumping is required. Upstream of this isolation valve, a tee redirects TD from the header pipe toward the suction side of the pump, and contains a plug valve to isolate this side of the pump. On the discharge side of the pump, a lateral wye connection with two (2) manual plug valves

allows mixed liquor to be pumped to either discharge location. One branch reconnects into the 12" TD pipe header for pumping into TDJS 14, and the other branch pumps to the AST Effluent Channel. These plug valves are all manual eccentric, PEC Style plug valves, manufactured by DeZURIK/Sartell Valves, Inc., and each is actuated by a handwheel operator.

The tank drainage pump is a self priming centrifugal pump, capable of 19-foot dynamic suction lift, and flanged directly into the TD pipe system. It is able to pass 3" diameter solids and delivers 1,500 gpm against a Total Dynamic Head of 32-feet. The pump is driven at a constant 1,200 rpm by a V-belt connection to a 25-hp, TEFC, severe duty/premium efficiency, inverter duty motor with a Class F insulation system. This electric motor has a 1.15 service factor, operates at 1750 rpm, and is rated for 460-Volt, 3-phase, 60-Hz power. The pump is a Model PO8LA-12L Crown Pump, manufactured by Crane Pumps; and is driven by a Model EM4103T Baldor Reliance motor.

Four (4) drainage sumps, located along the length of the eastern wall in the AST Influent Gallery, are each equipped with a single Barnes Model 3SE1044DS submersible pump with a capacity of 100 gpm at 32 feet TDH and 140 gpm at 28.7 feet TDH. The motors are rated at 1.5 HP, and require 460 Volt, 3-phase, 60 Hz power. Each pump is provided with a 3-inch check valve and a 3-inch ball valve for isolation in its discharge piping. The discharge piping from the two (2) northern pumps connect in the gallery with a 3" tee, discharging into the Influent Channel above via a single 3" discharge pipe. This discharge configuration is the same for the two (2) southern pumps. The AST Influent Gallery also contains four (4) hose stations along its length with 1-inch hose valves for maintenance purposes and wash-down.

The Tank Drainage Facility is shown schematically in Figure 3.3-3.

3.3.4 Process Air Blowers

The Process Air (PA) Blowers are located in the North Blower Building, immediately north of the AST structure. It is comprised of three (3) skid-mounted centrifugal air compressors, with provisions to connect a future fourth at build out. These compressors generate PA for the air diffusers in the aerobic treatment zone of the ASTs (See Section 3.3.2.4.1 for the Air Diffusers). Air is drawn into each compressor through louvered inlets located along the southern side of the building. Four (4) 8-foot by 10-foot

louvered inlets are provided on the southern wall of the blower building in line with the intake of the air compressors, and an additional four (4) 5-foot by 6-foot louvered inlets are for the passive ventilation of the building. All are fixed aluminum weather louvers designed with drainable head members to discharge water way from the sills. Internal insect and bird screens prevent organisms and blowing debris from gaining access in the building through these passive louvers. The louvers are manufactured by Greenheck, and are designed to create minimal resistance at the designed intake velocity, for a negligible pressure drop at the compressor intake.

For additional protection of the compressor impellers, inlet filters are mounted to the compressor intakes within the Blower Building. A 4.5-foot by 6.5-foot filter housing is provided for the mounting of the filter media, and it tapers to a 24" round flange for connection to the compressor inlets. The filters are dual media, with an initial pre-filter to remove large particles, and a final fiberglass filter to remove microscopic particles. A differential pressure switch, integral to the filter housing provides notification when filters need to be replaced.

Downstream of the filter housing, the compressor inlet is reduced to 20" and connected to the compressor via a 20" expansion joint. On the discharge side of the compressor, a 16-inch expansion joint connects the compressor to a 16" by 24" discharge nozzle for connection to the 24-inch discharge piping. This discharge nozzle is manufactured from 10 gauge carbon steel, and is constructed to provide instrumentation connections and a 6-inch flanged connection for the blow-off valve. The compressor blow-off valve is a 6" resilient-seated BOS butterfly valve manufactured by DeZURIK/Sartell Valves, Inc. It can be automatically actuated using the Limitorque MX-05 actuator with 0.26 hp, 460V/3Ph/60Hz motor, but has a 12-inch handwheel for manual control in the field. On compressor shut down, the blown off air is conveyed out of the building via 6-inch ductile iron piping.

The discharge from each PA blower is equipped with 24" cast iron lug style butterfly valves manufactured by DeZURIK/Sartell Valves, Inc., are installed to allow isolation of the compressor discharge piping from the 48" PA header. These valves are automatically actuated to open/close by a Rotork Model No. IQ10FA10B4 actuator and 0.2 hp, 460V/3Ph/60Hz motor. A manual override and standard handwheel are provided at the actuator for manual operation in field.

Downstream of these valves, the 24" PA pipes bend horizontally at 45-degrees as they connect into the 48" PA header. Two (2) instrument connections in the 48-inch PA pipe header provide mounting for a Rosemount 3144P temperature transmitter with a Series 68 sensor, and a Rosemount 3051C pressure transmitter to monitor the air within the pipe. For continuation of this 48" PA pipe, see Air Diffusers, Section 3.3.2.4.1.

Each of the PA blowers is a 16-inch IGC-H single-stage centrifugal compressors with an integral speed increasing gear, as manufactured by Dresser Roots. Air enters the eye of the impeller after passing through the inlet connection, and is accelerated and compressed by the rotation of the impeller. The air leaves the impeller at a high velocity, entering into a parallel wall diffuser which reduces the air velocity, converting it into pressure. From the diffuser, the air is conveyed into a vertically split volute that conveys the air to the discharge connection.

A horizontally split gear case assembly is bolted to the volute, and controls the airflow in the volute via low-speed and high-speed rotating assemblies. The low-speed assembly consists of an alloy steel shaft, supported by two (2) pressure-lubricated sleeve-style bearings, and a drive gear. A positive displacement gear-type oil pump is bolted to this gear box and driven by the low-speed shaft. An integral pinion gear transfers the rotational energy to this high-speed shaft, turning the impeller within the volute.

For added control of the air discharged from the compressor, adjustable inlet guide vanes and diffuser vanes can adjust compressor output while the impeller continues to operate at a constant rate. On the inlet side, the guide vanes are air-foil shaped and mounted within a cast-iron housing. Each vane is mounted on an integral shaft that can rotate approximately 90-degrees from fully open to fully closed via actuation of the linked control arm. Similarly, the wing-shaped diffuser vanes on the discharge side are mounted onto vane shafts, and can be rotated by a ring gear. Both inlet and diffuser vanes are actuated by Andco Eagle Actuators rated for 120V, single phase power, and manufactured by Dresser. Each is provided in a NEMA 4 housing, has a 12-inch stroke length, and comes with switches that send vane position information to the local blower panel for indication and adjustment.

To drive the PA Compressors, each skid is provided with a 700-hp induction motor, coupled to the low-speed rotating assembly of the compressor. This coupling is a

Metastream L-series dry disc coupling, manufactured by John Crane, and enables either shaft to be removed without disturbing the alignment of the other. The electric motor is within a totally enclosed, fan cooled (TEFC) enclosure, and is a type CZ motor with a 5013S frame as manufactured by Siemens. It is rated for 460-Volt, 3-phase, 60-Hz power, operating at a constant 1800 rpm with Class F insulation and a 1.15 service factor.

The structural steel base to which each compressor and motor attach is provided with vibration isolators to reduce transmissibility of seismic vibration to less than 2-percent. A total of eight (8) Model M2SS-1E5150N vibration isolators, manufactured by The VMC Group, are required between each skid and the building slab. Each compressor has a complete oil lubrication system with an oil reservoir integrated into the compressor base to lubricate the skid equipment. The oil reservoirs have a removable immersion heater to ensure that the oil temperature is maintained above 50°F, and a drain valve to facilitate oil changes. A water/oil heat exchanger continually cools the oil during compressor operation using water on a once-through basis. This heat exchanger is designed with a maximum inlet temperature of 85°F and a temperature rise of 10°F.

Two (2) lubrication oil pumps are furnished with each compressor skid, a main pump and an auxiliary pump. The main pump is gear driven from the low-speed shaft of the compressor, and operates during normal compressor operation. This positive displacement pump is manufactured by Tuthill Pump Group, and is a Model 3RC2F, capable of pumping 18 gpm at the 1,800 rpm of the compressor shaft. The electrically actuated auxiliary pump will operate on compressor startup and on low oil pressure. This pump is a IMO pump, driven by a Toshiba IEE841 severe duty, TEFC motor, rated for 460-Volt, 3-phase, 60-Hz power, and operating at 3600 rpm.

The Process Air Preparation Facility is shown schematically in Figure 3.3-4.

3.3.5 Channel Aeration Facilities

The Channel Air (CA) Facilities are located within the North Blower Building, on its eastern side. It is comprised of three (3) skid-mounted 8-inch positive displacement rotary lobe blowers and their associated downstream appurtenances. These blowers generate CA for the AST and SST channels, keeping the flow adequately mixed to prevent settling in the channels. One blower is dedicated to both influent and effluent channels of the AST, a second blower is dedicated to the influent channel of the SST, and the third

blower serves as a standby, capable of supplying air to either location.

Air is drawn into an inlet filter/silencer atop each blower unit through a 10-inch flanged inlet opening. Surfaces inside the filter/silencer are lined with 2-inch acoustical foam to reduce noise levels by 18-20 dbA, and a filter element to remove particulate matter and protect the compressor lobes. The filter element has a 99% removal efficiency for particles 1 micron and larger, and is surrounded by steel mesh and sealed between molded rubber ends so it is cleanable and reusable. A hinged access cover provides easy access to the filter element, and an 8" flanged connection mounts the unit directly to the compressor inlet. The housing for each blower is cast from a high strength gray iron, and is reinforced with ribbing to prevent distortion caused by torsional loads. Each of the two (2) compressor shafts are heat treated and dynamically balanced; and are integral to the straight, three-lobed impellers. Heavy duty spherical roller bearings support the shafts within the compressor housing and maintain their alignment during operation; while a helical timing gear coordinates the rotation of both shafts based on the rotation of the motor driven shaft. All bearings and timing gears are splash lubricated from an oil bath by splash discs mounted to the drive shaft, and oil is prevented from entering the compressor chamber by labyrinth and lip seals.

The blowers are Model RBS 106, manufactured by Robuschi, USA, Inc., and will operate at a constant speed of 1950 rpm, equating to a CA output of 1650 SCFM. The driving shaft of the compressor connects to a World Wide Electric, Model WWE100-18-405T industrial duty, high efficiency motor via a V-belt connection. This 100-hp continuous duty, squirrel cage motor is constructed within a totally enclosed, fan cooled (TEFC) enclosure, and is rated for 460-Volt, 3-phase, 60-Hz power, operating at a constant 1785 rpm. Winding insulation for the motor is Class F, rated for a Class B temperature rise, and a service factor of 1.15. Five (5) V-belts are required to drive each blower, and they must be coordinated with different sized, interchangeable blower and motor sheaves to achieve the minimum, maximum, and design blower outputs. The V-belts and sheaves are a 5VX System, manufactured by Maska, Inc., and each blower is provided with three (3) full sets of sheaves and belts.

Air from the compressor is discharged through an 8" flanged connection at the bottom of the compressor housing, directly into a discharge silencer. The inner surfaces of discharge silencer are lined with 2" acoustical foam for noise attenuation just like the

inlet silencer; however, there is no filter media on the discharge side of the blower. A 10" flanged discharge outlet from the silencer connects to downstream piping via an expansion joint, and is the downstream limit of the blower skid. A flanged spool piece attaches to this expansion joint, and contains a 4" connection for a manufacturer provided UBI Model weighted relief valve assembly and pressure and temperature gauges.

Reversal of airflow is prevented by a 10" wafer style, double door check valve installed on the downstream end of this pipe spool. This check valve is a Model CV 41-DI, manufactured by Titan Flow Control, Inc., and has a ductile iron body, stainless steel discs, and EPDM seats. Contour of the valve body provides a short, straight flow path through the valve, and the low cracking pressure of the valve's spring-loaded discs minimizes losses while preventing flow reversal. The downstream 10" wafer style, handle wheel operated, resilient seated butterfly valve, manufactured by DeZURIK/Sartell Valves, Inc., is used for isolation of individual blowers.

An Armstrong No. 21 air release valve is installed as a drain trap, and contains and discharges condensate moisture collected at the low point of the discharge piping prior to bending vertically upward into the discharge manifold. The vertical 10" discharge pipe from the northernmost compressor, bends southward at a centerline elevation of 62.5', and runs horizontally to the southern wall of the blower building. After penetrating this wall, the pipe turns vertically downward and runs buried to the AST to supply CA to the influent and effluent channels. The vertical discharge pipe of the southernmost compressor bends southward at a centerline elevation of 58.75', penetrating the building wall approximately 6-feet to the west of the other blower pipe penetration. On the outside of this wall, this pipe turns vertically downward, increases to 12", and runs buried to the eastern side of the ASTS to deliver CA to the SST influent channel. The 10-inch discharge pipe from the middle compressor runs vertically upward, branching at centerline 58.75' with a 10" tee to connect with the SST CA pipe, and terminating at centerline elevation 62.5' with a 10" tee into the AST CA pipe. This pipe arrangement allows the middle compressor to serve as a stand-by unit, feeding CA to either location by the manipulation of the isolation valves. These two (2) valves are 10" wafer style, resilient seated butterfly valves, manually actuated by chain wheels, and manufactured by DeZURIK/Sartell Valves, Inc.

The buried CA pipe supplying the AST channels turns vertically upward at the northeast corner of the AST structure as a 10" pipe. Approximately 2-feet below the AST

deck slab, a 10" tee branches westward to supply CA to the AST effluent channel on the western side of the structure. Beyond this tee and at the top slab of the AST, a 90-degree reducing elbow decreases this pipe size to 8-inches as it bends southward above the deck. This CA pipe contains an 8" butterfly valve at deck elevation for throttling of the airflow or isolation of the AST Influent Channel CA diffusers. The valve is an 8" wafer style resilient seated butterfly valve, with EPDM seat and seals. A short distance later an 8" tee, capped with a blind flange, changes the CA pipe material from DI to 304L SS as it turns down into the AST Influent Channel. It runs suspended under the deck for the entire 178-foot length of the channel, serving as the CA header for all effluent channel air diffusers. The branch teeing off the 10" CA supply line to supply the AST Effluent Channel is supported off the northern wall of the AST structure, and runs exposed for the length of the tank, reducing to an 8" pipe of the tee. At the western end of the AST structure, the 8-inch CA pipe is brought above the deck slab, and provided with an 8" butterfly valve for isolation and balancing of the air flow.

A short distance later an 8" tee, capped with a blind flange, changes the CA pipe material from DI to 304L SS as it turns down into the AST Effluent Channel. It runs suspended under the deck for the entire 178-foot length of the channel, serving as the CA header for all effluent channel air diffusers. Two (2) flanged pipe connections are provided in the 10-inch CA pipes near the northeastern corner of the AST, one (1) prior to the branching of the 10-inch effluent CA pipe, and one (1) in the 10-inch portion of the effluent branch of the pipe, downstream of the tee. These flange connections provide access for portable flow meters, allowing operators to measure total AST CA flow and effluent channel CA flow as needed. Each of these flanged connections for the portable flow meters is preceded by a flange type, 304 stainless steel straightening vanes, to condition the flowing air for proper measurement with the portable devices.

The buried piping that supplies CA to the SST influent channels is conveyed in a 12" buried DI pipe, buried with 3-foot cover along the northern side of the AST structure. This piping turns southward approximately 15-feet west of the access roadway on the west side of the ASTs, continuing onward until turning vertically upward at the northern wall of the SST influent channel. A flanged connection, similar to those located in the AST CA piping, is provided in this vertical pipe section for the insertion of a portable flow meter.

Approximately 2-feet below the SST Influent Channel deck, this 12" CA pipe

turns into the channel through a wall penetration, and transitions from DI to 304L stainless steel. Inside the northern channel wall, a 12" by 8" SS reducing tee reduces the main supply pipe down to 8" as it crosses the width of the channel. An 8" SS CA header extends west from the reducing tee to supply the SST channel air diffusers on the northern side of the influent channel. Inside the southern wall of the SST Influent Channel the 8" main supply pipe bends westward with a 90-degree elbow, and becomes the 8" SS CA header that supplies the SST channel air diffusers on the southern side of the influent channel.

Both SST Influent channel CA headers run parallel along the northern and southern sides of interior channel walls for approximately 250-feet westward, for the length of the channel. Each of these parallel CA headers is provided with an 8" butterfly valve for the isolation and balancing of the air flow, providing control of the air being delivered to the diffusers. The valve for the northern header is located immediately downstream of the reducing tee, and the valve for the southern header is located immediately downstream of the 90-degree bend. Both valves are 8" wafer style resilient seated butterfly valves, with EPDM seat and seals, and are manually operated by rack and pinion type actuators with extension stems for accessibility from the deck surface.

All diffuser assemblies that attach to each of these CA headers are constructed from 1" 304L stainless steel piping, matching the pipe material of the header pipes. Each diffuser assembly mounts to the CA header at spring-line, and runs laterally toward the channel wall, terminating 1-foot from the face of the wall with a 1" tee. From the tee, a pipe stub extends vertically upward and is sealed with a removable threaded cap; and 1" piping extends vertically downward, terminating 1-foot above the channel slab with the course bubble diffuser. For maintenance, the capped vertical extension provides access from the channel deck, and allows the 1" diffuser pipe to be flushed clean without removing it or draining down a channel.

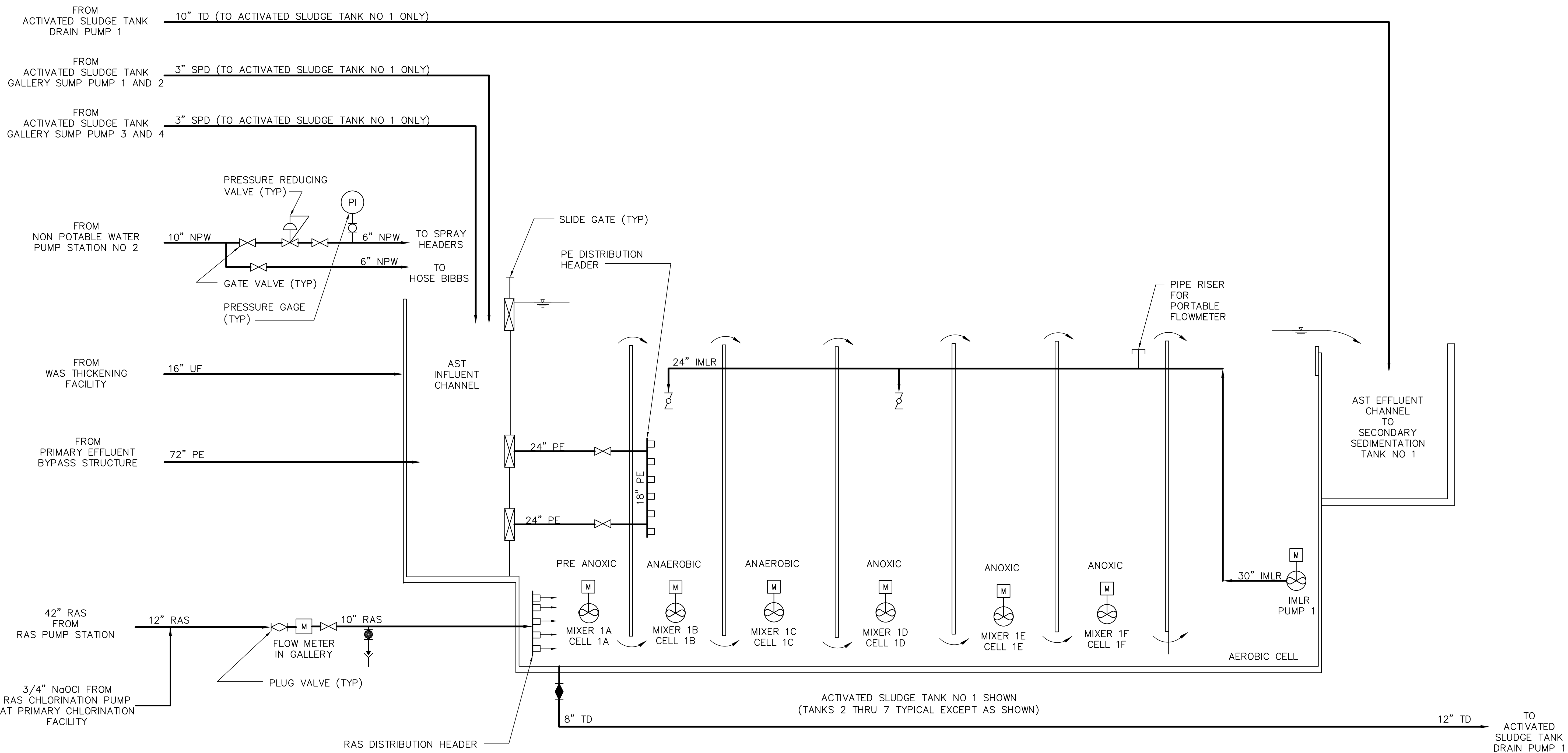
The course bubble diffusers are Model SD-1000 single drop diffusers, manufactured by the Sanitaire Corporation of ITT Industries, and operating with approximately 12 SCFM supplied. They are a non-clogging, continuously self-flushing design made from ABS plastic, and do not require orifice plates to balance the air flow. The maintainability of most diffusers is further enhanced by designed brackets that join adjacent drop leg pipes together at the mounting bracket and allow them to be disconnected

and removed from the channel as a pair. Individual drop legs that are not accessible from the deck surface remain permanently mounted to the manufacturer provided individual wall brackets, and can only be maintained when the channels are empty. In the influent and effluent channels of the AST, each CA header connects with forty-five (45) individual drop leg diffusers, resulting in 4-foot spacing between each.

The SST influent channel diffuser density is significantly higher due to the concern for solids settling out of the flow. Each of these parallel CA diffuser headers connects with ninety-four (94) diffuser assemblies, resulting in approximately 2.5-foot spacing between each. As a further precaution to avoid the potential formation of dead-zones in the 22-foot wide channel, the slab has been modified. In the upper portion of the SST influent channel, where no CA diffusers are located, 2-foot wide, 3-foot tall fillets are constructed on either side of the channel to discourage settling. Also, a 10-foot wide, 5-foot tall partition is constructed in the middle of the channel, and extends the entire channel length. This partition has sides sloping at 45-degrees to convey settling solids toward the channel walls and into the zone of influence created by the CA diffusers.

The Channel Aeration Facility is shown schematically in Figure 3.3-5.

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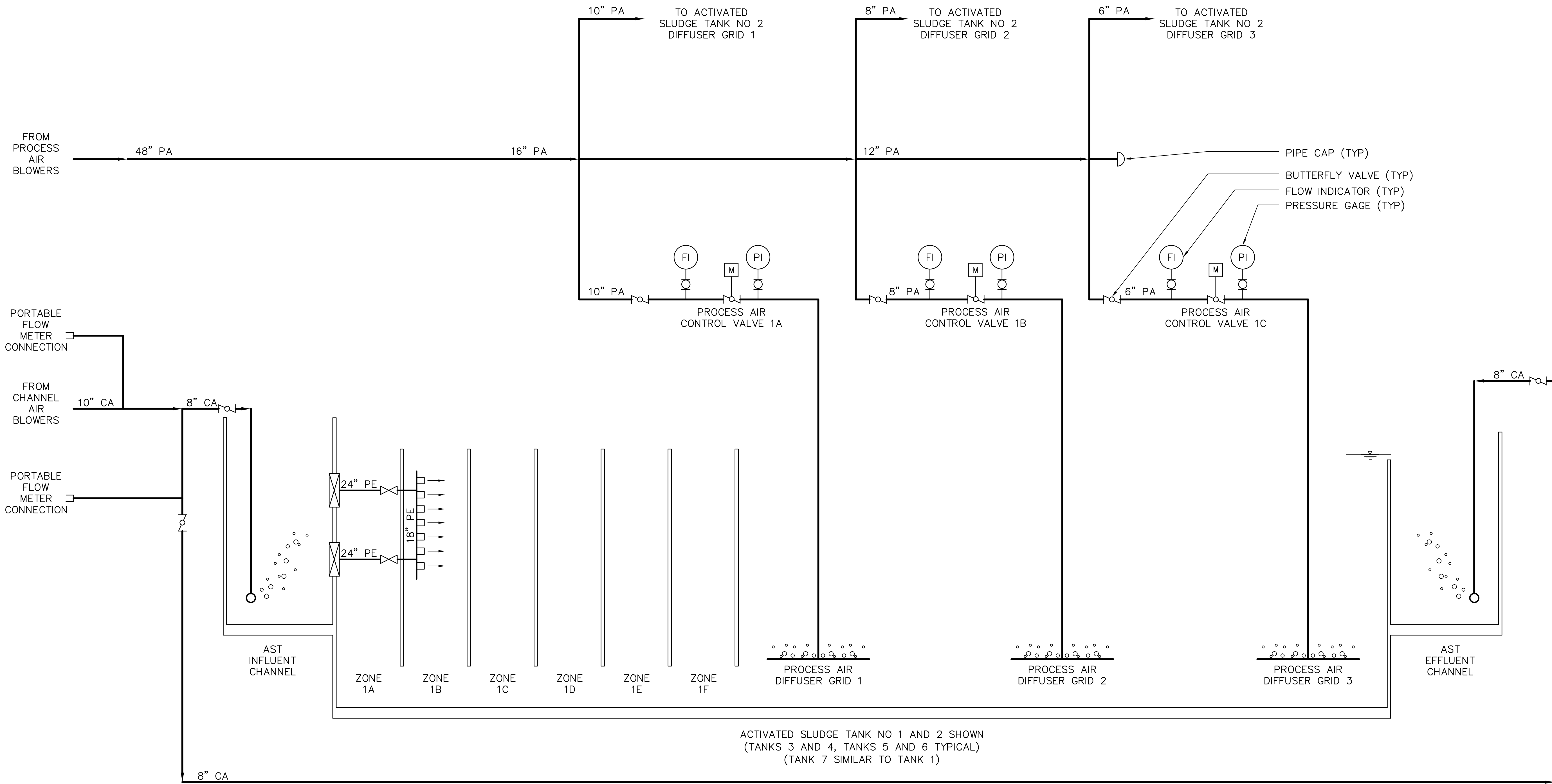


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ACTIVATED SLUDGE FACILITIES
TANK MIXING AND IMLR
PROCESS SCHEMATIC
NOT TO SCALE

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FIGURE 3.3-1
CAD REF. NO. I30M FIG 3.3-1

XREFS: \\TLBUK\dwg IMAGES:None
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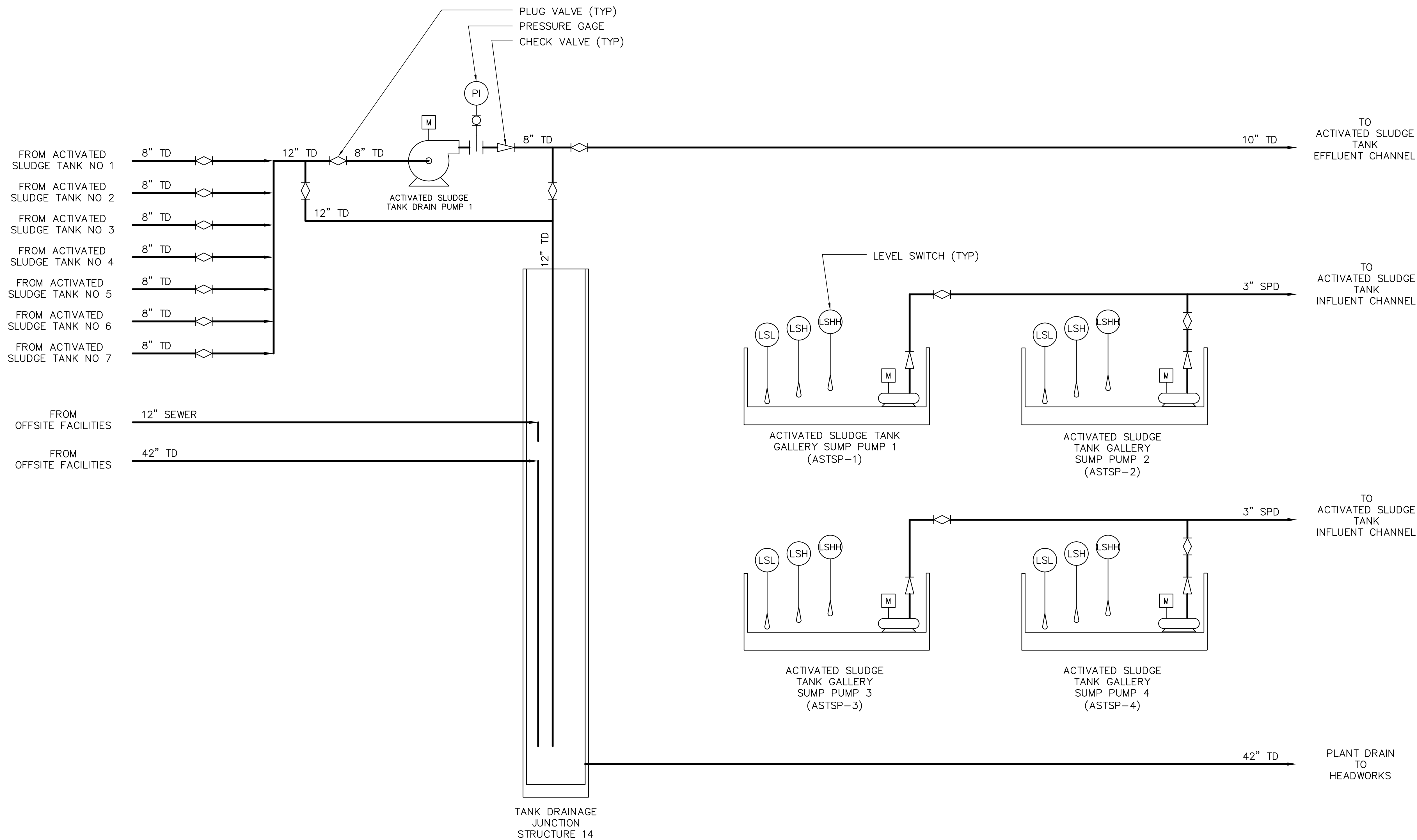


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ACTIVATED SLUDGE FACILITIES
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FIGURE 3.3-2
CAD REF. NO. I30M FIG 3.3-2

XREFS: \\TLBUK.dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:1:1991037\Q&M schematics\130M FIG 3.3-3.DWG Scale:1:1 Date:12/14/2010 Time:10:25 Layout:Blank



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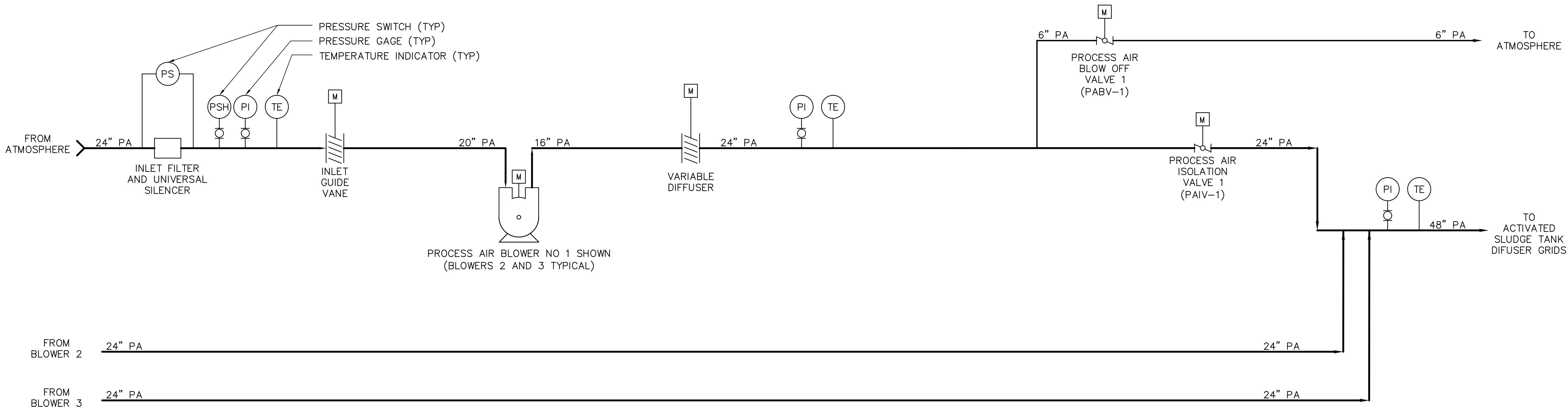


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ACTIVATED SLUDGE FACILITIES
**TANK AND GALLERY DRAINAGE
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FIGURE 3.3-3
CAD REF. NO. 130M FIG 3.3-3

XREFS: \\TLBLK.dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:1:1991037\3&M schematics\30M FIG 3.3-4.DWG Scale:1:1 Date:12/14/2010 Time:10:25 Layout:Blank



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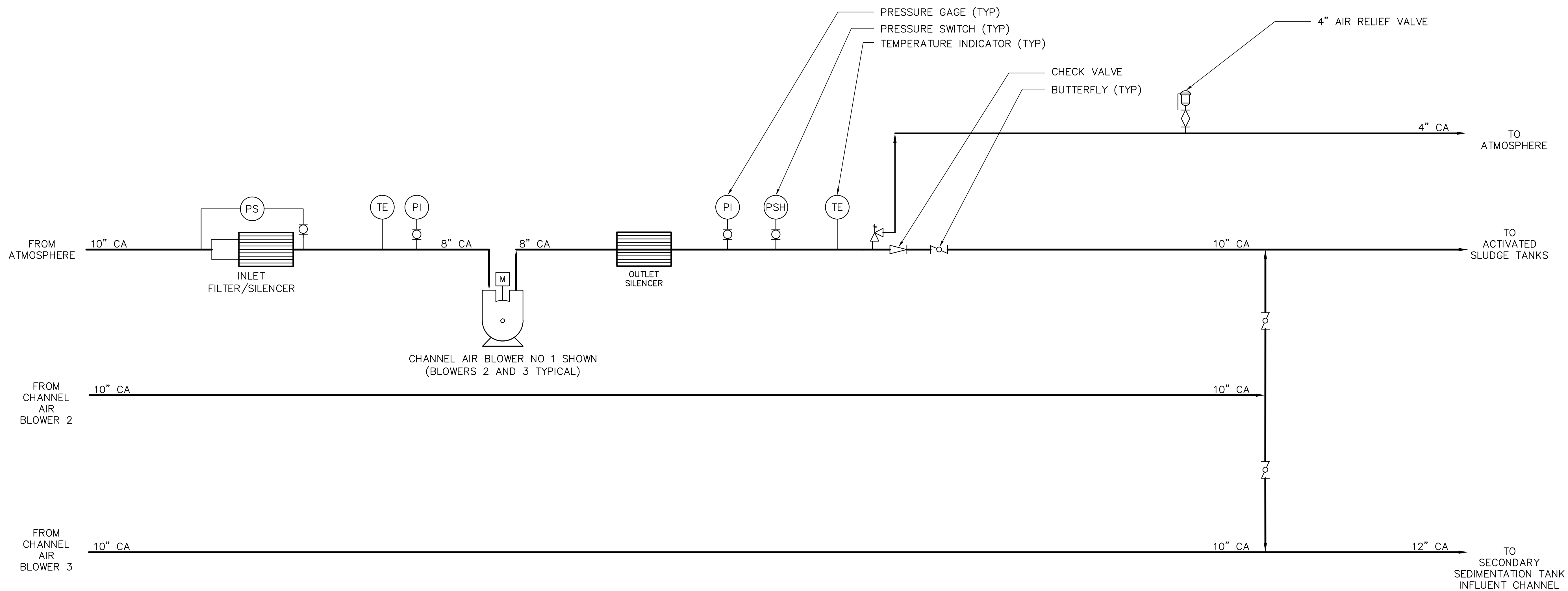
DES AR/MM
DWN PAL
CKD LDT



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ACTIVATED SLUDGE FACILITIES
BLOWER NO 1
PROCESS SCHEMATIC
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FIGURE 3.3-4
CAD REF. NO. I30M FIG 3.3-4



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ACTIVATED SLUDGE FACILITIES
CHANNEL AERATION
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FIGURE 3.3-5
CAD REF. NO. I30M FIG 3.3-5

3.4 SECONDARY SEDIMENTATION FACILITIES

3.4.1 Sedimentation Tanks

The Secondary Sedimentation Facilities (SSF) include 10 Secondary Sedimentation Tanks (SSTs), each measuring 160 ft (48.77 m) long by 20 ft (6.10 m) wide, with an average sidewall of 14.40 ft (4.39 m). The maximum water surface elevation in each tank is 54.14 ft (16.50 m), equating to side water depths of 14.14 ft (4.3 m) at the southern end and 15.44 ft (4.7 m) at the northern end.

Water enters each SST from the SST Influent Channel through two parallel wall penetrations located at the bottom of the channel. The two penetrations are 24 inches in diameter and each utilizes a tee as a diffuser assembly to disperse the mixed liquor and to avoid “short circuiting” as the flow enters the SST. Each of these assemblies is equipped with a 24-inch manually operated knife gate valve manufactured by J&S Valve. A third 18-inch penetration at the maximum water surface elevation in the SST Influent Channel (54.72 ft or 16.68 m) utilizes an 18-inch manually operated weir gate manufactured by Golden Harvest, Inc., which allows for any accumulated foam to be discharged from the SST Influent Channel to one or more specific SSTs, as necessary. This gate is closed under normal operating conditions. Each of the three penetrations allowing flow into each SST is equipped with a stop plate.

Coarse bubble diffusers manufactured by ITT are utilized in the SST Influent Channel to maintain the solids in suspension to prevent settling prior to entering the SSTs. Channel Air (CA) is supplied by blowers located in the Blower Building associated with the Activated Sludge Facilities (ASF), as described in Section 3.3.4.2.

Clarified secondary effluent in each SST is collected in three parallel concrete launders measuring 56 feet-8 inches long by 30 inches wide by 24 inches deep, which flow into the SST Effluent Channel. The launders are equipped with aluminum covers supplied by the Hallsten Corporation to prevent algal growth; the covers are hinged to allow access to the launders. FRP weir plates manufactured by Fiber-Tech Engineering, Inc. are used in conjunction with the launders to regulate to regulate the flow. A total

length of 340 ft (103.63 m) of effluent weir plating is provided for each SST, with an overflow rate of 9,500 gpd/lf.

Settled secondary sludge collects in two sludge hoppers at the effluent (north) end of each SST, as described in Section 3.4.2.1.

A schematic showing a representative SST is provided in Figure 3.4-1. The process is similar for all ten tanks.

3.4.2 Sludge Collection and Pumping Facilities

The Sludge Collection and Pumping Facilities consist of the sludge collectors (Section 3.4.2.1), RAS pumping (Section 3.4.2.2), and WAS pumping (Section 3.4.2.3).

3.4.2.1 Sludge Collectors

Each of the 10 SSTs is equipped with a non-metallic chain and flight sludge collector apparatus manufactured by Taset, Inc. The motor driving the sludge collector is manufactured by SEW Eurodrive and is rated at 0.55 kW (0.75 HP), requiring 460 Volt, 3-phase, 60 Hz power. Component materials of construction and applicable dimensions can be obtained from the supplier-provided operations and maintenance (O&M) manuals maintained on-site at the South Bay International Treatment Plant.

The sludge collectors move settled solids into the two sludge hoppers located at the effluent (north) end of each of the SSTs. Each hopper is provided with three sample ports, accessed from SST Effluent Gallery, to enable manual sampling of the sludge at various depths. All six samplers associated with each SST (i.e., three for each of the two sludge hoppers in each tank) are connect to single length of 1.5-inch (inside diameter) flexible hose. Each of the six sample lines has a 3-inch isolation ball valve, and the common sampling hose has 3-inch sample shutoff valve.

Collected sludge is removed from the hoppers through suction piping and into the RAS and WAS systems. Equipment for these systems is described in Sections 3.4.2.2 and 3.4.2.3, respectively. The return flight of the sludge collector apparatus moves the secondary skimmings (SSK) to the influent end of each SSTs, where the SSK is removed via rotary skimmers as described in Sections 3.4.3.1 and 3.4.3.2.

A schematic showing the sludge collectors is provided in the context of a representative SST, as depicted in Figure 3.4-1.

3.4.2.2 Return Activated Sludge (RAS) Pumping

The RAS pumping system includes both the RAS pumps and associated conveyance pipes. The system begins at the two sludge hoppers in each of the 10 SSTs.

Each SST is equipped with a 10-inch RAS withdrawal manifold consisting of two 10-inch withdrawal pipes – one for each of the two sludge hoppers. The two sludge hopper withdrawal lines associated with each SST are equipped with a manually operated plug valve, and each common 10-inch manifold utilizes a 10-inch magnetic flow meter and associated transmitter manufactured by Krohne with model numbers as follows:

- Flow meter: VN04 4FA0 413112 1X0H0000000000
- Transmitter: VN31NA 460011 003

Downstream of the respective flow meters, each 10-inch manifold is equipped with a plug valve prior to connecting to the RAS header lines that feed into the RAS/WAS Wet Well, as described in Section 2.4.2.3.

The RAS Pump Station includes six pumps, which sit atop the RAS/WAS Wet Well located at the northwest side of the SSTs top deck. Each pump is manufactured by Fairbanks Morse and is a 10-inch Model VTSH-AWF. All of the pumps are equipped with direct-coupled 40 HP, TEFC, inverter type motors manufactured by US Electrical Motors requiring 460 Volt, 3-phase, 60 Hz power. Each pump is capable of operating at a capacity of 2,700 gpm at a total dynamic head (TDH) of 44 feet and a maximum pump speed of 1,780 rpm. Three of the six RAS pumps (1A, 1B, and 1C) are equipped with Toshiba variable frequency drives (VFDs) that are located in the SST Local Control Center (SST-LCC-1). The remaining three RAS pumps (1D, 1E, and 1F) operate at constant speed. Each of the six pumps has an associated 16-inch plug valve, 16-inch check valve, and discharge pressure indicator, as well as a manually operated seal water system. Just downstream, each pump employs a 3-inch air / vacuum release valve and associated isolation plug valve prior to connecting to a common 42-inch header, which

conveys the RAS to the Activated Sludge Tank (AST) Influent Gallery. A schematic of the RAS pumping system is provided in Figure 3.4-2.

3.4.2.3 Waste Activated Sludge (WAS) Pumping

The WAS pumping system consists of the two WAS pumps and the associated withdrawal and discharge piping, located in the SST WAS Pump Station below the RAS/WAS Wet Well. WAS can be withdrawn from the RAS/WAS Wet Well via either of two 10-inch lines, each of which feeds a dedicated WAS pump that can be isolated by an upstream 10-inch plug valve.

The two progressive cavity WAS pumps serve in a duty and standby arrangement with manual switchover, such that only one of the two pumps is operating at any time. The pumps are manufactured by Netzsch, Model NM105-01L, with a rated capacity of 500 gpm and a net pump suction head (NPSH) of approximately 9.5 feet at a speed of 215 rpm. Both pumps are equipped with Baldor/Reliance TEFC-XEX motors rated at 30 HP, requiring 460 Volt, 3-phase, 60 Hz power. Each pump has an associated 10-inch check valve, 10-inch plug valve, and discharge pressure indicator. Each pump is also equipped with a 2-inch flushing connection (quick disconnect with plug valve) on both the withdrawal (downstream of the plug valve) and discharge (upstream of the plug and check valves) piping.

This discharge piping for each respective pump is connected in a manifold. Downstream of the both pump discharge lines, the common manifold is equipped with two 8-inch plug valves, located upstream and downstream (respectively) of a 8-inch magnetic flow meter and associated transmitter manufactured by Krohne. The flow meter and transmitter model numbers as follows:

- Flow meter: VN044EA0A413112 1X0H000000000
- Transmitter: VN31NA046001100003

A schematic the WAS pumping system is provided in Figure 3.4-3.

3.4.3 Secondary Skimmings Processing Facilities

The Secondary Skimming Processing Facilities consist of the surface rotary skimmers (Section 3.4.3.1) and the Skimmings Pump Station (Section 3.4.3.2).

3.4.3.1 Surface Rotary Skimmers

Secondary skimmings are moved to the influent end of each SST by the return travel of the respective chain and flight sludge collector apparatus, as described in Section 3.4.2.1. Skimmings are removed via an 18-inch rotary skimmer at the top of the influent (south) end of each SST. The rotary scum skimmers are manufactured by Newswanger Machine Ltd. and use Rotork Controls motorized actuators, Model IQ25FA14Z. Actuator nominal power is 1.04 HP, requiring 480 Volt, 3-phase, 50 Hz supply. Five spray nozzles spaced at 3- to 4-inch intervals are mounted above the water surface across each SST just north of the rotary to direct the skimmings into the skimmer collection trough using non-potable water. The discharge piping associated with each rotary skimmer is equipped with a 8-inch isolation plug valve just prior to the common header, in which skimmings flow by gravity to the Secondary Skimming Wet Well. The skimmers are shown in the schematic in Figure 3.4-1.

3.4.3.2 Skimmings Pump Station

Two secondary skimmings pumps (duty and standby, with manual switchover) located in the Secondary Skimmings Pump Station withdraw skimmings and subnatant from the adjacent Secondary Skimmings Wet Well. Both pumps (SSKP1A and SSKP1B) are 3" recessed impeller centrifugal type and manufactured by TwinPumps, Model 3523C, with a rated capacity of 510 gpm at 81.4 feet TDH. The pumps motors are manufactured by US Electrical Motors and rated 40 HP, requiring 460 Volt, 3-phase, 60 Hz power. Each pump has a 8-inch and 6-inch manually operated plug valve on the withdrawal and discharge line, respectively; the discharge line also includes a 6-inch check valve and pressure indicator. In addition, the withdrawal line associated with SSKP1B has a tee connecting to a 6-inch line that enables the Secondary Skimmings Wet Well to discharge to the SST tank drainage facilities, as necessary. This discharge line

also has a 6-inch isolation valve. Both of the secondary skimmings pumps have an manually operated seal water system.

The secondary skimmings pumps and associated appurtenances are configured to enable operation in three different modes, as discussed in Section 2.4.2.5. These modes are subnatant pumping; skimmings homogenization (i.e., recirculation); and skimmings pumping. The piping configuration that facilitates each of these functions is controlled by three 6-inch motorized plug valves. These valves are the subnatant valve (SSKV1A); recirculation valve (SSKV1B); and the discharge valve (SSKV1C). These three valves are manufactured by DeZurik and utilize Rotork motorized actuators, Model no. IQT500FA101. Actuator nominal power is 0.58 HP, requiring 480 Volt, 3-phase, 50 Hz supply.

The Secondary Skimmings Pump Station slopes to a sump in the southwest corner of the facility, which contains two Barnes Model 3SE1544DS submersible pumps with a rated capacity of 65 gpm at 31 feet TDH and 130 gpm at 27 feet TDH. The pumps motors are rated at 1.5 HP, requiring 460 Volt, 3-phase, 60 Hz power. The discharge piping of each of the two pumps is equipped with a 2-inch plug valve.

The wet well is equipped with a bubbler pipe, as well as a 4-inch line running through the north wall into the pump station, where a 4-inch quick disconnect enables the contents of the wet well to be actively withdrawn via applied vacuum, as needed. An additional 1.5-inch quick disconnect is located on top of the wet well and pump station, enabling the as-needed application of caustic into the 6-inch secondary skimming discharge line for clean-out purposes. A 1-inch hose valve is provided on the west wall of the pump station to supply as-needed non-potable water. A schematic of the Secondary Skimmings Pump Station is provided in Figure 3.4-4.

3.4.4 RAS Chlorination

As a component of the SSF, the RAS stream may be subject to as-needed chlorination at the RAS Chlorination Vault located at the northeast corner of the ASF. Equipment associated with RAS chlorination is described in Section 3.5.2 Secondary Treatment Plant (CC-3) Chlorination Facilities.

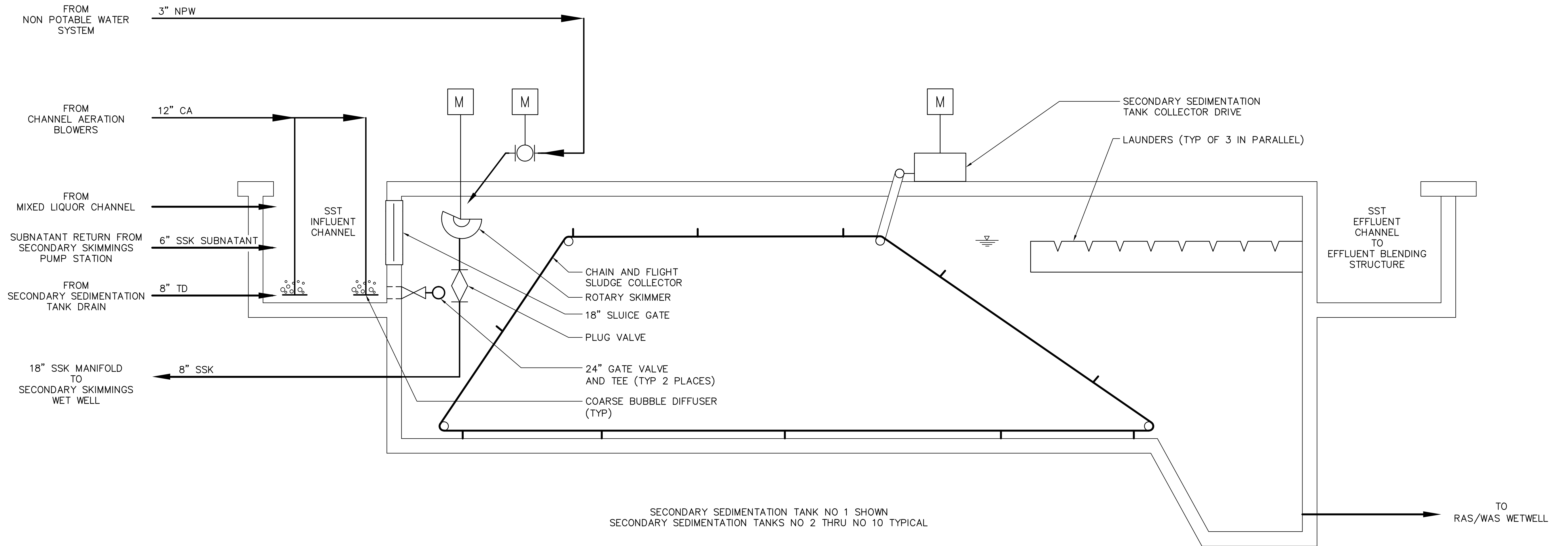
3.4.5 Tank Drainage Facilities

The RAS suction lines associated with each of the 10 SSTs are equipped with a 10-inch plug valve that enables the tanks to drain to a common 12-inch manifold, which conveys the drainage water to the east end of the SST Effluent Gallery. A single self-priming centrifugal pump either transfers the drainage to the tank drain facilities or recycles the flow to the SST Influent Channel via respective 8-inch lines joined by a tee connection on the discharge piping. The drainage flows by gravity via a pump bypass line until the SST hydraulic grade line drops below that of the SST Effluent Gallery, after which the tank drain pump actively withdraws the remain water in the tank(s). The pump is manufactured by Crown, Model PO6LB-12F, with a capacity of 910 gpm at a TDH of 25 feet. The pump is equipped with a Baldor/Reliance motor, Model EM2333T, rated at 15 HP, requiring 230/460 Volt, 3-phase, 60 Hz power. A 12-inch plug valve and two 8-inch plug valves (one per 8-inch discharge line, just downstream of the tee connection) provide for pump isolation on the suction and discharge side, respectively. The suction piping includes a 12-inch x 6-inch eccentric reducer downstream of the 12-inch plug valve and prior to the pump, and the pump discharge line includes a 6-inch check valve upstream of the tee connection. The pump is also outfitted with a 2-inch flushing connection, including a plug valve and quick disconnect.

Three drainage sumps located in the SST Effluent Gallery are each equipped with a single Barnes Model 3SE1044DS submersible pump with a capacity of 120 gpm at 22.1 feet TDH and 150 gpm at 10.5 feet TDH. The motor is rated at 1 HP, requiring 460 Volt, 3-phase, 60 Hz power. The pump discharge piping includes a 3-inch check valve followed by a 3-inch ball valve. The SST Effluent Gallery also contains 1-inch hose valves for clean-out purposes.

A schematic showing the tank drainage facilities, including both the SST tank drain pump and the three sump pumps, are provided is provided in Figure 3.4-5.

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User: LARSON Spec: PIRNIE STANDARD File: \\pro\\1991037\\044 schematics\\30M FIG 3.4-1.DWG Scale: 1:1 Date: 12/14/2010 Time: 10:26 Layout: Blank



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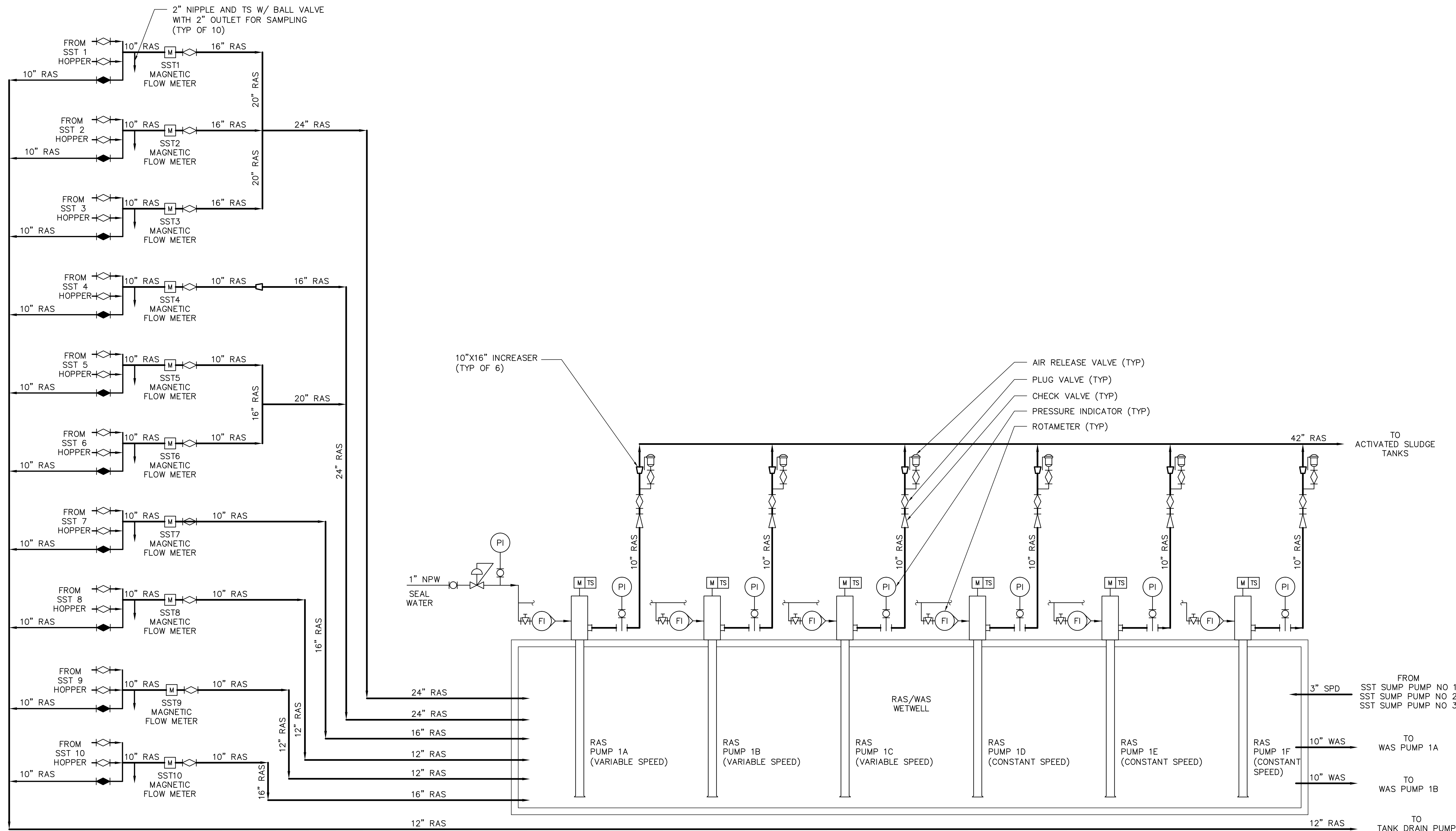


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SECONDARY SEDIMENTATION FACILITIES
TANK AND SLUDGE COLLECTION
PROCESS SCHEMATIC
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FIGURE 3.4-1
CAD REF. NO. I30M FIG 3.4-1

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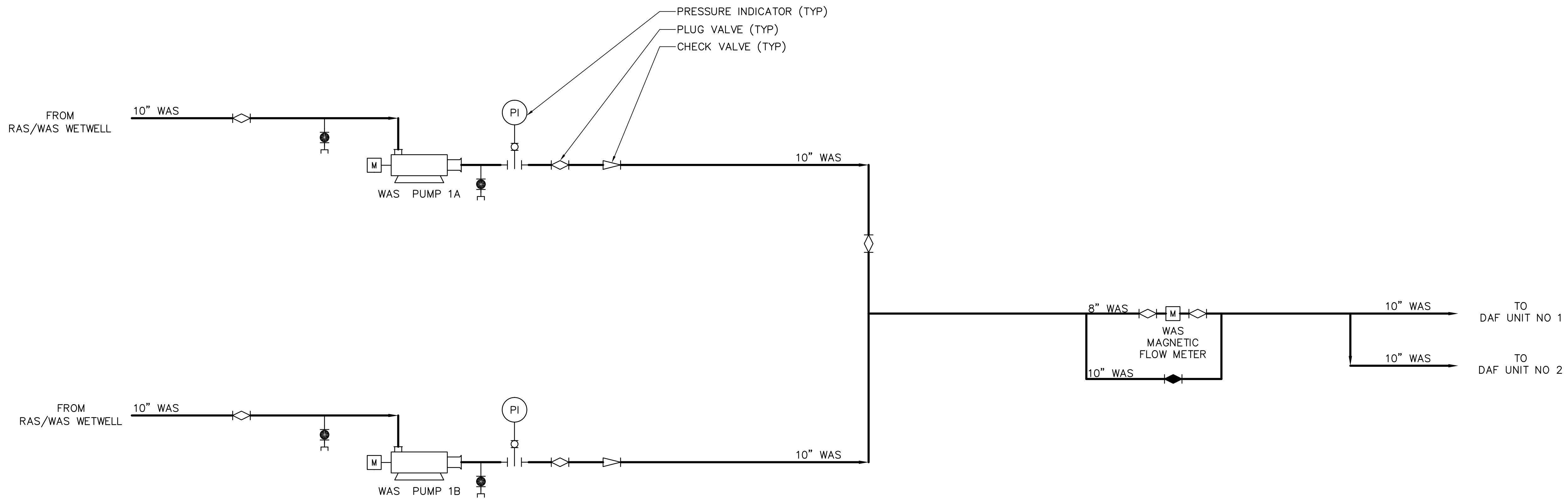
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SECONDARY SEDIMENTATION FACILITIES
RAS PUMPING SYSTEM
PROCESS SCHEMATIC
NOT TO SCALE

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FIGURE 3.4-2
CAD REF. NO. I30M FIG 3.4-2



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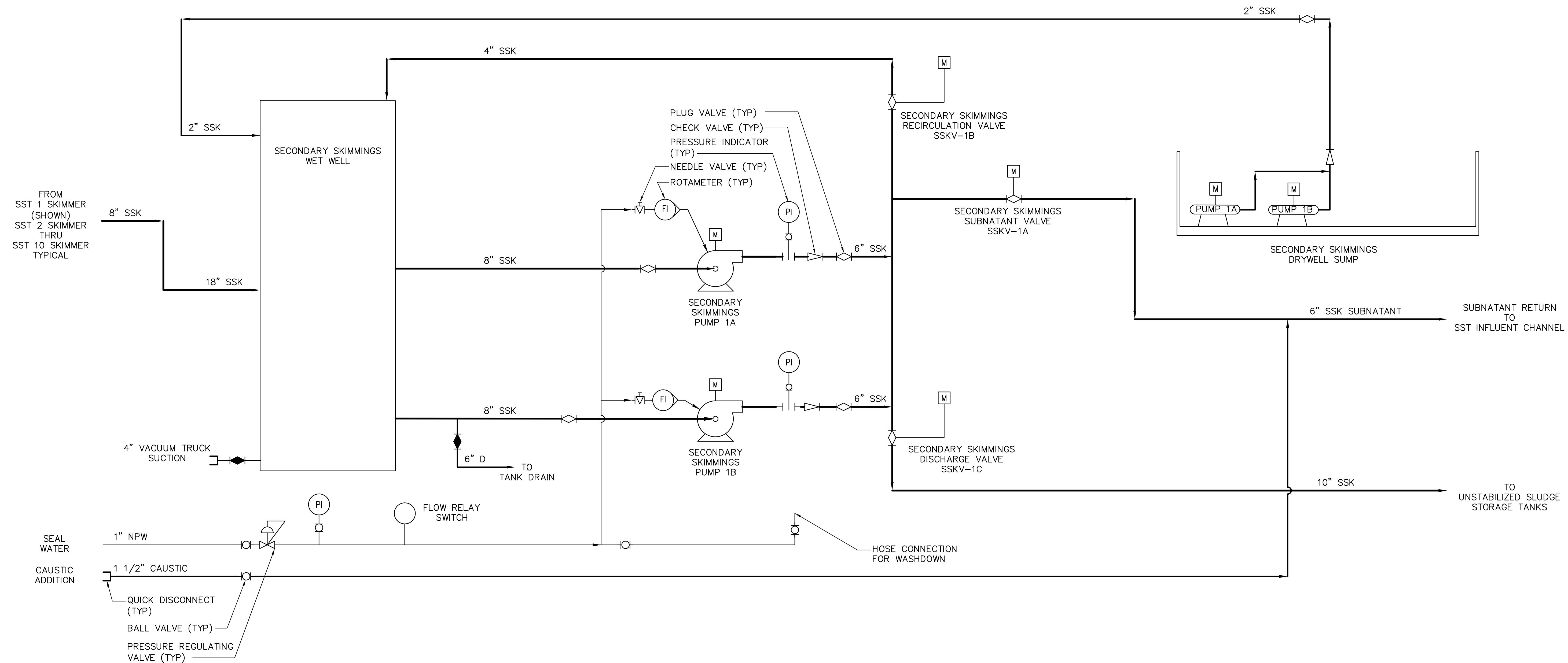


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South Bay International Wastewater Treatment Plant

SECONDARY SEDIMENTATION FACILITIES
WAS PUMPING SYSTEM
PROCESS SCHEMATIC
NOT TO SCALE

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FIGURE 3.4-3
CAD REF. NO. I30M FIG 3.4-3

XREFS: \\TUBLK.dwg IMAGES:None
User:LARSON Spec:PIRNE STANDARD File: \\pro\\1991037\\O&M schematics\\30M FIG 3.4-4.DWG Scale:1:1 Date:12/14/2010 Time:10:03 Layout:Blank



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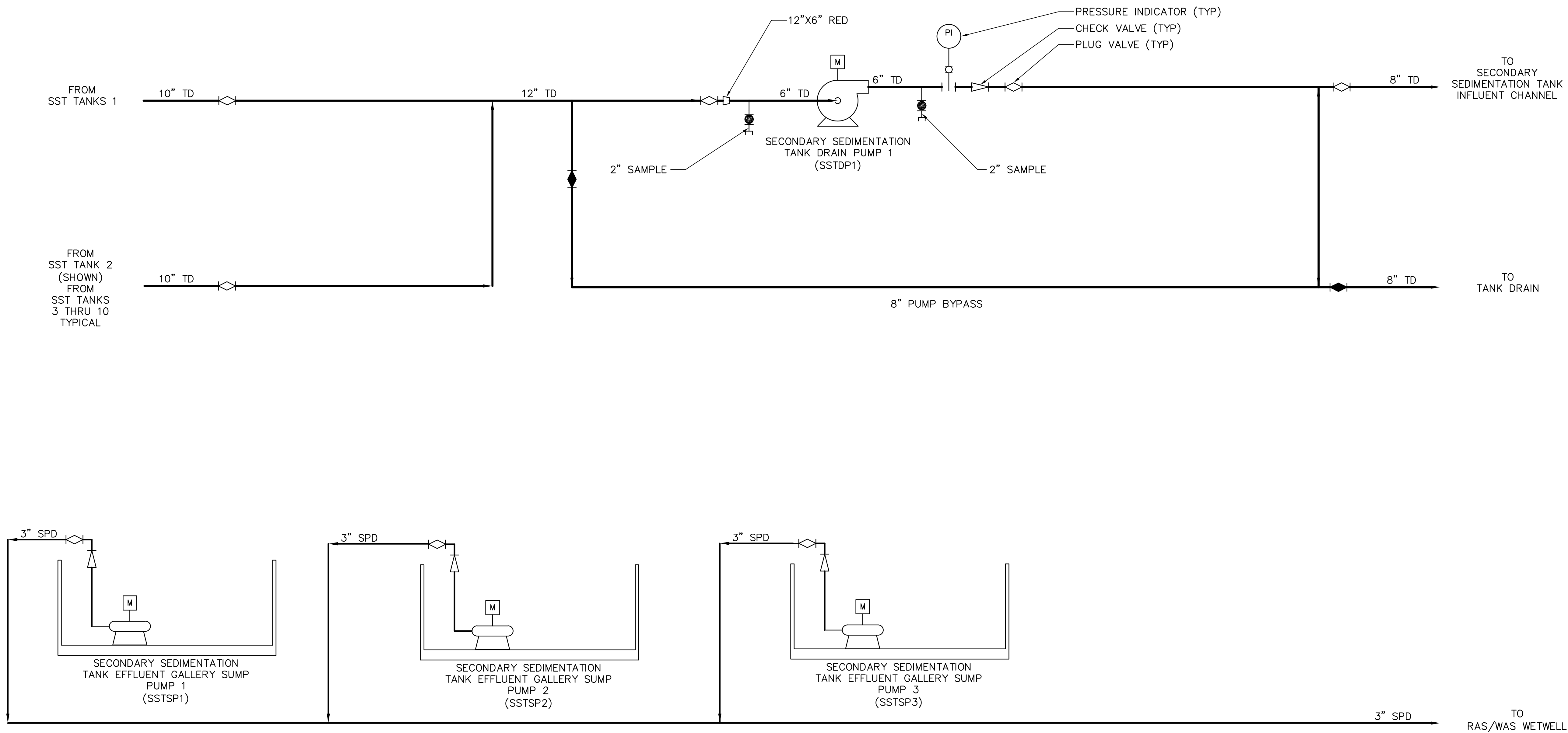
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SECONDARY SEDIMENTATION FACILITIES
SKIMMINGS PUMPING SYSTEM
PROCESS SCHEMATIC
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FIGURE 3.4-4
CAD REF. NO. I30M FIG 3.4-4



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SECONDARY SEDIMENTATION FACILITIES
TANK DRAINAGE FACILITIES
PROCESS SCHEMATIC
NOT TO SCALE

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FIGURE 3.4-5
CAD REF. NO. I30M FIG 3.4-5

3.5 CHLORINATION, DECHLORINATION AND NON-POTABLE WATER FACILITIES

3.5.1 Chlorination Facilities

3.5.1.1 Sodium Hypochlorite Supply

Pumping of sodium hypochlorite is accomplished by chemical metering pumps with a ten-to-one range of manual stroke adjustment. For the post-chlorination pumps, a ten-to-one range of speed adjustment is provided through a variable speed direct current drive.

A process schematic of the Chlorination Facilities System is presented in Figures 3.5-1 and 3.5-2.

Pre-Chlorination and RAS Chlorination Supply

Intermittent pre-chlorination demands and chlorination of RAS flow to the AST tanks are met with one pair of the positive displacement diaphragm metering pumps provided in the sodium hypochlorite system. Pre-chlorination Pump No. 1 supplies sodium hypochlorite to the Headworks Inlet Junction Structure via 4-inch pipe inside a 6-inch containment pipe. The RAS Chlorination Pump supplies sodium hypochlorite via a 4-inch line inside a 6-inch containment pipe to the RAS Chlorination Vault where it is injected into the 42" RAS line. Before the RAS feed point, a 2-inch line inside a 4-inch containment pipe branches off, exits the vault, and is conveyed to the Canyon Collector/Tank Drainage Structure to supply intermittent chlorination. Each leg of the split is provided with a diaphragm valve and a local rotometer/ flow indicator. Either the Pre-chlorination Pump or RAS pump can also be used to supply chlorine to the primary sludge chemical addition vault by manually opening a valve off the pre-chlorination supply line to the 1/2-inch sodium hypochlorite line inside a 1-inch containment pipe.

The pre-chlorination and RAS chlorination pumps are PulsaFeeder Model 7660-S-AE diaphragm metering pump with integral suction and discharge check valves. Each pump has a design capacity of 42 to 333 gallons per hour (gph) and an operating pressure of 45 psig, and is provided with a 1.5 horsepower (hp), 1750 rpm, 3 phase, 60 hz, 460 volt, TEFC, chemical duty, Baldor motor. The output of each pump is regulated by an

automatic stroke length adjuster in response to a 4-20mA input signal from the influent flow meter. The stroke length adjuster is provided with a manual override.

The common pump suction line is provided with a pulsation dampener to minimize the pulsation of flow in the line, and with a calibration column which can be used for flow measurement.

The discharge the RAS Chlorination pump and the Pre-chlorination pump are provided with a pulsation dampener and a safety (over-pressure) relief valve. PVC ball valves are provided throughout the system to provide isolation of the pump and of appurtenant equipment including pulsation dampeners, calibration columns, and safety relief valves.

Non-Potable Water (NPW) Pump Station No.2 Chlorination Supply

A pair of chlorination pumps, operated as lead and standby, were constructed to deliver sodium hypochlorite for disinfection of the non-potable water system. The non-potable water chlorination pumps are Pulsar Model 25HJ Hypo Pump positive displacement diaphragm chemical metering pumps. The pumps have a design capacity of 2 to 20 gph and a maximum operating pressure of 150 psi and are provided with a 0.75 hp, 1800 rpm, 3 phase, 60 hz, 230/460 volt, TEFC motor. The metering pump operates by an automatic stroke length adjuster to a 4-20 mA input signal dictated by the NPW Pump Station No. 2 discharge flow. The stroke length adjustment is provided with a manual override.

The common pump suction line is provided with a pulsation dampener to minimize the pulsation of flow in the line, and with a calibration column which can be used for flow measurement.

The discharge of each pump is provided with a pulsation dampener and a safety (over-pressure) relief valve. PVC ball valves are provided throughout the system to provide isolation of pumps and of appurtenant equipment including pulsation dampeners, calibration columns, and safety relief valves.

Effluent Chlorination Supply

Sodium hypochlorite is provided on a continuous basis for disinfection of the plant effluent. Under normal operating conditions, only secondary effluent will be produced and discharged. However, the treatment plant has the ability to bypass primary effluent around the secondary treatment system and therefore the effluent chlorination system is sized to disinfect primary effluent.

The Effluent Chlorination Pumps normally supplies sodium hypochlorite to the Effluent Blending Structure. Effluent chlorination is provided by the two effluent chlorination metering pumps. A chlorine dilution water pump is used to increase the velocity and thereby the mixing at the effluent chlorination diffuser located at the Effluent Blending Structure. The chlorine dilution water pump is described in Part 3.11 of this manual.

The effluent chlorination pumps can also supply sodium hypochlorite to the Primary Effluent Bypass Junction Structure when primary effluent is being bypassed around the secondary treatment system. A chlorine dilution water pump is also used to increase the velocity before the diffuser located at the Primary Effluent Bypass Junction Structure. The chlorine dilution water pump is described in Part 3.10 of this manual.

Each effluent chlorination pump is a PulaFeeder Model 8480-S-AE diaphragm metering pump with integral suction and discharge check valves. Each pump has a design capacity of 100 to 780 gph and an operating pressure of 45 psig, and is provided with a 2 hp, 1750 rpm, shunt-wound, TEFC, chemical duty, Fincor motor with D.C. SCR drive. The output of each pump is regulated by an automatic stroke length adjuster in response to a 4-20mA input signal from the plant effluent flow meter and by the SCR drive in response to a 4-20mA input signal from the plant effluent ORP residual analyzer. The stroke length adjuster is provided with a manual override.

The common pump suction line is provided with a pulsation dampener to minimize the pulsation of flow in the line, and with a calibration column which can be used for flow measurement.

The discharge of each pump is provided with a pulsation dampener and a safety (over-pressure) relief valve. PVC ball valves are provided throughout the system to

provide isolation of pumps and of appurtenant equipment including pulsation dampeners, calibration columns, and safety relief valves.

3.5.1.2 Sodium Hypochlorite Storage

Sodium hypochlorite storage capacity was sized based on a continuous primary effluent chlorination demand of 24 mg/L, with a storage period of ten and one-half days at an average plant flow of 25 MGD. At this dosage and duration, a total active volume of 50,400 gallons of 12.5% sodium hypochlorite solution is required. With allowances for high and low level alarms, and for freeboard in the tank, two tanks of 31,650 gallons apiece were provided for this use.

The tanks are manufactured of fiberglass reinforced plastic (FRP), with a interior corrosion resistant barrier fabricated with isophthalic resin, reinforced with a 20 to 30 mil glass veil, and backed with a 100 mil chopped strand fiberglass laminate. The tanks are provided with dished heads, and with ladders for access to the top. The tank fill piping discharges into the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as tank vent pipe, overflow pipe, and drain pipe, are provided for each tank. The tanks are enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

Each tank is 15 ft 6-inch in diameter with a 22 ft 6-inch straight shell height, and is manufactured by Belco Manufacturing Company.

The containment walls surrounding the sodium hypochlorite storage area have been thickened in places to accommodate potential future cover for the tanks.

To control spills, rainwater, and washwater within the sodium hypochlorite storage area, a sump is provided with a totally enclosed Simplex Barnes 3SE1544DS submersible pump with a 1.5 hp, 1750 rpm, 3 phase, 60 hz , 460 v, motor with a double mechanical seal. The unit is manually controlled.

3.5.2 Dechlorination Facilities

3.5.2.1 Sodium Bisulfite Supply

De-chlorination was used to maintain zero chlorine residual in the discharge to the Pacific Ocean when the plant was only an Advance Primary Treatment Plant. When the

treatment plant is producing secondary effluent; the existing de-chlorination facility will not be utilized. Dechlorination of secondary effluent with sodium bisulfite will require construction of the planned but “yet-to-be” constructed Remote Dechlorination Facility to be located at the Goat Canyon Pump Station. The description provided below is for the existing facility that was installed to dechlorinate primary effluent.

Pumping of sodium bisulfite for dechlorination is by positive displacement diaphragm metering pumps similar to those used for sodium hypochlorite delivery. A schematic of the Dechlorination Facilities is presented in Figure 3.5-3.

Two sodium bisulfite pumps are provided to deliver sodium bisulfite to the Effluent Blending Structure (EBS). A sodium bisulfite dilution water pump is provided at the EBS to provide the necessary velocity at the sodium bisulfite diffuser to obtain proper mixing. The sodium bisulfite dilution water pump is described in Part 3.11 of this manual.

Each sodium bisulfite pump is a PulaFeeder Model 7660-S-AE diaphragm metering pump with integral suction and discharge check valves. Each pump has a design capacity of 40 to 330 gph and an operating pressure of 45 psig, and is provided with a 1.5 horsepower, 1750 rpm, shunt-wound, TEFC, chemical duty, Fincor motor with D.C. SCR drive. The output of each pump is regulated by an automatic stroke length adjuster in response to a 4-20mA input signal from the plant effluent flow meter and by the SCR drive in response to a 4-20mA input signal from the plant effluent ORP analyzer. The stroke length adjuster is provided with a manual override. The common pump suction line is provided a pulsation dampener to minimize the pulsation of flow in the line, and with a calibration column which can be used for flow measurement.

The discharge of each pump is provided with a pulsation dampener and a safety (over-pressure) relief valve. PVC ball valves are provided throughout the system to provide isolation of pumps and of appurtenant equipment including pulsation dampeners, calibration columns, and safety relief valves.

3.5.2.2 Sodium Bisulfite Storage

Sodium bisulfite storage capacity was sized based on a continuous sodium bisulfite dosage of 25.5 mg/L, with a storage period of ten and one-half days at an average plant flow of 25MGD. At this dosage and duration, a total active volume of 20,580 gallons of

25% sodium bisulfite solution is required. With allowances for high and low water level alarms, and for freeboard in the tank, two tanks of 13,150 gallons apiece were provided.

The tanks are manufactured of fiberglass reinforced plastic, with an interior corrosion-resistant barrier fabricated with isophthalic resin, reinforced with a 20 to 30 mil glass veil, and backed with a 100 mil chopped strand fiberglass laminate. The tanks are provided with dished heads, and with ladders for access to the top. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as pressure relief, overflow pipe, and drain pipe, are provided for each tank. The tanks are enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

Each tank is 12 ft in diameter with a 15 ft 6-inch straight shell height, and is manufactured by Belco Manufacturing Company.

To control spills, rainwater, and washwater within the sodium bisulfite storage area, a sump is provided with a totally enclosed Simplex Barnes 3SE1544DS submersible pump with a 1.5 hp, 1750 rpm, 3 phase, 60 hz, 460 v, motor with a double mechanical seal. The unit is manually controlled.

Each sodium bisulfite tank and all above-ground sodium bisulfite piping are provided with a self-limiting electric cable, 240 VAC operation, heat-trace system and an external layer of 2.3-inch thick Trymer-1800 brand polyisocyanurate, insulation with insulation jacketing to maintain a minimum temperature of 50 degrees fahrenheit, thereby preventing crystallization of sodium bisulfite solution.

3.5.3 Non-Potable Water Pump Station No. 1 (NPWPS1)

NPW Pump Station No. 1 incorporates the delivery of potable water from the City of San Diego's water system via an air-gap connection. Under normal operating conditions when secondary effluent is being produced, NPW Pump Station No. 1 is used as backup to NPW Pump Station No. 2.

A schematic of NPW Pump Station No. 1 is presented in Figure 3.5-4.

3.5.3.1 Hydropneumatic Tank

Minor non-potable water demands are made up by a hydropneumatic tank. The tank is a dished head, 125 psi steel ASME rated tank, 6 ft in diameter with an overall height of 18 ft. The tank is sized to keep pump cycles down to 6 minutes (10 cycles/hour) at worst case conditions. The tank is manufactured by Fluid Kinetics, Inc.

The tank is provided with a 3/4-inch sight gauge, a 2-inch safety relief valve, pressure and level sensors, and an access ladder.

3.5.3.2 Make-Up Air System

Hydropneumatic tank make-up air is provided by two compressors (run/standby), each with a capacity of 11.5 scfm at 100 psi pressure rise. Compressors are mounted to a rigid steel frame which straddles a receiving tank.

Each compressor is an Atlas-Copco Model LE-6, two-cylinder, reciprocating compressor, and is driven by a 5 hp, 1760 rpm, 3 phase, 60 hz, 460 v, premium efficiency motor with a TEFC, hostile environment, enclosure. The compressors provide make-up air to the hydropneumatic tank through an 80 gallon ASME steel air receiver. The make-up air line to the hydropneumatic tank is provided with a 3/4-inch solenoid valve which is opened and closed by level switches in the hydropneumatic tank.

The compressor/receiver system is manufactured by Atlas-Copco, and is supplied by Fluid Kinetics Corporation.

3.5.3.3 Non-Potable Water Pumps

Four five-stage vertical turbine pumps are provided to supply NPW for plant water. One pump acts as a standby unit. Each pump is provided with a 6-inch weighted check valve and isolation valve on its discharge line. Individual pump discharge lines pump into an 8-inch discharge header.

Pumps are Floway Model 10 LKM, and are rated for 420 gallons per minute (gpm) at 187 ft of TDH with three pumps operating. Pumps are open line shaft type and product lubricated. Pumps are furnished with 30 hp, 1770 rpm, 3 phase, 60 hz, 460 v, TEFC vertical solid shaft constant speed motors.

3.5.3.4 Water Supply and Storage

All flow to NPW PS No. 1 is from an air-gap connection to the City of San Diego potable water system. The air-gap piping is 8-inch diameter, and is provided with a Clayton (Cla-val) Model 124G globe-type float actuated valve, which opens to provide flow to the NPW PS1 wetwell. A 3 phase, 60 hz, 460 volt, TEFC motor actuated plug valve is provided on the air-gap piping as a back-up to shut off potable water flow in the event of float valve failure. The motor actuated valve is a Limitorque Model L-120 close coupled to a Limitorque Model WTR-12 quarter turn gear box.

The NPW wetwell is a reinforced concrete structure with an active volume which is sized to provide a minimum of 15 minutes of NPW storage at peak demand. The wetwell is approximately 28 ft long by 13 ft wide by 12 ft deep. The wetwell depth includes 3 ft of freeboard, 1 ft for a “HIGH WATER LEVEL” alarm, and 3 ft for a “LOW WATER LEVEL” alarm and for pump bowl submergence requirements.

When the NPW Pump Station No. 2 is on-line, NPW Pump Station No. 1 is manually valved off from the system, and will serve as a standby facility to NPW Pump Station No. 2.

3.5.4 Non-Potable Water Pump Station No. 2 (NPWPS2)

When the plant is producing secondary effluent, non-potable water (secondary effluent) from the secondary sedimentation effluent channel is supplied via NPW Pump Station No.2.

A process schematic of the NPW Pump Station No.2 is presented in Figure 3.5-5.

3.5.4.1 Non-Potable Water Pumps

NPW Pump Station No.2 pumping system consists of five open line shaft vertical turbine pumps operated with a VFD system; three main pumps (two operating and one standby) and two jockey pumps (one operating and one standby). Each of the main pumps is provided with a 2-inch air/vacuum relief valve, 10-inch check valve and 10-inch butterfly valve on its discharge line. Each of the jockey pumps is provided with a 1½-inch air/vacuum relief valve, 6-inch air check valve and 6-inch butterfly valve on its discharge line. The individual pump discharge lines pump into a 16-inch discharge header.

The main pumps are Fairbank Morse size 13H model 7000-AWF (4 stage). The main pumps are rated for 1,700 gpm at 1,770 rpm and 185 ft of TDH and for 500 gpm at 1,600 rpm and 185 ft of TDH.

The jockey pumps are Fairbank Morse size 10M model 7000-AWF (4 stage). The jockey pumps are rated for 500 gpm at 1,770 rpm and 185 ft of TDH and 150 gpm at 1,600 rpm and 185 ft of TDH.

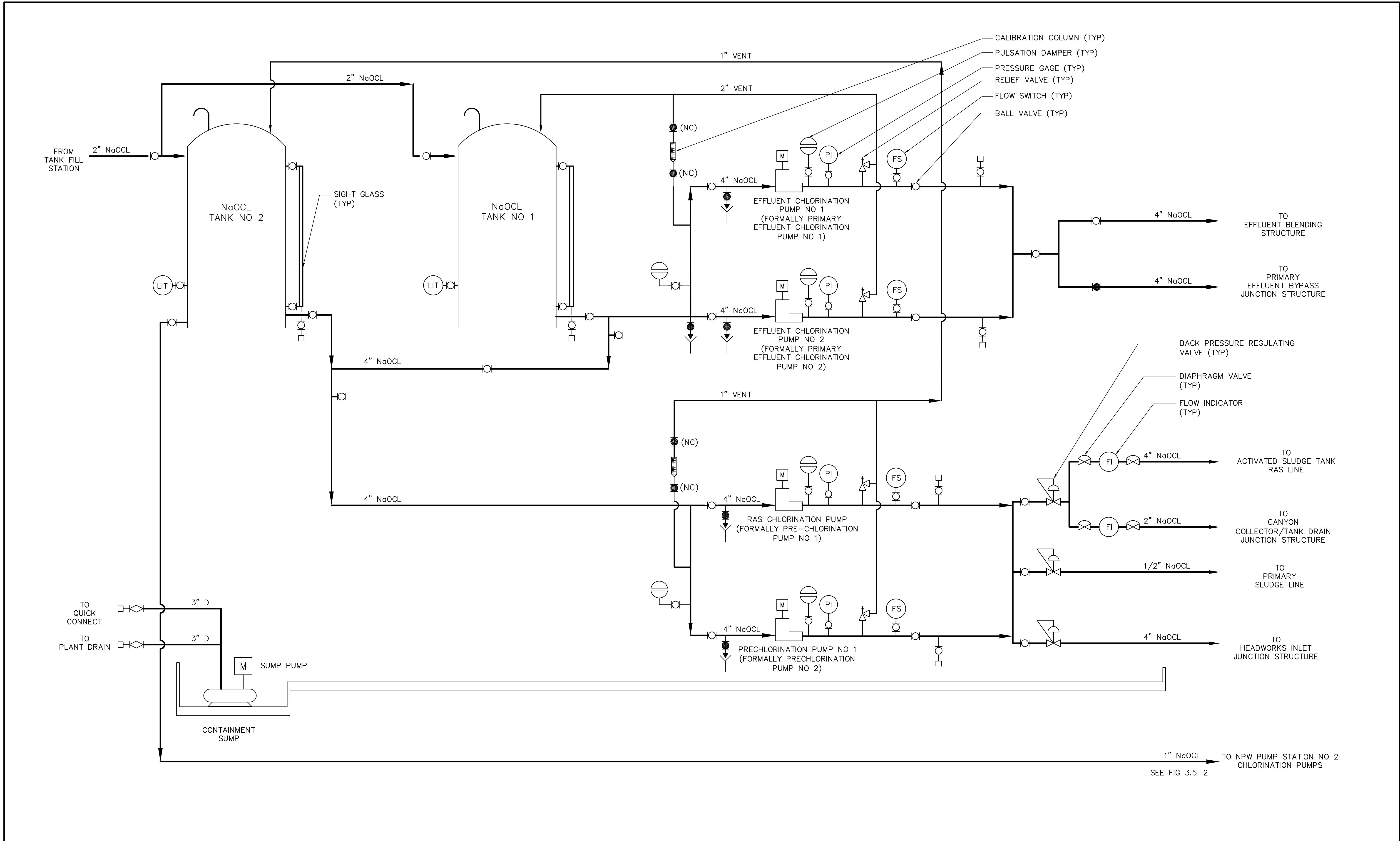
Both the main pumps and jockey pumps are four-stage open line shaft and product lubricated type. Each main pump is driven by a 125 hp, 3 phase, 60 hz, 460 volt vertical solid shaft variable speed motor. Each jockey pump is driven by a 40 hp, 3 phase, 60 Hz, 460 volt vertical solid shaft variable speed motor.

3.5.4.2 Water Supply and Storage

NPW Pump Station No. 2 is located adjacent to the secondary effluent gallery. A 54-inch square downward open weir gate with pedestal operator allows the secondary effluent to flow from the secondary effluent gallery to the wetwell for non-potable water supply.

The non-potable water wetwell is a reinforced concrete structure. The wetwell is approximately 27 ft long x 16 ft wide and 12 ft deep.

XREFS: \\TLBUK.dwg IMAGES:None User:CARSON Spec:PIRNE STANDARD File:1:1991037\3&M schematics\30M FIG 3.5-1.DWG Scale:1:1 Date:12/14/2010 Time:09:40 Layout:Blank



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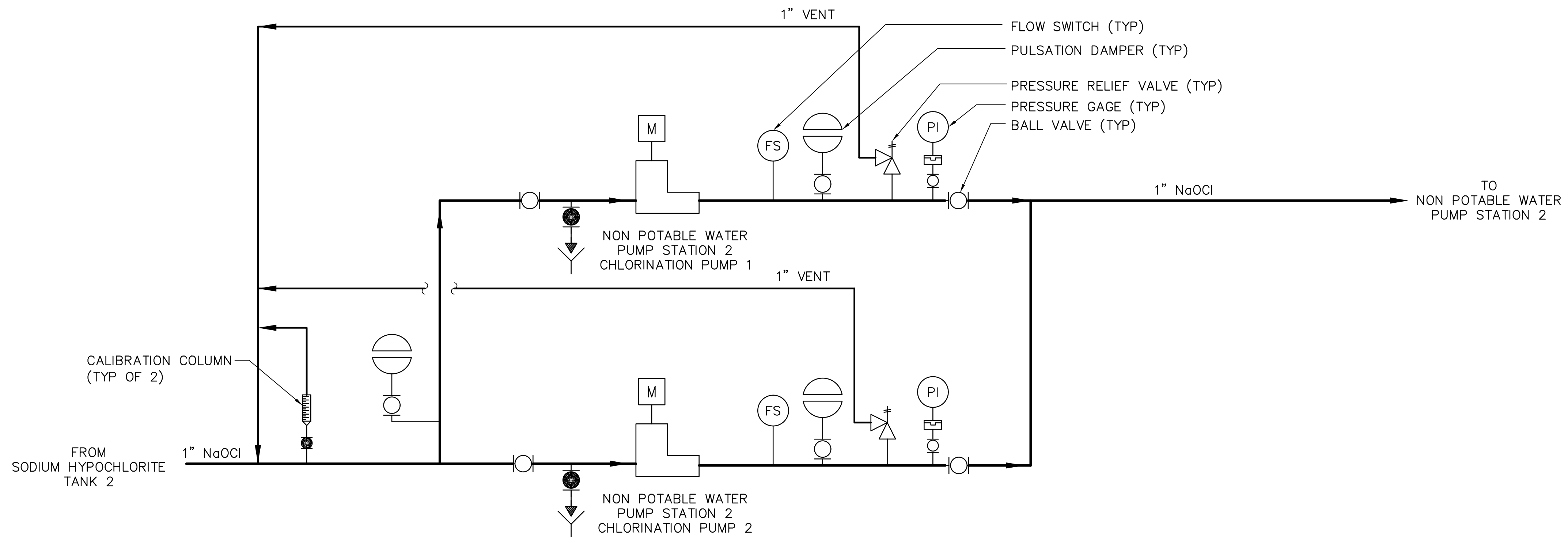


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CHLORINATION FACILITIES
CHLORINATION FACILITIES
SYSTEM PROCESS SCHEMATIC 1
NOT TO SCALE

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FIGURE 3.5-1
CAD REF. NO. I30M FIG 3.5-1

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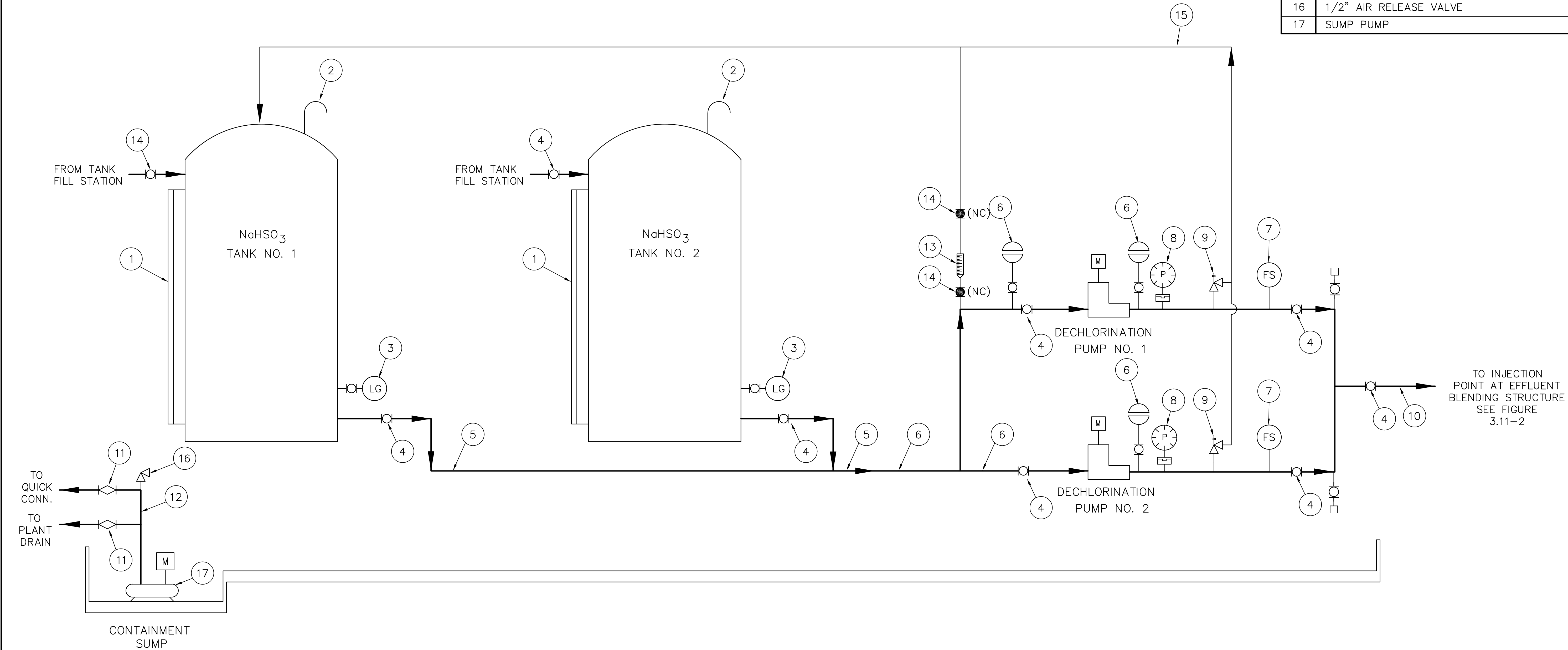
CHLORINATION FACILITIES
CHLORINATION FACILITIES
SYSTEM PROCESS SCHEMATIC 2

NOT TO SCALE

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FIGURE 3.5-2
CAD REF. NO. 130M FIG 3.5-2

PARTIAL ASSEMBLY SCHEDULE

ITEM	DESCRIPTION
1	SIGHT GLASS
2	4" VENT PIPE
3	PRESSURE TRANSDUCER TYPE LEVEL GAUGE
4	4" BALL VALVE
5	4" PUMP SUCTION LINE (SCH. 80 PVC)
6	PULSATION DAMPENER
7	FLOW SWITCH
8	PRESSURE GAUGE
9	2" PRESSURE RELIEF VALVE
10	4" PUMP DISCHARGE LINE (SCH. 80 PVC)
11	4" PLUG VALVE; DEZURIK OR EQUAL
12	4" PVC SUMP PUMP DISCHARGE
13	CALIBRATION COLUMN
14	2" BALL VALVE
15	1" PVC RETURN LINE
16	1/2" AIR RELEASE VALVE
17	SUMP PUMP



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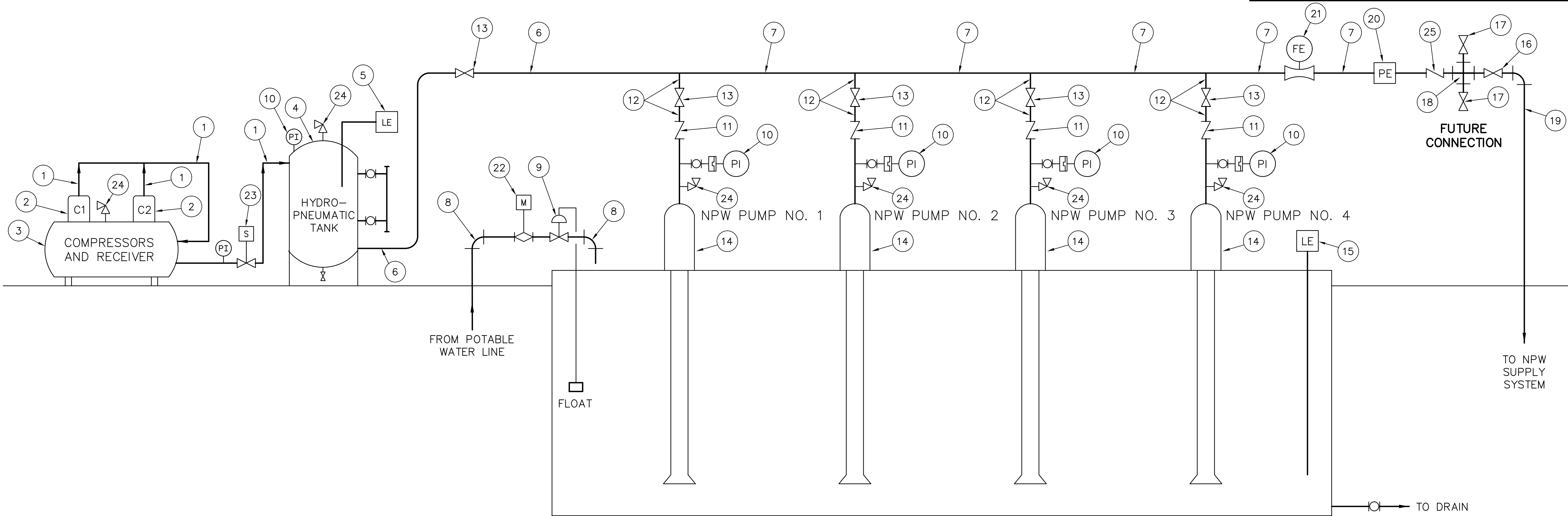
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South Bay International Wastewater Treatment Plant

DECHLORINATION FACILITIES
ADVANCED PRIMARY TREATMENT PLANT
(CC-2/CC-2B)
SODIUM BISULFITE SUPPLY PROCESS SCHEMATIC
NOT TO SCALE

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FIGURE 3.5-3
CAD REF. NO. I30M FIG 3.5-3

XREFS: \\TLBLK.dwg IMAGES:None User:CARSON Spec:PIRNE STANDARD File:c:\proj\1991037\3&M schematics\130M FIG 3.5-4.DWG Scale:1:1 Date:12/14/2010 Time:11:14 Layout:Blank

PARTIAL ASSEMBLY SCHEDULE	
ITEM	DESCRIPTION
1	1" COMPRESSED AIR LINE; STEEL
2	TANK FILL COMPRESSOR
3	AIR RECEIVER
4	150 PSI ASME RATED HYDROPNEUMATIC TANK
5	TANK LEVEL PROBES
6	6" DUCTILE IRON HYDROPNEUMATIC TANK DISCHARGE LINE
7	8" DUCTILE IRON NON-POTABLE WATER HEADER
8	8" DUCTILE IRON 90° ELBOW
9	CLAYTON 1246-01 FLOAT VALVE WITH INTEGRAL FLOAT; 8"
10	PUMP DISCHARGE PRESSURE GAUGE
11	6" APCO WEIGHTED LEVER SWING CHECK VALVE WITH LIMIT SWITCH
12	6" DUCTILE IRON SPOOL
13	6" GATE VALVE
14	PEABODY FLOWAY VERTICAL TURBINE PUMP AND MOTOR; 420 GPM AT 187 TDH
15	PRESSURE TYPE WETWELL LEVEL SENSOR
16	8" GATE VALVE
17	8" GATE VALVE FOR FUTURE CONNECTION
18	8" DUCTILE IRON CROSS
19	8" NPW LINE
20	HEADER PRESSURE SENSOR
21	8" FLOW METER, RANGE: 0 TO 1500 GPM
22	8" MOTOR OPERATED PLUG VALVE WITH TYPE B ACTUATOR
23	1" SOLENOID VALVE
24	AIR RELEASE VALVE
25	8" APCO CHECK VALVE



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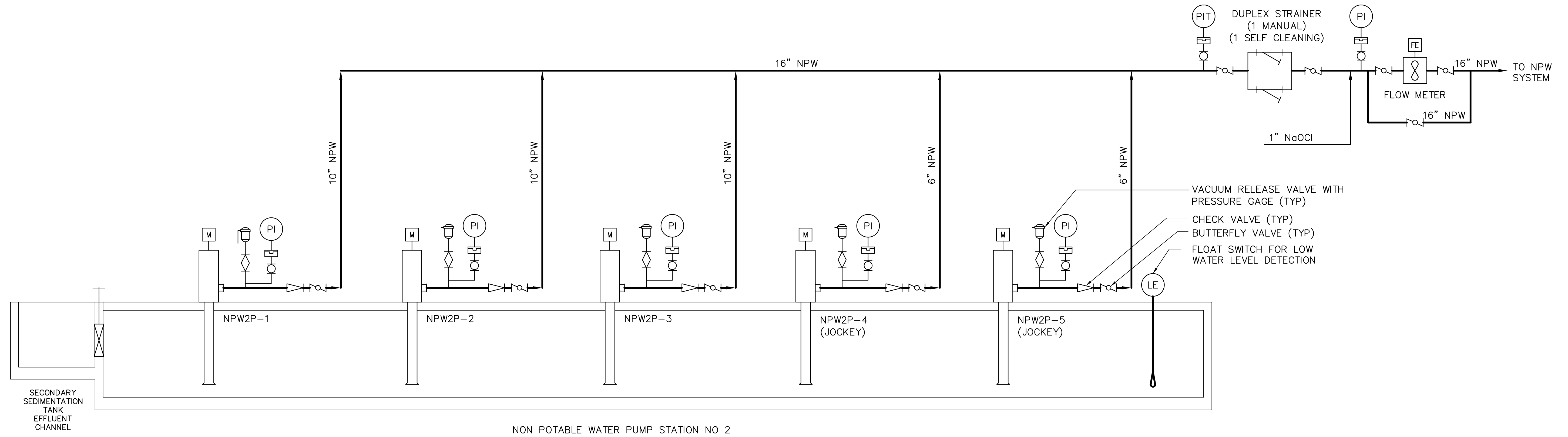
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CHLORINATION FACILITIES
NPW PUMP STATION NO 1
PROCESS SCHEMATIC

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FIGURE 3.5-4
CAD REF. NO. I30M FIG 3.5-4

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NPW PUMP STATION NO 2 FACILITIES
NON POTABLE WATER PUMP STATION
NO 2 PROCESS SCHEMATIC

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FIGURE 3.5-5
CAD REF. NO. 130M FIG 3.5-5

3.6 WASTE ACTIVATED SLUDGE THICKENING FACILITIES

3.6.1 Dissolved Air Flotation (DAF) Thickeners

Two (2) dissolver air flotation (DAF) units have been installed at the South Bay IWTP. Each unit is a steel tank of 1/4" wall thickness, 27' in diameter, 9'-9" high with 6'-1-1/2" side water depth.

Waste activated sludge is delivered to each DAF unit via WAS pumps and a 6" GLDI line which is equipped with a magnetic flow meter and a bypass arrangement. The WAS is mixed with DAF underflow, pressurized with dissolved air, and introduced to the DAF supplied through an 8" back pressure control valve. Polymer is added to the WAS pipe via a 1" PVC pipe. The mixture of WAS, pressurized underflow, and polymer is supplied to an influent diffuser located in the center of a DAF unit.

Each unit is equipped with four rotating surface skimmers and two lower sludge collector arms equipped with blades and squeegees. The sludge collector equipment includes a SEW-Eurodrive Varigear VU Model R37 collector drive consisting of a main worm gear and worm, driven by nominal 10:1 speed range 3/4 HP XPFC variable speed gear motor with roller chain and sprockets.

Each DAF unit has a side inlet pipe to supply the influent diffuser and is equipped with a float box, v-notch effluent weirs, and walkway bridges supplied by the manufacturer. The DAF units were manufactured by HITECH.

The thickened waste activated sludge (TWAS) pumps remove TWAS from the float box and the bottom of each unit through 6" piping. Recycled underflow is withdrawn through an 8" pipe and conveyed to the pressurization tank by use of the pressurization pumps. Underflow is withdrawn through a 12" pipe and flows by gravity to the influent channels of the activated sludge tanks for additional treatment.

A bubbler level control system is installed on top of each DAF unit to measure the level in the float box continuously, to activate on-off operation of the TWAS pumps, and to disable the pumps on low float box level. Each bubbler panel consists of two compressors (duty/standby), and internal circuitry to sense lead compressor failure, to automatically start the stand-by compressor, and to sense a low air flow system failure.

A schematic presenting the WAS Thickening Facilities is shown in Figure 3.6-1.

3.6.2 Pressurization and Air Injection System

Each DAF system has a dedicated pressurization and air injection system which provides recirculation and pressurization of the DAF underflow and dissolving of air in the underflow. The pressurization and air injection system is supplied by the manufacturer of the DAF system. Each pressurization and air injection system has four major components: a pressurization pump, a pressurization tank, a backpressure control valve, and an air control panel.

Each pressurization pump is a horizontal centrifugal pump manufactured by Goulds Model 3196 MT, Size 4 X 6-13. The pump is rated for 800 gpm capacity at a TDH of 142', and is driven by a 50 HP TEFC motor. Each pump is supplied with a mechanical seal. A common seal water assembly is provided for each pair of pressurization and TWAS pumps.

Vertically mounted pressurization tanks, one for each DAF unit, are provided to dissolve air into the pressurized, recycled underflow. Each tank is 4'-0" in diameter, 11'-3" high and rated for a working pressure of 100 psig, with a pressurized flow range of 500-1000 gpm. Each pressurization tank is equipped with a liquid level sight gauge, pressure gauge, pop safety valve, drain plug, and an air release (float) valve.

Flow from the pressurization tank is routed to an 8" hand-wheel operated back pressure valve which maintains the proper pressure in the pressurization tank. The pressurized flow line is connected to the DAF unit inlet assembly via a 6" x 8" x 14" recycle tee.

Each DAF unit is supplied with an air control panel which includes a heavy duty pressure regulator, needle valve, rotameter, pressure gauges, air flow control valve, and solenoid valve. The pressure regulator valve reduces the pressure of the compressed air to approximately 75 psig. The rotameter can be manually adjusted to provide the required flow rate at ambient temperatures and pressures. Pressure in DAF air compressors automatically delivers air to the pressurization tank.

The compressed air is supplied by the air compressors located in the Compressor Room of the DAF Control Structure. Two (2) air compressors are provided for the CC-3 conditions. One compressor is normally in service and one is on standby mode.

Each compressor is an Ingersoll-Rand Type 30, a two stage reciprocating air compressor, Model T301180120H. Each compressor has a capacity of 35.8 acfm, a maximum discharge pressure of 250 psig, and is driven by a 10 HP TEFC motor. The compressor's receiver has a capacity of 120 gallons.

A schematic presenting the Pressurization and Air Injection System is shown in Figure 3.6-2.

3.6.3 TWAS Pumping and Metering System

Each DAF unit is equipped with a TWAS pump for pumping TWAS to the USSTs. Each TWAS pump is a Netzsch, Model NM053-01L positive displacement progressive cavity pump with dual clean out ports and is equipped with a mechanical seal and a seal water connection. The pump is rated for 80 gpm capacity at a TDH of 40 psi, and is driven by a 5 HP TEFC motor. A common seal water assembly is provided for each pair of pressurization and TWAS pumps.

Each TWAS pump has a dual suction. The first 6" suction line draws TWAS from the bottom of the float box of the DAF unit. The second 6" suction line draws any settled sludge from the bottom of the DAF unit by means of manually opening withdrawal valves.

The discharge pipe of each pump is equipped with a 1" automatic air/vacuum release valve located downstream of the pump check valve. The common 6" TWAS manifold is equipped with a magnetic flow meter with a bypass arrangement.

3.6.4 DAF Polymer Addition System

The DAF polymer addition system is provided for polymer storage, transfer, mixing, and supply of the diluted solution to the DAF system in order to increase solids capture rate in the dissolved air flotation thickening process. The polymer addition area is contains an emergency eyewash and shower.

A schematic of the DAF Polymer Addition System is presented in Figure 3.6-3.

3.6.4.1 Polymer Bulk Storage Tank

There is one bulk liquid polymer storage tank. The Pacific Tank Ltd. Model VCB fiberglass reinforced plastic (FRP) tank is 9'-0" in diameter, 11'-9" tall, has a capacity of 5590 gallons.

The bulk polymer storage area includes a drainage sump equipped with a sump pump. The sump pump is a simplex submersible, end suction, centrifugal pump with 100 gpm capacity at 8 feet TDH, and equipped with a 1.5 HP motor. The pump is manufactured by Barnes Pumps, Model 3SE-DS.

The sump pump has a double discharge arrangement, including a quick disconnect with an isolation valve to connect the pump to a special collection truck in case of polymer spillage, and a connection to the plant drainage system equipped with an isolation valve to be used in case of draining rain water or washwater.

3.6.4.2 Bulk Polymer Transfer Pumps

One bulk polymer transfer pump delivers the bulk polymer from the bulk polymer storage tank to the polymer mix tank, based on level in the polymer mix tank. Each Netzsch, Model NM015-01L positive displacement progressive cavity pump will be driven by an SCR variable speed motor. The transfer pump has a 35 gph capacity at approximately 20 psi TDH, and 500 rpm maximum pump speed. The pump is equipped with a double mechanical seal; a common seal water assembly is provided for the bulk polymer transfer pump and polymer feed pumps.

3.6.4.3 Polymer Mix Tanks

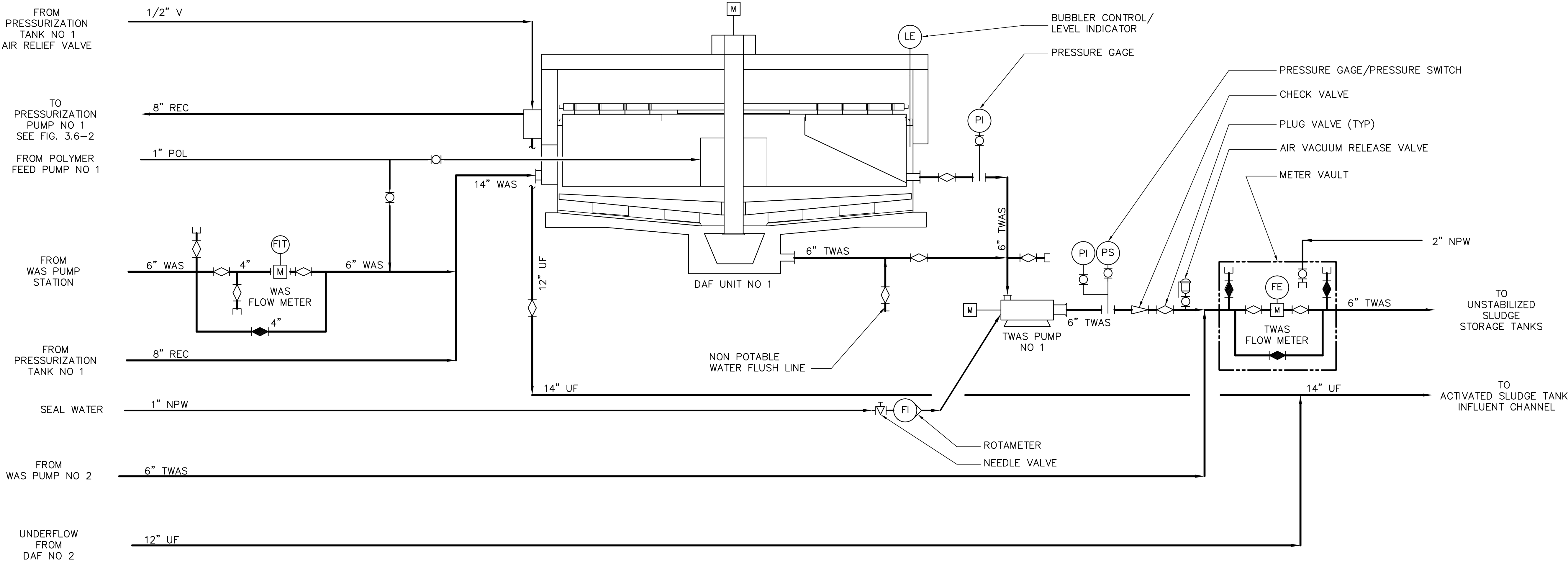
One polymer mix tank is provided for diluting bulk polymer to concentrations of 0.05 to 0.30 percent prior to addition to the DAF feed stream. The Pacific Tank LTD, Model VF FRP tank is vinyl ester resin coated, 4'-0" in diameter and 6'-0" tall, and has a capacity of 563 gallons. The polymer mix tank is equipped with a Grovhac Inc. mixer with a 1 HP TEFC motor.

3.6.4.4 Polymer Feed Pumps

Polymer feed pumps (one for each DAF unit) deliver polymer at 0.05% to 0.30% solution to the DAF units. The polymer feed pumps are manifolded in pairs to allow any of the pumps to deliver polymer solution to any of the DAF units; however, each pump is normally dedicated to their respective DAF unit.

Each Netzsch, Model NM031-01L positive displacement progressive cavity pump has a 10 gpm capacity at approximately 30 psi TDH, and 280 rpm maximum pump speed. Each pump is driven by a variable speed 1 hp TEFC motor, and is equipped with a mechanical seal. A common seal water assembly is provided for the bulk polymer transfer pump and the polymer feed pumps.

XREFS: \\TTLBLK.dwg IMAGES:None User: LARSON Spec: PIRNIE STANDARD File: I: \\proj\\1991037\\O&M schematics\\30M FIG 3.6-1.DWG Scale: 1:1 Date: 12/14/2010 Time: 10:28 Layout: Blank



DAF UNIT NO 1 SHOWN
(TANK 2 TYPICAL)

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CKD LDT

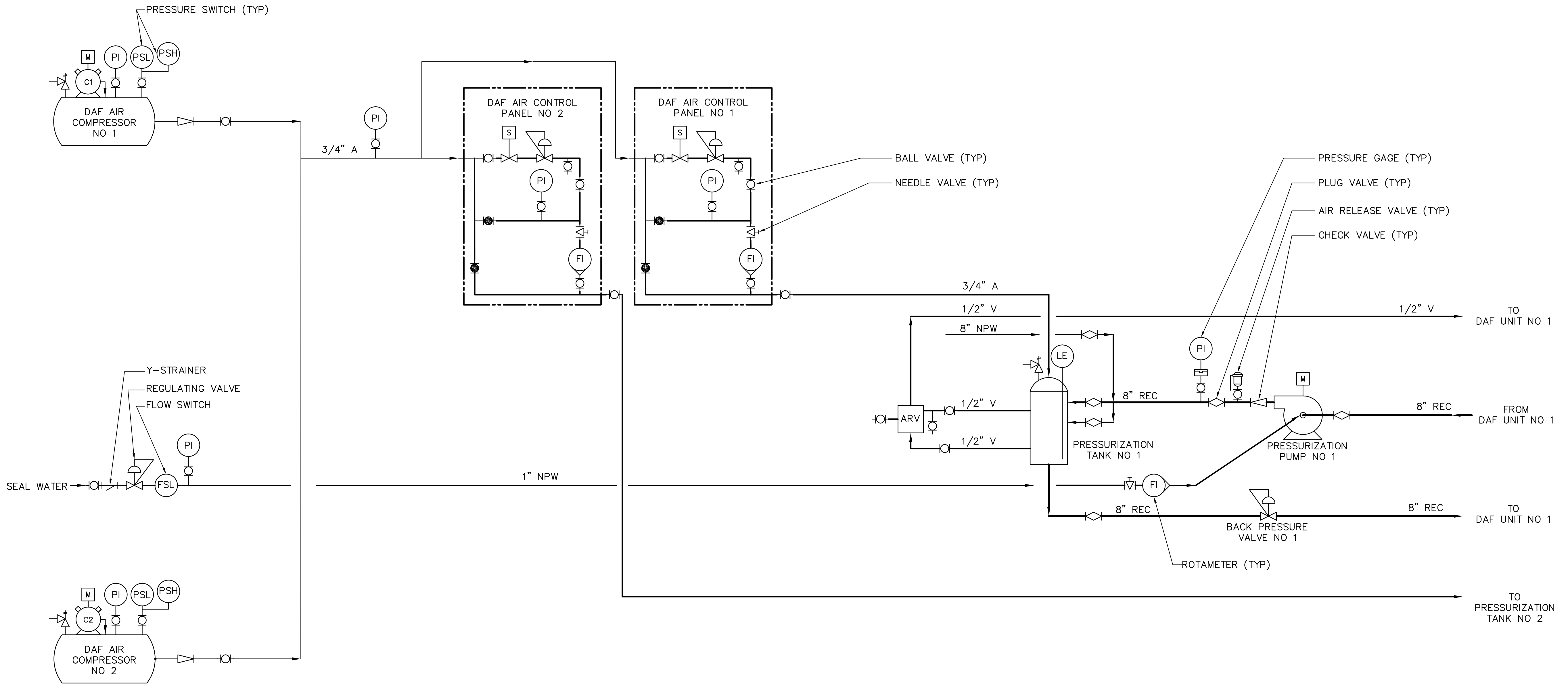


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WAS THICKENING FACILITIES
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PROCESS SCHEMATIC
NOT TO SCALE

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DATE MARCH 2011
FIGURE 3.6-1
CAD REF. NO. I30M FIG 3.6-1

XREFS: \\TLBUK.dwg IMAGES:None User:CARSON Spec:PIRNIE STANDARD File:t:\proj\1991037\Q&M schematics\130M FIG 3.6-2.DWG Scale:1:1 Date:12/14/2010 Time:10:29 Layout:Blank



PRESSURIZATION TANK NO 1 SHOWN
(TANK 2 TYPICAL)

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DWN PAL
CKD LDT

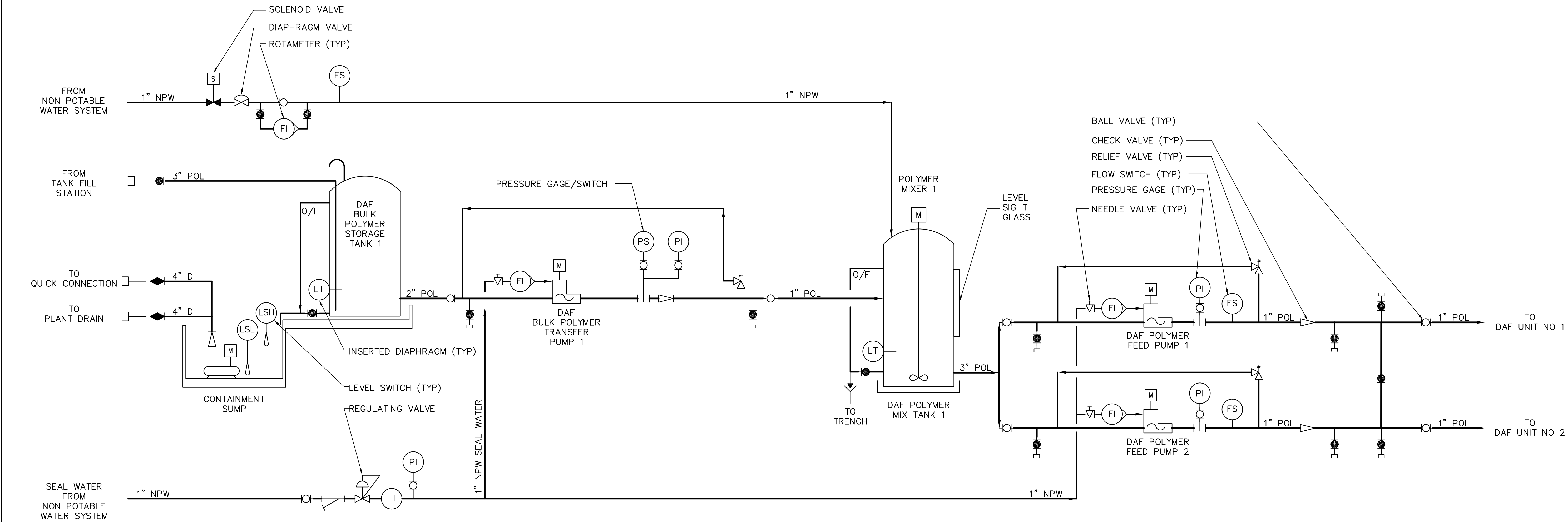


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PRESSURIZATION AND AIR INJECTION
SYSTEM PROCESS SCHEMATIC

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FIGURE 3.6-2
CAD REF. NO. I30M FIG 3.6-2



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DAF POLYMER ADDITION
SYSTEM PROCESS SCHEMATIC
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FIGURE 3.6-3
CAD REF. NO. I30M FIG 3.6-3

3.7 UNSTABILIZED SLUDGE STORAGE FACILITIES

3.7.1 Sludge Storage Tanks

The two (2) unstabilized sludge storage tanks (USSTs) are sized to provide four (4) days of unstabilized liquid sludge storage under the average annual loading conditions defined in Section 1.6. Each USST is 68' diameter with a 25' SWD. *To avoid the production of methane gas in the USSTs, sludge shall not be stored in any of the USSTs for more than 4 days, and sodium hypochlorite addition to the primary sludge flow should be done on a regular basis.*

A process schematic for the USST 1 is presented in Figure 3.7-1 and is typical for USST 2.

3.7.2 Sludge Mixing System

The sludge mixing system for each storage tank consists of three (3) sludge mixing pumps. One (1) additional pump is provided as off-the-shelf replacement unit. The pumps draw off the sludge from the bottom of storage tank and recirculate it back via the discharge piping.

Sludge Mixing Pump Station 1 is the designation given to the pump station installed for Unstabilized Storage Tank 1. The Sludge Mixing Pump Station 1 provides for a turnover rate of 25 minutes at a sidewater operating depth of 10.5'. For Unstabilized Storage Tank 1, each sludge mixing pump is horizontal, severe-duty, non-clog, recessed impeller centrifugal pumps "Goulds", Model 6100, size 8x8-25. Each pump is rated for 3,400 gpm capacity at a TDH of 55 ft, and is driven by a constant speed 125 hp "US Electrical Motors", explosion proof, full voltage starting motor that is connected to the pump shaft and by a V-belt and sheave assembly. Each pump is equipped with 16-inch isolation plug valves on the suction and discharge pipes and a 16-inch check valve equipped with a limit switch on the discharge pipe. In addition, each pump has inlet and outlet 3-inch high pressure non-potable water flushing connections, each equipped with a 3-inch isolation plug valves. Each pump is completed with a double mechanical seal with NPW seal water connection.

Sludge Mixing Pump Station 2 is the designation given to the pump station installed for Unstabilized Storage Tank 2. The Sludge Mixing Pump Station 2 provides for

a turnover rate of 25 minutes at sidewater operating depth of 10.5'. For Unstabilized Storage Tank 2, each sludge mixing pump is a Wemco-Hidrostaal single vane screw pump, Model H8K-S-H4SM. Each pump is rated for 3,400 gpm capacity at a TDH of 55 feet. Each pump is driven by a 75 hp, 1750 rpm, 3 phase, 60 Hz, 460 volt variable speed motor. Each pump is equipped with 16-inch isolation plug valves on the suction and discharge pipes and a 16-inch check valve equipped with a limit switch on the discharge pipe. In addition, each pump has inlet and outlet 3-inch high pressure non-potable water flushing connections, each equipped with a 3-inch isolation plug valves. Each pump is completed with a double mechanical seal with NPW seal water connection.

3.7.3 Ferric Chloride and Sodium Hypochlorite Addition Systems

A ferric chloride addition system is provided to minimize odor production in the sludge storage tank and to control odors at the dewatering facilities caused by hydrogen sulfide gas. This system also provides the ability to minimize struvite deposition. A description of the ferric chloride addition system is presented in Section 3.2.

Sodium hypochlorite can be added to the primary sludge flow in the PST Influent Gallery to help suppress the growth of methane producing bacteria in the USSTs and avoid the production to methane gas in the USSTs.

3.7.4 Odor Reduction Station

Odorous air from the unstabilized sludge storage tanks is continuously ventilated and treated by the Unstabilized Sludge Storage (USS) Odor Reduction Station located south of the unstabilized sludge storage tanks.

Ventilation air is drawn into the tank via two (2) 12-inch and one (1) 18-inch (equipped with an 18-inch air damper) air inlet connections. The foul air exhaust duct is 18-inch (equipped with an 18-inch air damper) and is connected to a 36-inch common foul air exhaust duct.

The USS Odor Reduction Station consists of a one-stage counter current scrubber and exhaust fans to provide a slight negative pressure within the vapor space of the tank. The tank ventilators inlets and outlets are configured to allow a "sweep effect" to maximize the contaminant and collection of the potential odorous compounds.

The scrubber is a closed vessel in which a scrubber solution of sodium hypochlorite, NaOCl; sodium hydroxide, NaOH; and water is continuously recirculated to the top of the scrubber and distributed over plastic media. The media, or packing, inside the scrubber provides a significant amount of surface area to facilitate the transfer of odorous compounds to be oxidized/absorbed into the scrubber solution. Fresh chemicals (NaOCl and NaOH) and make-up water are added to the scrubber solution which displaces spent scrubber solution (blowdown) into an overflow drain. This overflow drain is returned to the headworks.

The USS Odor Reduction Station Process and Air Flow Schematics are presented in Figure 3.7-2 and Figure 3.7-3, respectively.

3.7.4.1 Odor Reduction Station Scrubber Exhaust Fans

Two (2) exhaust fans, OREF5 and OREF6, are provided to ventilate the Unstabilized Storage Tanks. Each Unstabilized Sludge Storage Tank is ventilated at six (6) air changes per hour at fifty percent (50%) storage capacity, and three (3) air changes per hour when tank is empty. One exhaust fan is a standby unit.

The two fiberglass, belt driven, centrifugal type fans are located adjacent to the ORS scrubber tower. The fans are manufactured by Ceilcote Air Pollution Control, Inc., Model CLUB 3000. Each of the fans has a 30-inch diameter wheel which produces 10,257 cfm at a static pressure of 8.5-inches of water at 1545 rpm.

Each fan is driven by a constant speed, explosion proof corrosive duty, solid shaft, Reliance, Duty Master, 25 hp, 1770 rpm, 460 v, 3 phase, 60 Hz motor.

3.7.4.2 Odor Reduction Station Scrubber

The single fiberglass one-stage counter current odor scrubber tower is manufactured by R.J. Environmental, Inc., and is located just south of the unstabilized sludge storage tank. The 30 ft high tower has a bed of packing which consists of 3 1/2-inch polyethylene Lanpac packing as manufactured by Lantee Products. Above the packing is a manifold with seven 2-inch teflon fog nozzles manufactured by Bete which distribute scrubber solution over the bed. Above the scrubber solution manifold is a mist eliminator manufactured by Kimre Inc., Model B-GON to minimize liquid droplets exiting

through the discharge of the tower. Above the mist eliminator is an acid distribution header with seven 1-inch teflon fog nozzles manufactured by BETE which is used in the cleaning of the scrubber. The scrubber is designed to meet the following:

Flowrate (cfs)	12,000
Number of Systems	1
Number of Tower/System	1
Total Residence Time (sec)	1.5 to 1.7
Inlet H ₂ S Concentration (ppm)	50
System Efficiency (min) (%)	99
Vessel Size:	
Diameter (ft)	6
Side Wall Height (ft)	30

3.7.4.3 Odor Reduction Station pH and ORP Controllers

The scrubber solution is continuously monitored for pH and ORP. The two separate analyzers are installed in a bypass line which runs between the recirculation pump suction and discharge piping. The pH and ORP analyzers are both Great Lakes Instruments, Model 692P3F5A7N and 692R3F5A7N, respectively. The pH probe is a Model 6028P0 with a measurement range of 0.0 to 14.0 pH. The ORP probe is a Model 2028R0 with a measurement range of -2000 to 2000 mV.

3.7.4.4 Odor Reduction Station Recirculation Pumps

Scrubber solution is continuously recirculated by recirculation pumps from the scrubber sump to the distribution manifold. The scrubber solution flows by gravity through the packing media to the sump. Two (2) fiberglass, end suction, centrifugal, frame

mounted recirculation pumps are located adjacent to the odor reduction scrubber tower. The pumps are manufactured by Fybroc, Model 1500. Each pump has a 3-inch inlet, 2-inch outlet and 8 7/8-inch impeller which provides a design flow of 180 gpm, at 65 ft TDH. The pumps are equipped with T. B. Woods, No. 7 motor-to-pump flexible couplings Duramatalic ROX double mechanical seals, and seal water flush. Each pump is driven by a constant speed, TEFC, Siemens Model RG2ESD, 7 1/2 hp, 1800 rpm, 460 v, 3 phase, 60 Hz motor.

3.7.4.5 Odor Reduction Station Sodium Hydroxide (NaOH) Metering Pump

Two (2) NaOH double diaphragm, positive displacement type metering pumps are located at the odor reduction station adjacent to the NaOH storage tank within the corresponding containment area. Each is manufactured by PulsaFeeder, Model 680-S-AE, and is capable of delivering 0.3 to 3.0 gallons per hour at a maximum pressure of 125 psig and a maximum stroke speed of 44 strokes per minute. Each pump is driven by a totally enclosed, chemical duty, Baldor, 1 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor. The motor is connected to the pump shaft by a flexible coupling. The output volume of the pump is adjustable over a range of 10:1 with an Elma, 240 v, single phase, 60 Hz electric stroke length actuator. Additionally each pump is provided with a pulsation dampener, pressure relief valve, calibration column, back pressure control valve, and a conductivity sensor for detection of diaphragm leakage. One pump is a standby unit.

3.7.4.6 Odor Reduction Station Sodium Hypochlorite (NaOCl) Metering Pump

Two (2) NaOCl double diaphragm, positive displacement, type metering pumps are located at the odor reduction station adjacent to the NaOCl storage tank within the corresponding containment area. Each is manufactured by PulsaFeeder, Model 880-S-AE, and is capable of delivery 3.1 to 23.0 gallons per hour at a maximum pressure of 125 psig and a maximum stroke speed of 58 strokes per minute. Each pump is driven by a totally enclosed, chemical duty, Baldor, 1 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor. The motor is connected to the pump shaft by a flexible coupling. The output volume of the pump is adjustable over a range of 10:1 with an Elma, 240 v, single phase, 60 Hz electric

stroke length actuator. Additionally, each pump is provided with a pulsation dampener, pressure relief valve, calibration column, back pressure control valve, and a conductivity sensor for detection of diaphragm leakage. One pump is a standby unit.

3.7.4.7 Odor Reduction Station NaOH Storage Tank

The NaOH tank is located just southeast of the scrubber tower and provides 30 days of storage capacity. The tank is manufactured of fiberglass reinforced plastic using Derakane 411 resin, with an interior nexus veil corrosion-resistant barrier also fabricated with Derakane 411 resin. The tank is provided with a dished head and a ladder for access to the top. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as pressure relief, overflow pipe, and drain pipe, are provided. The tank is enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

The tank is 5 ft in diameter with an 8 ft straight shell height, 1200 gallons, and is manufactured by Belco Manufacturing Company.

The NaOH tank is designed for 1.53 specific gravity and is provided with 2-inches of polyurethane thermal insulation. Electric heat tracing which provides heating of the tank and operates on 240 VAC and is manufactured by Thermon.

3.7.4.8 Odor Reduction Station NaOCl Storage Tank

The NaOCl tank is located just northeast of the scrubber tower and due to the natural degradation of the NaOCl solution, provides only 14 days of storage capacity. The tank is manufactured of fiberglass reinforced plastic using Derakane 411 resin, with an interior nexus veil corrosion-resistant barrier also fabricated with Derakane 411 resin. The tank is provided with a dished head and a ladder for access to the top. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as pressure relief, overflow pipe, and drain pipe, are provided. The tank is enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

The tank is 9 ft in diameter with a 17 ft 3-inch straight shell height, 8200 gallons, and is manufactured by Belco Manufacturing Company. The NaOCl tank is designed for 1.22 specific gravity.

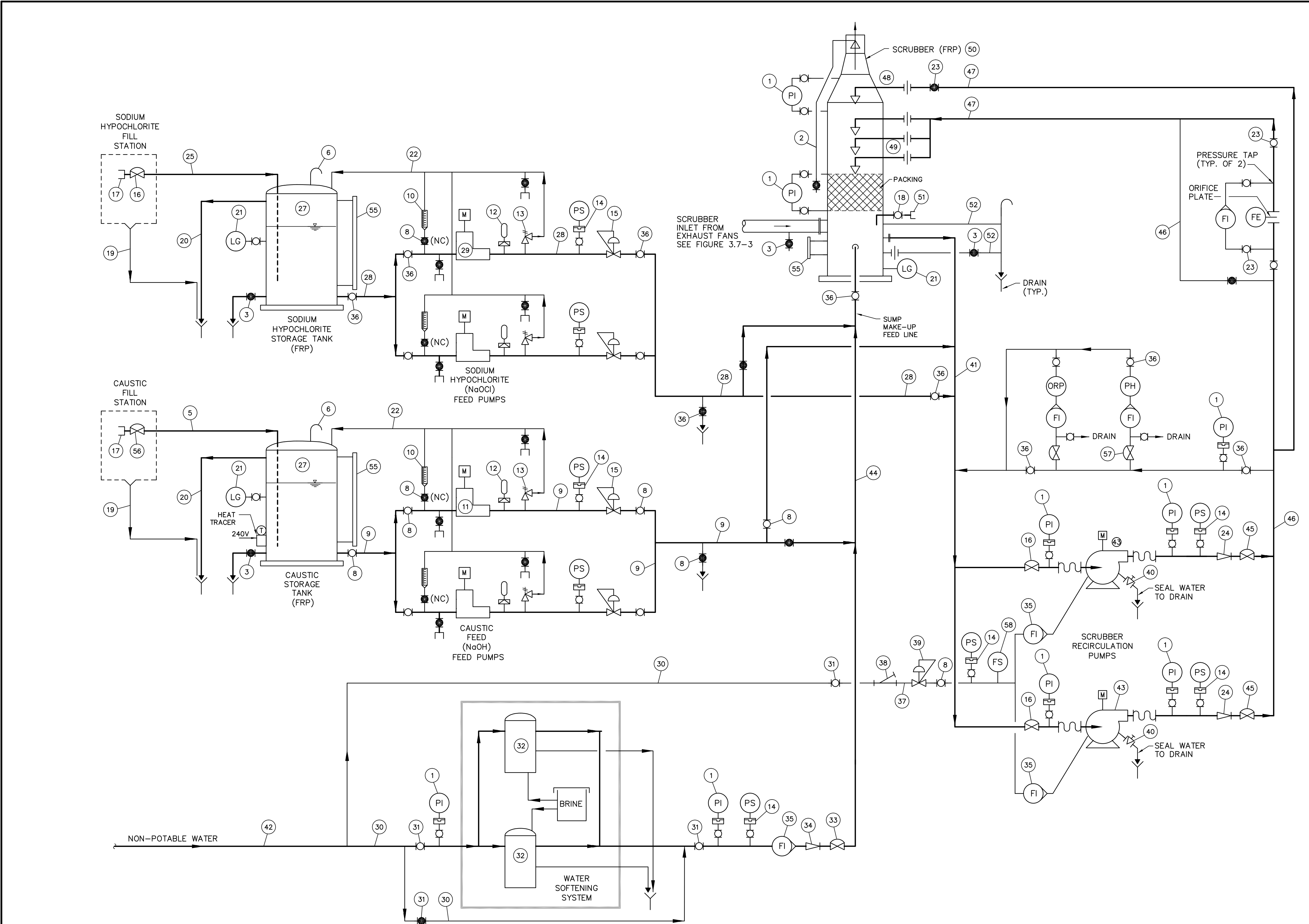
3.7.4.9 NaOH and NaOCl Containment Sump Pumps

To control spills, rainwater, and washwater within the sodium hydroxide and sodium hypochlorite containment areas, each area is provided with a sump and one (1) totally enclosed Barnes 3SE1544DS submersible simplex pump with a 1.5 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor with a double mechanical seal. The sump pump is manually controlled.

3.7.4.10 Water Softening System

An automatic water softening system, ion exchange type, is provided to treat make-up water for the scrubber. The water softener is located on the north side of the NaOCl Tank containment wall. The water softener is manufactured by Culligan, Model 9000, and is capable of producing a maximum flow of 6 gpm and daily capacity of 2,900-3,000 gallons. The unit includes two softening ion exchange vessels and a brine tank. The unit is provided with automatic controls to alternate tanks, and regulate the regeneration cycles. The control system operates on 120 v, single phase, 60 Hz electrical current. A calcium analyzer manufactured by Jenco Instruments, Model J3675 is provided to monitor water hardness.

XREFS: \\TLBLK.dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:1:1991037\Q&M schematics\I2OM FIG 3.7-2.DWG Scale:1:1 Date:03/21/2011 Time:15:41 Layout:Blank



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DES BP/TN/RK
DWN MP
OKD LDT



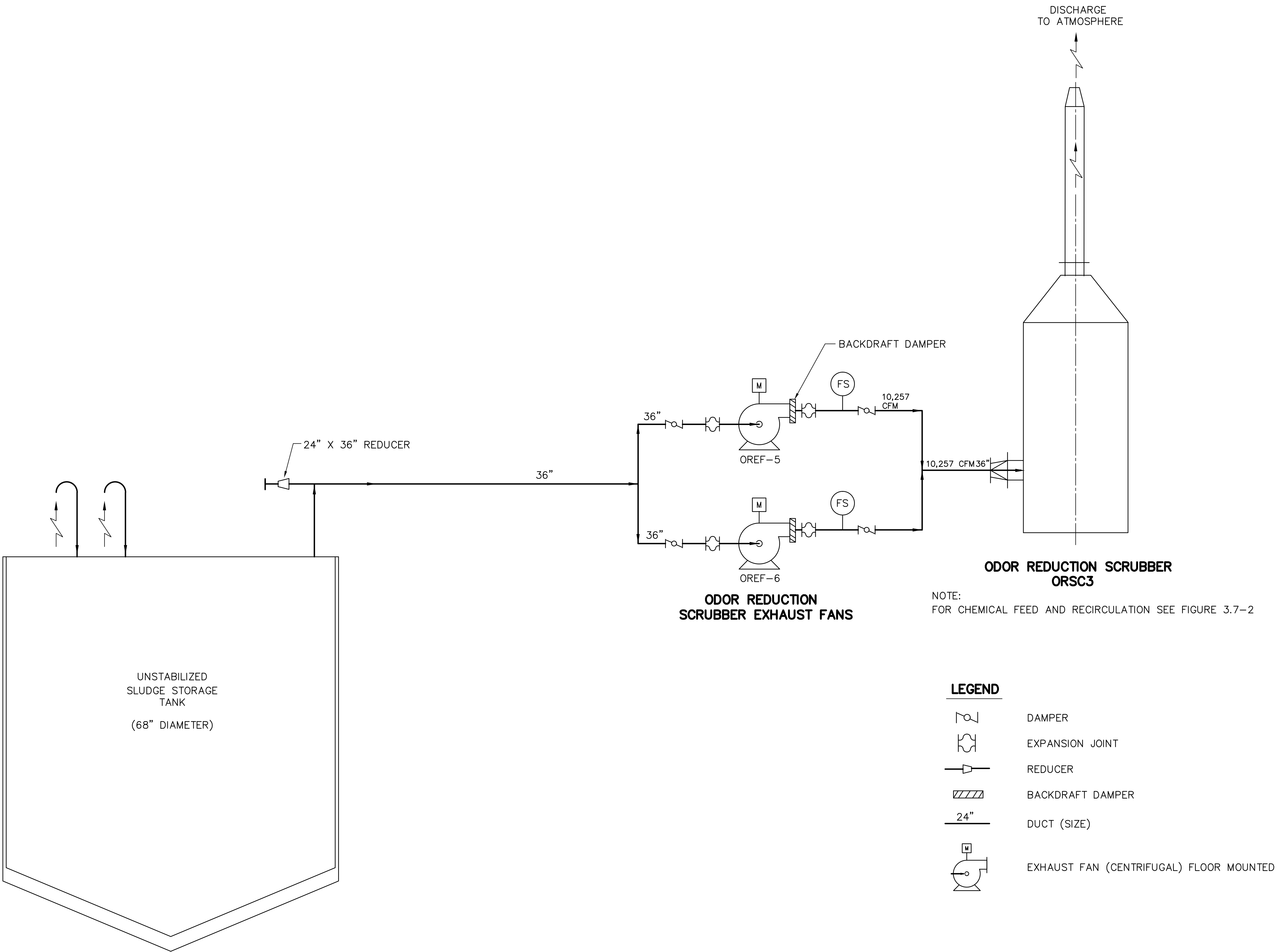
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**UNSTABILIZED SLUDGE STORAGE
ODOR REDUCTION
PROCESS SCHEMATIC**

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FIGURE 3.7-2
CAD REF. NO. I2OM FIG 3.7-2

XREFS: \\TLBUK.dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:1:1991037\Q&M schematics\I2OM FIG 3.7-3.DWG Scale:1:1 Date:03/18/2011 Time:16:11 Layout:Blank



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DES TN/MW/SP
DWN MP
CKD LDT



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**UNSTABILIZED SLUDGE STORAGE AREA
ODOR REDUCTION AIR
FLOW SCHEMATIC**

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FIGURE 3.7-3
CAD REF. NO. I2OM FIG 3.7-3

3.8 SLUDGE DEWATERING FACILITIES

3.8.1 General

The sludge dewatering facilities are sized according to the design criteria defined in Section 2.8.3 under the average annual loading conditions defined in Section 1.6. Based on the above loading and design criteria including the provisions for evacuation of the unstabilized sludge storage tanks within approximately 7 days, the sludge dewatering facilities are as follows for the Advanced Primary Treatment Plant (CC-2), the Phase I South Bay IWTP (CC-2 and CC-3), and the Ultimate Facilities:

Plant Module	Number of BFPs - Size
Advanced Primary Treatment Plant (CC-2)	
• 25/75 MGD PST	4 @ 2.2m
Phase I South Bay IWTP (CC-2 & CC-3)	
• 25/75 MGD PST & 25 MGD AST	4 @ 2.2m
Ultimate Facilities	
• 100/200 MGD PST & AST	16 @ 2.2m

Each belt filter press package including the belt filter press itself, hydraulic power unit, washwater booster pump and other support equipment is equipped with a belt filter press sludge feed pump and a polymer feed pump.

The process schematics for the sludge dewatering facilities and the polymer conditioning facilities are presented in Figures 3.8-1 and 3.8-2, respectively.

3.8.2 Dewatering System Pumping Facilities

Unstabilized sludge is conveyed from the unstabilized sludge storage tanks to the Sludge Dewatering Building via one (1) 12-inch glass lined ductile iron (GLDI) pipelines with cross connection provisions. One belt filter press sludge feed pump station is provided for each set of four (4) belt filter presses. The entry point of the sludge line into each pump

station is reduced to a 10-inch pipeline that will be connected to one (1) 6-inch sludge grinder.

The common sludge feed line is provided with a double-shaft grinder located at the Sludge Feed Pump Station. The grinder is manufactured by Franklin Miller Model “Task Master” TM8516-06. The grinder has 6-inch flanged connections and a capacity of 600 gpm at a pressure loss of less than 12 inches. The grinder is driven by a constant speed, TEFC, Baldor, 3 hp, 1750 rpm, 460 v, 3 phase, 60 hz motor. The motor is connected to the pump by a flexible coupling. Additionally, the motor is equipped with a Nord Model SK-42 Unibase helical, vertical mount, 29.29:1 ratio reducer and flexible coupling. The sludge grinder is provided with a manual bypass. One grinder is furnished as an off-the-shelf replacement for all three grinders at the plant.

The unstabilized sludge is manifolded to the inlet side of the BFP sludge feed pumps. One pump is provided for each belt filter press. The BFP sludge feed pumps are manifolded in pairs to allow for any of the sister/sister pumps to feed any of the respective sister/sister belt filter presses as shown in Figure 3.8-1.

Each BFP sludge feed pump is a single-stage positive displacement progressive cavity pump from Moyno Industrial Products, Model 1F 036GI SSQ DBB. Each pump is capable of delivering 30-130 gpm capacity at a maximum pressure of 30 psig and maximum speed of 397 rpm. The pumps have manual speed adjustment. Each pump is equipped with a variable frequency drive (VFD) located at the Sludge Dewatering Building. The VFD powers the TEFC, Reliance Electric, 10 hp, 1750 rpm, 460 v, 3 phase, 60 hz motor. The motor is also provided with a 1 phase, 60 hz, 120 v space heater. Each pump is equipped with a double mechanical seal with a NPW seal water assembly. The pumps have side mounted suction and are connected to the driver with a piggyback belt and pulley configuration. Each pump is equipped with 6-inch isolation plug valves, air release valves, and pressure sensor isolators with pressure gauges on the suction and discharge lines. Additionally, each pump is equipped with a pressure switch, a check valve with a limit switch, and a 1" flushing assembly on the discharge pipe.

3.8.3 Dewatering System Polymer Conditioning Facilities

The dewatering system polymer conditioning facilities consists of bulk polymer storage, bulk polymer transfer, polymer solution/mixing and polymer addition facilities. The polymer conditioning facilities are sized according to the design criteria defined in Section 2.8.3.

A schematic of the Dewatering System Polymer Conditioning Facilities is presented in Figure 3.8-2.

3.8.3.1 Polymer Bulk Storage

Based on the above loading and design criteria, the bulk liquid polymer storage is as follows for the Advanced Primary Treatment Plant (CC-2), the Phase I South Bay IWTP (CC-2 and CC-3), and the Ultimate Facilities:

Plant Module	Number of Tanks	Capacity (ea) gal	Days of Storage
Advanced Primary Treatment Plant (CC-2)			
· 25/75 MGD PST	2	12,600	42
Phase I South Bay IWTP (CC-2 and CC-3)			
· 25/75 MGD PST and 25 MGD AST	2	12,600	30
Ultimate Facilities			
· 100/200 MGD PST and AST	2	12,600	30
	2	35,400	

The two (2) bulk liquid polymer storage tanks are manufactured of fiberglass reinforced plastic Derakane 411 with an interior c-veil/chop corrosion resistant barrier fabricated with Derakane 411. The tanks are provided with dished heads, and with ladders for access to the top. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as a 2-inch clear sight gauge, overflow pipe, vent, and drain pipe, are provided for each tank. The tanks are enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

Each tank is 12 ft diameter with a 15 ft straight shell height with a 12,600 nominal capacity and is manufactured by Belco Manufacturing Company.

To control spills, rainwater, and washwater within the bulk polymer storage area, a sump is provided with a totally enclosed Simplex Barnes 3SE1544DS submersible pump with a 1.5 hp, 1750 rpm, 460 v, 3 phase, 60 hz motor with a double mechanical seal.

3.8.3.2 Bulk Polymer Transfer Pumps

Bulk polymer transfer pumps are provided to deliver the bulk polymer at 6 percent solution from the bulk polymer storage tanks to the polymer mixing tanks. One pump is dedicated to each bulk polymer storage tank and for each polymer mixing tank.

Based on the above loading and design criteria, the bulk polymer transfer pumps are as follows for the Advanced Primary Treatment Plant (CC-2), the Phase I South Bay IWTP (CC-2 and CC-3), and the Ultimate Facilities:

Plant Module	Number of Pumps
Advanced Primary Treatment Plant (CC-2)	
· 25MGD PST	2
Phase I South Bay IWTP (CC-2 and CC-3)	
· 25/75 MGD PST and 25 MGD AST	2
Ultimate Facilities	
· 100/200 MGD PST and AST	4

Each of the transfer pumps is a single-stage progressive cavity pump from Moyno Industrial Products, Model 1L3 SSQ DBB. Each pump is capable of delivering 6 - 90 gallons per hour of bulk polymer at a maximum pressure of 20 psig at a maximum pump speed of 700 rpm. The pumps have manual speed adjustment. Each pump is driven by an SCR, variable speed, TEFC, Reliance Electric, 1.0 hp, 1750 rpm, 90V, DC motor. The pumps have side mounted suction and are connected to the driver with a piggyback belt and pulley configuration. Each pump is equipped with double mechanical seal and seal water assembly. Each pump is equipped with isolation ball valves and NPW quick connections on the suction and discharge pipes. Additionally, each pump is provided with a pressure gauge, high/low pressure switch, and a pressure relief valve on the discharge side.

3.8.3.3 Polymer Mixing Tanks

Polymer mixing tanks are provided for diluting bulk polymer (6%) to concentrations of 0.15 to 0.20 percent prior to addition to the belt filter press feed stream.

Based on the above loading and design criteria, the polymer mixing tanks are as follows for the Advanced Primary Treatment Plant (CC-2), the Phase I South Bay IWTP (CC-2 and CC-3), and the Ultimate Facilities:

Plant Module	Number of Tanks	Capacity (ea) gal	Detention Time, min
Advanced Primary Treatment Plant (CC-2)			
· 25/75 MGD PST	2	1,600	123
Phase I South Bay IWTP (CC-2 and CC-3)			
· 25/75 MGD PST and 25 MGD AST	2	1,600	82
Ultimate Facilities			
· 100/200 MGD PST and AST	2	1,600	
	2	3,700	61

The two (2) polymer mixing tanks are manufactured of fiberglass reinforced plastic Derakane 411 with an interior c-veil/chop corrosion resistant barrier fabricated with Derakane 411. The tanks are provided with an open top and with a clamp pad for the mixer. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as overflow pipe and drain pipe, are provided for each tank.

Each tank is 6 ft in diameter with an 8 ft straight shell height with a 1600 gal nominal capacity and is manufactured by Belco Manufacturing Company.

Two (2) portable, top entry clamp mount mixers are provided for the polymer mixing tanks. One mixer for each tank. Each mixer is manufactured by Chemineer, Inc., Model 5 JTC. Each mixer is driven by a constant speed, TEFC, Reliance Electric, 2 hp, 1750 rpm, 230/460 v, 3 phase 60 hz motor.

3.8.3.4 Polymer Feed Pumps

Polymer feed pumps (one for each belt filter press) are provided to deliver polymer at 0.15 percent to 0.20 percent solution to the belt filter presses. The polymer feed pumps are

manifolded in pairs to allow for any of the sister/sister pumps to deliver polymer solution to any of the respective sister/sister belt filter presses.

Each of the polymer feed pumps is a two-stage positive displacement progressive cavity type from Moyno Industrial Products, Model 2L4 SSQ DBB. Each pump is capable of delivering 45 - 900 gallons per hour at a maximum pressure of 20 psig at a maximum pump speed of 780 rpm. Each pump has a manual speed adjustment. Each pump is driven by an SCR, variable speed, TENV, Reliance Electric, 2.0 hp, 1750 rpm, 90V, DC motor. The pumps have side mounted suction and are connected to the driver with a piggyback belt and pulley configuration. Each pump is equipped with a double mechanical seal and NPW seal water assembly. Each pump is equipped with isolation ball valves on the suction and discharge pipes and a NPW quick connection on the discharge pipe. Additionally, each pump is provided with a pressure relief valve, flow switch, and a pressure gauge with isolator on the discharge pipe.

3.8.4 Belt Filter Presses

Sizing and number of the belt filter presses (BFP) for the Advanced Primary Treatment Plant (CC-2), the Phase I South Bay IWTP (CC-2 and CC-3), and the Ultimate Facilities are presented in Section 3.8.1.

Each belt filter press has a 2.2m belt width and is configured with ancillary equipment, including hydraulic system, washwater booster pump and control panel. Each belt filter press is installed over a concrete drainage sump to collect filtrate, washdown water, and spillage.

Each belt filter press is a 2.2m Ashbrook-Simon-Hartley Model 3V Winklepress belt filter press.

The filter belts are manufactured of a monofilament polyester woven mesh joined by a stainless steel clip to form an endless band. The seam is designed to prevent interference with doctor blades or any other belt press equipment.

Each belt filter press is provided with both steering and tensioning assemblies to ensure reliable operations. The belt steering and tensioning assemblies incorporate hydraulic belt adjustments.

Automatic sensing devices are provided to activate the automatic belt steering assembly and assure proper belt alignment in the center of the machine at all times. The sensing devices continuously monitor the position of all the belts at all times allowing the steering roller to make minor belt position adjustments continuously. The belt steering assembly is designed so that all belt position adjustments are performed smoothly without sharp sudden movements of the filter belt or alignment roller. The assembly works by moving one end of the steering roller so that the belt tracking perimeter is smaller on one side of the machine. The belt responds to this change in tracking perimeter and moves to that side of the machine.

Limit switches are provided to detect malfunctioning of the steering assembly. The switches are designed to detect gross misalignment of either belt on either side or shut down all machine functions. Also, two proximity switches are provided to detect a break in either belt.

A manually adjusted belt tensioning assembly is provided. Two (2) pressure gauges at the hydraulic unit are provided to indicate actual belt tension in pounds per linear inch and normal operating limits are indicated on the face of the gauge. The tensioning assembly consists of the hydraulic cylinders, a rack and pinion alignment system and a hydraulic control valve (tension/retract switch). The amount of belt tension is regulated at the pressure relief valve located on the hydraulic power unit.

The polymer conditioned sludge is evenly distributed onto the gravity drain section of the filter belt through an inlet distribution assembly. A series of 7 rows of plows (chicanes) are employed in the gravity drainage section to promote sludge dewatering and to ensure an even distribution of the material across the entire width of the filter belt. A lifting handle is provided so that the chicanes can be easily raised for cleaning.

The wedge dewatering section of the belt filter press gently applies and gradually increases the pressure on the thickened sludge through a wedge shaped tray section onto which the two pressure belts carrying the sludge are gradually connected to form a belt/cake sandwich. The first roller encountered in this section is the “Dandy Roller” which is perforated and has internal scoops to channel captured filtrate away from sludge. The wedge

zone has adjustable thickness capability and is adjustable while the press is operating. Both sides of the zone are sealed with sealing material to contain the sludge within the zone.

The high pressure section consists of smaller diameter rollers which apply shear and compression to the cake by passing the cake sandwiched between two pressure belts between the rollers.

Drainage pans are provided and fully assembled to avoid emitted water from being deposited onto another roller or section.

All rollers (pressure or shear) are coated with a minimum of 30 mil. of nylon. Drive rollers have a Buna-N rubber coating for better belt traction. All rollers are supported with heavy-duty externally mounted, split case, self-aligning roller bearings in a cap sealed, splash proof pillow block housings of 60 mm or 90 mm in size. All bearings are regreasable-type. Grease fittings are extended to the face of the press frame. All bearings are greasable while the belt press is operating.

Tension loaded, scraper blades are provided at the cake discharge end to efficiently remove the cake from the belt at the point of cake discharge. The scraper blades are adjustable and easily replaced. A lifting handle is provided for each scraper mechanism to allow for easy cleaning of the blade while the press is operating.

Each belt filter press is equipped with a 6-inch isolation plug valve on the inlet pipe located near the sludge feed pumps and 8-inch drain pipe from the concrete basin located below the unit.

Each belt filter press wash station consists of two slotted stainless steel boxes containing the wash tube. The wash tube generates an overlapping spray pattern from jet nozzles to blast embedded and surface particles from the belt. The nozzles are designed with a built-in cast aluminum handwheel operated brush to provide cleaning action without disassembly or interruption of operation. The wash station is contained so as to eliminate spray in the work area. The wash box totally encloses the belt and has replaceable neoprene seals where the belt enters and exits the housing. Each wash box is drained individually.

Spray piping and nozzles are adequately braced and of sufficient pressure rating to withstand pressure transients caused by sudden valve closures. The system is capable of handling 1000 mg/l of suspended solids.

Each of the two belts (upper and lower) has a separate drive assembly. Each belt is provided with a variable speed, TEFC, Baldor Electric, 3 hp, 1760 rpm, 3 phase, 460 v, 60 hz motor. Both the upper and lower belt motors are driven from a single variable frequency drive (VFD) located in the SP-LCC.

Each belt motor is provided with a helical bevel gear reducer connected in parallel to one variable motor speed controller. Each reducer is manufactured by Eurodrive Model KA96R62LP, has a reduction ratio of 236:1, and has an output speed of 0 - 7 rpm. The belt speed ranges from 1 - 6 meters/min.

There are four (4) hydraulic units, one for each belt filter press. Each pump is a hydraulic gear pump manufactured by Delta Power Hydraulic Company, Model C-6. Each pump operates at a capacity of 2.5 gpm, maximum pressure of 1500 psig, and a speed of 1720 rpm. An externally mounted motor powers the internal hydraulic pump. Each pump is driven by a constant speed, TEFC, Sterling Electric, 1.5 hp, 1720 rpm, 230/480 v, 3 phase, 60 hz motor. Each hydraulic unit includes a 20 gallon reservoir with externally mounted oil level, temperature and pressure gauges. The hydraulic unit is adjusted by regulating the pressure relief valve on the unit. Hydraulic oil is filtered through the externally mounted return filter and through an internal filter on the suction side of the pump.

There are four (4) washwater booster pumps, one for each belt filter press. Each pump is a centrifugal pump manufactured by Peerless Pumps, Series F, Model F1815. Each pump operates at a constant speed of 3525 rpm with a capacity of 120 gpm at a total dynamic head of 190 feet. Each pump is driven by a constant speed TEFC, Baldor Electric, 15 hp, 3525 rpm, 460 v, 3 phase, 60 hz motor. The motor is connected to the pump shaft by a coupling.

Oriented in each sludge feed line is a 4-inch magnetic flowmeter with a bypass arrangement for positive flow control. The flow meter measures the sludge flow prior to polymer injection. A sludge feed magnetic flowmeter manufactured by Fischer & Porter Co. Model 10DX3111 is provided on the sludge feed discharge line. The meter is a 4-inch flanged tube, teflon PTFE lined, with 316 SS electrodes. The meter is capable of reading and indicating a flow range of 0 to 200 gpm.

Immediately downstream of the sludge flow meter is a polymer injection ring with four (4) 1/2-inch injection ports and a static mixer. The static mixer is a 4-inch, self-cleaning, variable orifice, Venturi-type mixer. The mixing energy may be varied by moving the mixer arm and counterweight.

A one ton hoist is provided on the second floor of the Sludge Dewatering Building for installation/removal of the belt filter press components with the laydown area located at the southeastern corner of the building.

Dewatered sludge is discharged from the belt filter presses onto the belt filter press conveyors. Belt Filter Press (BFP) No. 1 and No. 2 discharges to BFP Conveyor No. 1A, BFP No. 3 and No. 4 to BFP Conveyor No. 2A. BFP Conveyors No. 1A and No. 2A subsequently discharge the cake onto BFP Conveyors No. 1B and No. 2B, respectively. Refer to Section 3.9 for a detailed description of the dewatered sludge conveyance system.

3.8.5 Odor Reduction Station

The objective of the Solids Processing Odor Reduction Station is to remove ammonia (NH₃) and hydrogen sulfide (H₂S) from the following locations:

Process Areas	Type of Containment
Sludge Dewatering Building	Building
Lime Stabilization Facilities	Cover
Truck Loading Building	Building

The Solids Processing Odor Reduction Station consist of odor reduction station (ORS) exhaust fans, two-stage ORS scrubber system, ORS recirculation pumps, ORS chemical feed systems, ORS water softening system, ORS chemical storage tanks, Sludge Dewatering Building and Truck Loading Building ventilation systems.

The heart of the Odor Reduction System is the two stage scrubber arrangement. The first stage removes ammonia odor and the second stage removes hydrogen sulfide odors. Each individual scrubber is a closed vessel in which scrubber solution is continuously re-circulated to the top of the scrubber and distributed over plastic media. The media, or packing, inside the scrubbers provides a significant amount of surface area to facilitate the transfer of odorous compounds into the scrubber solution. Make-up water and fresh chemicals, H₂SO₄ in the case of the first stage, and NaOCl and NaOH in the case of the

second stage, are added to the scrubber solution which displaces spent scrubber solution (blowdown) into an overflow drain. This overflow drain is returned to the headworks.

The Solids Processing Odor Reduction Station Process and Air Flow Schematics are presented in Figures 3.8-3 and 3.8-4 and Figures 3.8-5 and 3.8-6, respectively.

3.8.5.1 Odor Reduction Station Scrubber Exhaust Fans

Three (3) exhaust fans are provided as part of the CC-2 Advanced Primary Treatment Plant. Two exhaust fans, OREF7 and OREF8, one a being standby unit, ventilate the Sludge Dewatering Building. A single exhaust fan OREF9, with no standby unit, ventilates the Truck Loading Building. The Sludge Dewatering Building and Truck Loading Building are ventilated at twelve (12) air changes per hour.

All three fiberglass, belt driven, centrifugal type fans are located adjacent to the ORS scrubber towers. The fans are manufactured by Ceilcote Air Pollution Control, Inc.

Exhaust fans OREF7 and OREF8 are Model Club 4850, each with a 48-inch inside diameter wheel producing 27,253 cfm at static pressure of about 14.1-inches of water at 1192 rpm. Each of the two fans is driven by a constant speed, explosion proof corrosive duty, solid shaft, Reliance, Duty Master, 100 hp, 1785 rpm, 460 v, 3 phase, 60 Hz motor.

Exhaust fan OREF9 is a Model Club 3650 with a 36-inch inside diameter wheel producing 17,684 cfm at a static pressure of about 12.3-inches of water at 1518 rpm. The fan is drive by a constant speed, explosion proof, corrosive duty, solid shaft, Reliance, Duty Master, 60 hp, 1780 rpm, 460 v, 3 phase, 60 Hz motor.

3.8.5.2 Odor Reduction Station Scrubber

Each of the fiberglass counter current odor scrubber towers are manufactured by R.J. Environmental, Inc., and are located just east of the Truck Loading Building. Each 30 ft high tower has a bed of packing which consists of 3 1/2-inch polyethylene Lanpac packing as manufactured by Lantee Products. Above the packing is a manifold with seven 4-inch Teflon fog nozzles manufactured by Bete which distribute scrubber solution over the bed. Above the scrubber solution manifold is a mist eliminator manufactured by Kimre Inc., Model B-GON, to minimize liquid droplets exiting through the discharge of the tower. Above the mist eliminator is an acid distribution header with seven 1-1/2-inch Teflon fog nozzles

manufactured by BETE which is used in the cleaning of the scrubber. The scrubbers are designed to meet the following:

**Advanced Primary Treatment Plant
(CC-2) Project**

	First Stage	Second Stage
Flow rate (cfm)	48,500	48,500
Total residence time (sec)	1.5 to 1.7	1.5 to 1.7
Inlet H ₂ S concentration (ppm)	10	10
Inlet NH ₃ Concentration (ppm)	30	0.3
System efficiency (min)(%)	97	99
Vessel Size:		
Diameter (ft)	12	12
Side Wall Height (ft)	30 (max)	30 (max)

3.8.5.3 Odor Reduction Station Scrubber No. 1 pH Controller

The scrubber solution of the first stage scrubber, Scrubber No. 1, is continuously monitored for pH. The pH analyzer is in a bypass line which runs between the recirculation pump suction and discharge piping. The pH analyzer is a Great Lakes Instruments, Model 692P3F5A7N. The pH probe is a Model 6028P0 with a measurement range of 0.0 to 14.0 pH.

3.8.5.4 Odor Reduction Station Scrubber No. 1 and No. 2 Recirculation Pumps

Scrubber solution is continuously re-circulated by recirculation pumps from the scrubber sump to the distribution manifold. The scrubber solution flows by gravity through the packing media to the sump. For each scrubber, two (2) fiberglass, end suction, centrifugal, frame mounted recirculation pumps are located adjacent to the respective odor reduction scrubber tower. The pumps are manufactured by Fybroc, Model 1500. Each pump has a 6-inch inlet, 4-inch outlet and 9-3/4-inch impeller which provides a design flow of 700 gpm, at 65 ft TDH. The pumps are equipped with T. B. Woods, No. 8 motor-to-pump flexible couplings, Duramatalic ROX double mechanical seals, and seal water flush

connections. Each pump is driven by a constant speed, TEFC, Siemens Model RGZESD, 20 hp, 1800 rpm, 460 v, 3 phase, 60 Hz motor.

3.8.5.5 Odor Reduction Station Scrubber No. 1 Sulfuric Acid (H₂SO₄) Metering Pumps

Two (2) H₂SO₄ double diaphragm, positive displacement type metering pumps are located at the odor reduction station adjacent to the H₂SO₄ storage tank within the containment area. Each is manufactured by PulsaFeeder, Model 680-S-AE, and is capable of delivering 0.3 to 3.0 gallons per hour at a maximum pressure of 45 psig and a maximum stroke speed of 44 strokes per minute. Each pump is driven by a totally enclosed, chemical duty, Baldor, 1 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor. The motor is connected to the pump shaft by a flexible coupling. The output volume of the pump is adjustable over a range of 10:1 with an Elma, 240 v, single phase, 60 Hz electric stroke length actuator. Additionally each pump is provided with a pulsation dampener, pressure relief valve, calibration column, back pressure control valve, and a conductivity sensor for detection of diaphragm leakage. One pump is a standby unit.

3.8.5.6 Odor Reduction Station Scrubber No. 1 H₂SO₄ Storage Tank

The H₂SO₄ tank is located just north of the scrubber towers and west of the sodium hypochlorite storage tank and provides 30 days of storage capacity. The tank is manufactured of cross-linked polyethylene using Marlex CL-200. The tank is provided with a dished head and a ladder for access to the top. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other appurtenances such as overflow pipe and drain pipe are provided. A small scrubber tank of the same material originally intended to capture any chemical fumes passing through the storage tank vent is abandoned in place because sulfuric acid does not vaporize as ambient conditions. This tank is provided with a sightglass. The storage tank and scrubber tank are enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

The storage tank is 5 ft in diameter with a 12 ft straight shell height, and a capacity of 1500 gallons. The scrubber tank is 37-1/2-inches in diameter with a 55-inch straight shell

height and a capacity of 200 gallons. Both the storage tank and scrubber tank are manufactured by the Poly Processing Company.

The H₂SO₄ tank and scrubber are designed for 1.9 specific gravity.

3.8.5.7 Odor Reduction Station Scrubber No. 2 pH and ORP Controllers

The scrubber solution is continuously monitored for pH and ORP. The two separate analyzers are installed in a bypass line which runs between the recirculation pump suction and discharge piping. The pH and ORP analyzers are both Great Lakes Instruments, Model 692P3F5A7N and 692R3F5A7N, respectively. The pH probe is a Model 6028P0 with a measurement range of 0.0 to 14.0 pH. The ORP probe is a Model 2028R0 with a measurement range of -2000 to 2000 mV.

3.8.5.8 Odor Reduction Station Scrubber No. 2 Sodium Hydroxide (NaOH) Metering Pump

Two (2) NaOH double diaphragm, positive displacement type metering pumps are located at the odor reduction station adjacent to the NaOH storage tank within the corresponding containment area. Each is manufactured by PulsaFeeder, Model 680-S-AE, and is capable of delivering 0.3 to 3.0 gallons per hour at a maximum pressure of 45 psig and a maximum stroke speed of 44 strokes per minute. Each pump is driven by a totally enclosed, chemical duty, Baldor, 1 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor. The motor is connected to the pump shaft by a flexible coupling. The output volume of the pump is adjustable over a range of 10:1 with an Elma, 240 v, single phase, 60 Hz electric stroke length actuator. Additionally each pump is provided with a pulsation dampener, pressure relief valve, calibration column, back pressure control valve, and a conductivity sensor for detection of diaphragm leakage. One pump is a standby unit.

3.8.5.9 Odor Reduction Station Scrubber No. 2 Sodium Hypochlorite Metering Pump (NaOCl)

Two (2) NaOCl double diaphragm, positive displacement, type metering pumps are located at the odor reduction station adjacent to the NaOCl storage tank within the corresponding containment area. Each is manufactured by PulsaFeeder, Model 880-S-AE, and is capable of delivery 2.3 to 21.0 gallons per hour at a maximum pressure of 45 psig and

a maximum stroke speed of 58 strokes per minute. Each pump is driven by a totally enclosed, chemical duty, Baldor, 1 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor. The motor is connected to the pump shaft by a flexible coupling. The output volume of the pump is adjustable over a range of 10:1 with an Elma, 240 v, single phase, 60 Hz electric stroke length actuator. Additionally, each pump is provided with a pulsation dampener, pressure relief valve, calibration column, back pressure control valve, and a conductivity sensor for detection of diaphragm leakage. One pump is a standby unit.

3.8.5.10 Odor Reduction Station Scrubber No. 2 NaOH Storage Tank

The NaOH tank is located just southeast of the scrubber tower and provides 30 days of storage capacity. The tank is manufactured of fiberglass reinforced plastic using Derakane 411 resin, with an interior nexus veil corrosion-resistant barrier also fabricated with Derakane 411 resin. The tank is provided with a dished head and a ladder for access to the top. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as pressure relief, overflow pipe, and drain pipe, are provided. The tank is enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

The tank is 5 ft in diameter with a 7 ft straight shell height, 1000 gallons, and is manufactured by Belco Manufacturing Company.

The NaOH tank is designed for 1.53 specific gravity and is provided with 2-inches of polyurethane thermal insulation. Electric heat tracing which provides heating of the tank and operates on 240 VAC and is manufactured by Thermon.

3.8.5.11 Odor Reduction Station Scrubber No. 2 NaOCl Storage Tank

The NaOCl tank is located just northeast of the scrubber tower and due to the natural degradation of the NaOCl solution, provides only 14 days of storage capacity. The tank is manufactured of fiberglass reinforced plastic using Derakane 411 resin, with an interior nexus veil corrosion-resistant barrier also fabricated with Derakane 411 resin. The tank is provided with a dished head and a ladder for access to the top. Fill piping discharges through the top of the tank, with outlet piping at the bottom of the tank. Other required appurtenances, such as pressure relief, overflow pipe, and drain pipe, are provided. The tank

is enclosed in a containment area with chemical resistant coating to provide spill containment in the event of tank failure.

The tank is 8 ft in diameter with a 14 ft-6-inch straight shell height, 5400 gallons, and is manufactured by Belco Manufacturing Company. The NaOCl tank is designed for 1.22 specific gravity.

3.8.5.12 H₂SO₄, NaOH and NaOCl Containment Sump Pumps

To control spills, rainwater, and washwater within the sulfuric acid, sodium hydroxide and sodium hypochlorite containment areas, each area is provided with a sump and one (1) totally enclosed Barnes 3SE1544DS submersible pump with a 1.5 hp, 1750 rpm, 460 v, 3 phase, 60 Hz motor with a double mechanical seal. The simplex sump pump maintains a liquid level in a sump manually.

3.8.5.13 Water Softening System

An automatic water softening system, ion exchange type, is provided to treat make-up water for the scrubbers. The water softener is located just to the northeast of Scrubber No. 1. The water softener is manufactured by Culligan, Model SMP-365/9500, and is capable of producing a maximum flow of 25 gpm and daily capacity of 21,600 gallons. The unit includes two softening ion exchange vessels and a brine tank. The unit is provided with automatic controls to alternate tanks, and regulate the regeneration cycles. The control system operates on 120 v, single phase, 60 Hz electrical current. A calcium analyzer manufactured by Jenco Instruments, Model J3675 is provided to monitor water hardness.

3.8.5.14 Sludge Dewatering Building Air Supply Fans

The Sludge Dewatering Building is ventilated at twelve (12) air changes per hour. Two (2) air supply fans, SF2 and SF3, are provided to supply a positive air flow of fresh air to the first and second floor areas. The fiberglass, in-line, belt driven, axial, air supply fan, Hartzell, Model 35-28EM3, located on the roof on the north end of the Dewatering Building, is 28-inches in diameter and provides 13,695 cfm at a static pressure of 1.0 inches of water and speed of 1954 rpm. Each of the air supply fans is driven by an explosion proof, Reliance, 7-1/2 hp, 1800 rpm, 460 v, 3 phase, 60 Hz motor.

3.8.5.15 Sludge Dewatering Building Exhaust Fans

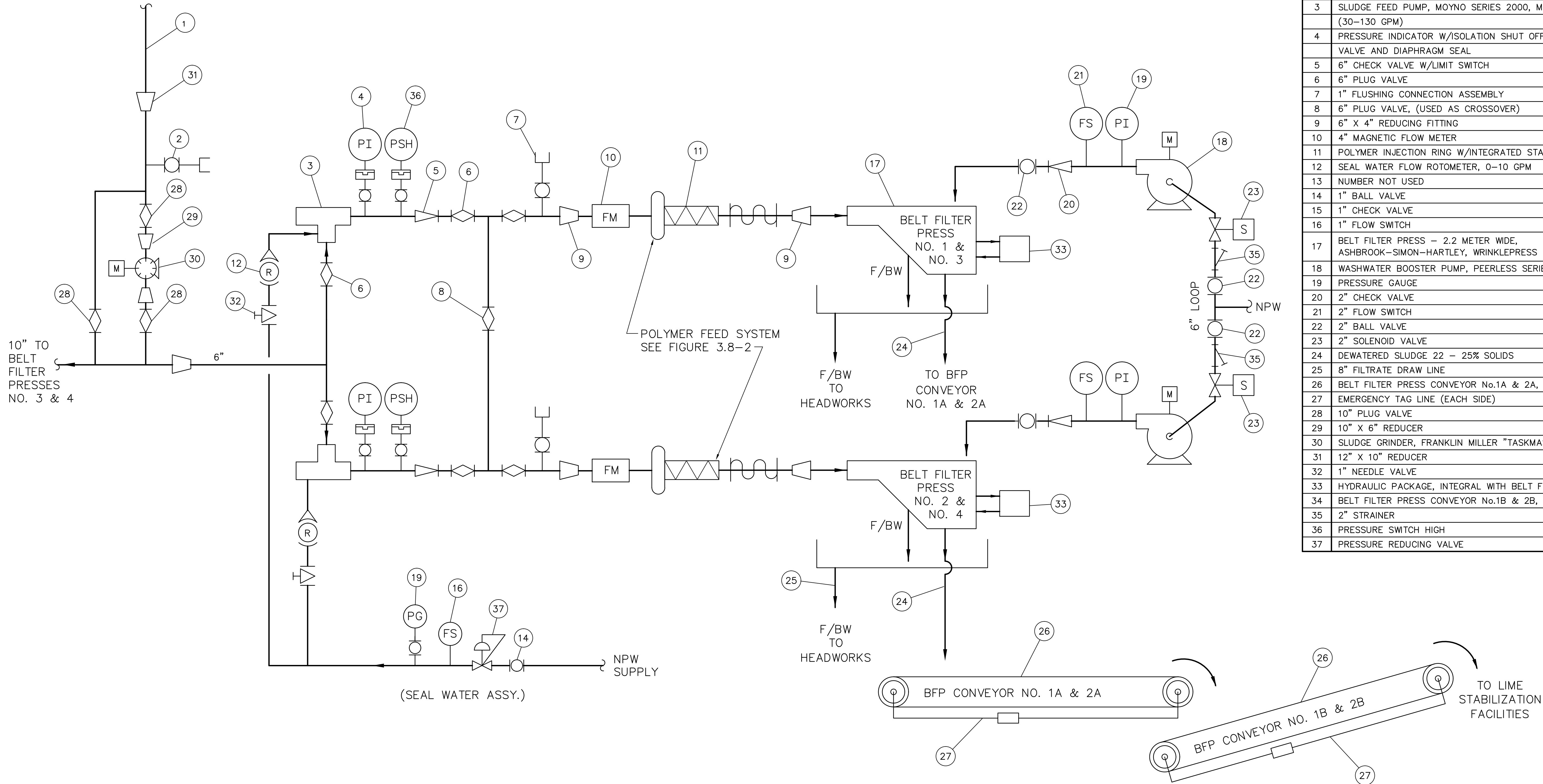
Four (4) exhaust fans, EF4 to EF7, assist in ventilating the Sludge Dewatering Building. The fiberglass, direct drive, axial, panel fans are Hartzell, Model 59-28M64 and are located in the wall on the south end of the building, two on the first level and two on the second level of the building. Each fan propeller is 28-inches in diameter providing about 7600 cfm at a static pressure of 1/8 inches of water and speed of 1170. Each exhaust fan is driven by an explosion proof, Reliance, 3/4 hp, 1140 rpm, 460 v, 3 phase, 60 Hz motor. Fans are equipped with backdraft dampers.

3.8.5.16 Truck Loading Air Supply Fans

The Truck Loading Facilities are ventilated at twelve (12) air changes per hour. Two air supply fans, SF4 and SF5, are provided to supply a positive air flow of fresh air to the truck loading area. The two (2) fiberglass, hooded roof mounted, belt driven, axial air supply fans, Hartzell, Model 58-28 FWK3, are located at the north end of the roof of the Truck Loading Building. Each fan has a 28-inch, propeller and provides 8780 cfm at a static pressure of 1/8-inch and speed of 1050 rpm. Each of the fans is driven by an explosion proof, Reliance, 3.0 hp, 1800 rpm, 460 v, 3 phase, 60 Hz motor.

XREFS: \\TLBUK.dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:1:proj\1991037\Q&M schematics\20M FIG 3.8-1.DWG Scale:1:1 Date:03/18/2011 Time:16:20 Layout:Blank

FROM UNSTABILIZED
SLUDGE STORAGE TANKS



PARTIAL ASSEMBLY SCHEDULE

ITEM	DESCRIPTION
1	12" GLASSLINE DI TRANSFER LINE FROM UNSTABILIZED SLUDGE STORAGE TANKS, TO SLUDGE PROCESSING BUILDING.
2	4" CLEAN OUT ASSEMBLY
3	SLUDGE FEED PUMP, MOYNO SERIES 2000, MODEL 1F036 (30-130 GPM)
4	PRESSURE INDICATOR W/ISOLATION SHUT OFF VALVE AND DIAPHRAGM SEAL
5	6" CHECK VALVE W/LIMIT SWITCH
6	6" PLUG VALVE
7	1" FLUSHING CONNECTION ASSEMBLY
8	6" PLUG VALVE, (USED AS CROSSOVER)
9	6" X 4" REDUCING FITTING
10	4" MAGNETIC FLOW METER
11	POLYMER INJECTION RING W/INTEGRATED STATIC MIXER
12	SEAL WATER FLOW ROTOMETER, 0-10 GPM
13	NUMBER NOT USED
14	1" BALL VALVE
15	1" CHECK VALVE
16	1" FLOW SWITCH
17	BELT FILTER PRESS - 2.2 METER WIDE, ASHBROOK-SIMON-HARTLEY, WRINKLEPRESS
18	WASHWATER BOOSTER PUMP, PEERLESS SERIES F F1815
19	PRESSURE GAUGE
20	2" CHECK VALVE
21	2" FLOW SWITCH
22	2" BALL VALVE
23	2" SOLENOID VALVE
24	DEWATERED SLUDGE 22 - 25% SOLIDS
25	8" FILTRATE DRAW LINE
26	BELT FILTER PRESS CONVEYOR No.1A & 2A, 24" WIDE
27	EMERGENCY TAG LINE (EACH SIDE)
28	10" PLUG VALVE
29	10" X 6" REDUCER
30	SLUDGE GRINDER, FRANKLIN MILLER "TASKMASTER" TM 8516-06
31	12" X 10" REDUCER
32	1" NEEDLE VALVE
33	HYDRAULIC PACKAGE, INTEGRAL WITH BELT FILTER PRESS
34	BELT FILTER PRESS CONVEYOR No.1B & 2B, 24" WIDE
35	2" STRAINER
36	PRESSURE SWITCH HIGH
37	PRESSURE REDUCING VALVE

NOTE: TYPICAL MANAGEMENT OF TWO (SISTER-SISTER) BELT PRESS CONFIGURATION

**MALCOLM
PIRNE**

REVISIONS			
NO.	BY	DATE	REMARKS

DES BP
DWN MP
CKD LDT



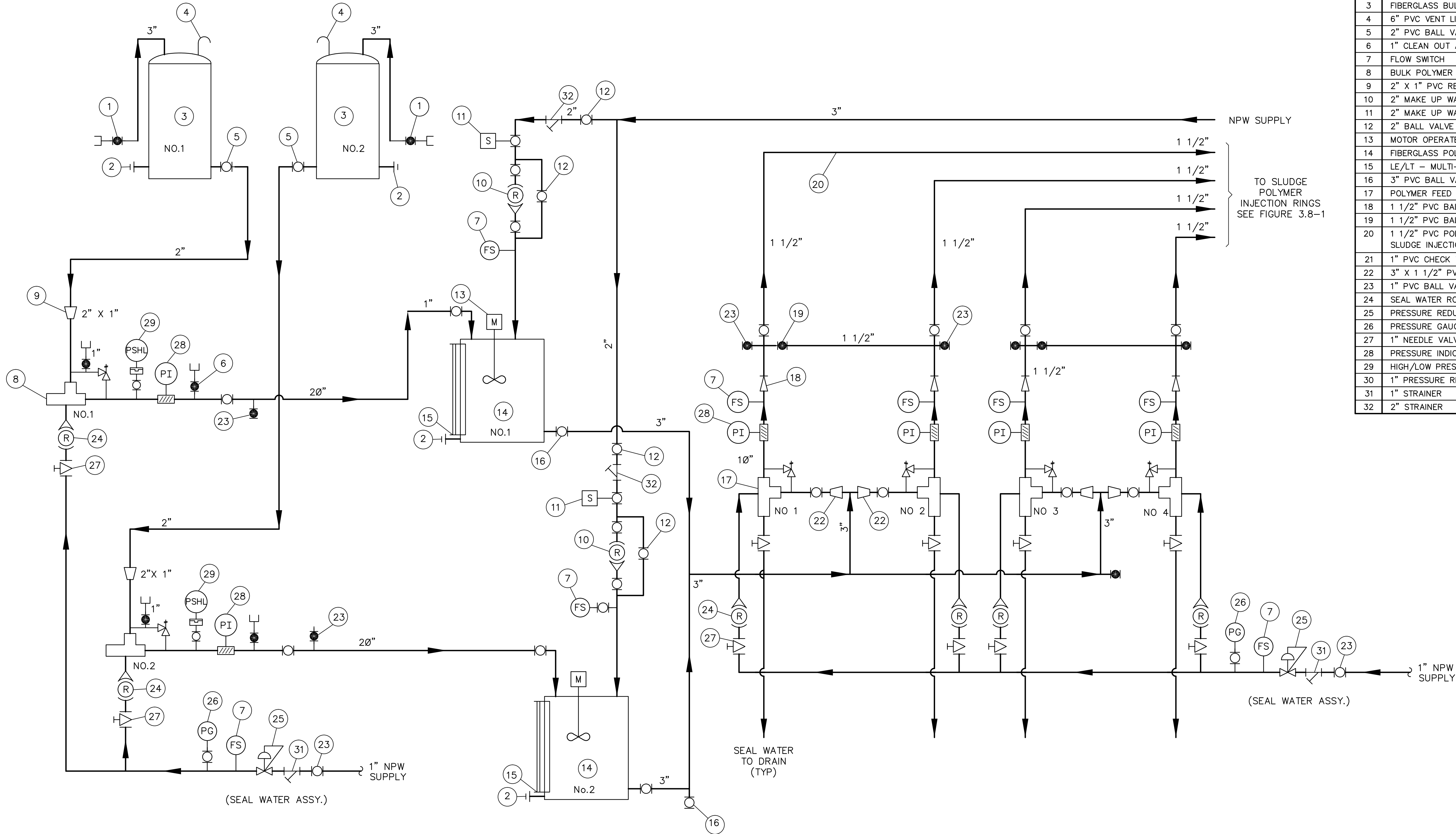
INTERNATIONAL BOUNDARY & WATER COMMISSION
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
South Bay International Wastewater Treatment Plant

**SOLIDS PROCESSING AREA
SLUDGE DEWATERING
PROCESS SCHEMATIC**

NOT TO SCALE

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MALCOLM PIRNIE, INC.
DATE MARCH 2011
FIGURE 3.8-1
CAD REF. NO. 120M FIG 3.8-1

XREFS: \\TLBLK.dwg IMAGES:None
User: LARSON Spec: PIRNIE STANDARD File: \\proj\\1991037\\Q&M schematics\\I2OM FIG 3.8-2.DWG Scale: 1:1 Date: 03/18/2011 Time: 16:26 Layout: Blank



PARTIAL ASSEMBLY SCHEDULE	
ITEM	DESCRIPTION
1	3" PVC FILL LINE ASSEMBLY
2	LE/LT
3	FIBERGLASS BULK POLYMER STORAGE TANK - 12,600 GAL, BELCO
4	6" PVC VENT LINE
5	2" PVC BALL VALVE
6	1" CLEAN OUT ASSEMBLY
7	FLOW SWITCH
8	BULK POLYMER TRANSFER PUMP, MOYNO SERIES L, MODEL 1L3
9	2" X 1" PVC REDUCING BUSHING
10	2" MAKE UP WATER ROTAMETER (0-100 GPM)
11	2" MAKE UP WATER SOLENOID VALVE
12	2" BALL VALVE
13	MOTOR OPERATED MIXER, CHEMINEER, INC.
14	FIBERGLASS POLYMER MIX TANK - 1,600 GAL, BELCO
15	LE/LT - MULTI-SETPOINTS
16	3" PVC BALL VALVE
17	POLYMER FEED PUMP, MOYNO SERIES L, MODEL 2L4
18	1 1/2" PVC BALL CHECK VALVE
19	1 1/2" PVC BALL VALVE
20	1 1/2" PVC POLYMER SOLUTION SUPPLY TO SLUDGE INJECTION RING/MIXER ASSY.
21	1" PVC CHECK VALVE
22	3" X 1 1/2" PVC REDUCING BUSHING
23	1" PVC BALL VALVE
24	SEAL WATER ROTAMETER, 20-160 GPM
25	PRESSURE REDUCING VALVE
26	PRESSURE GAUGE
27	1" NEEDLE VALVE
28	PRESSURE INDICATOR WITH ISOLATOR
29	HIGH/LOW PRESSURE SWITCH WITH ISOLATOR
30	1" PRESSURE RELIEF VALVE
31	1" STRAINER
32	2" STRAINER

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DES BP
DWN MP
CKD LDT



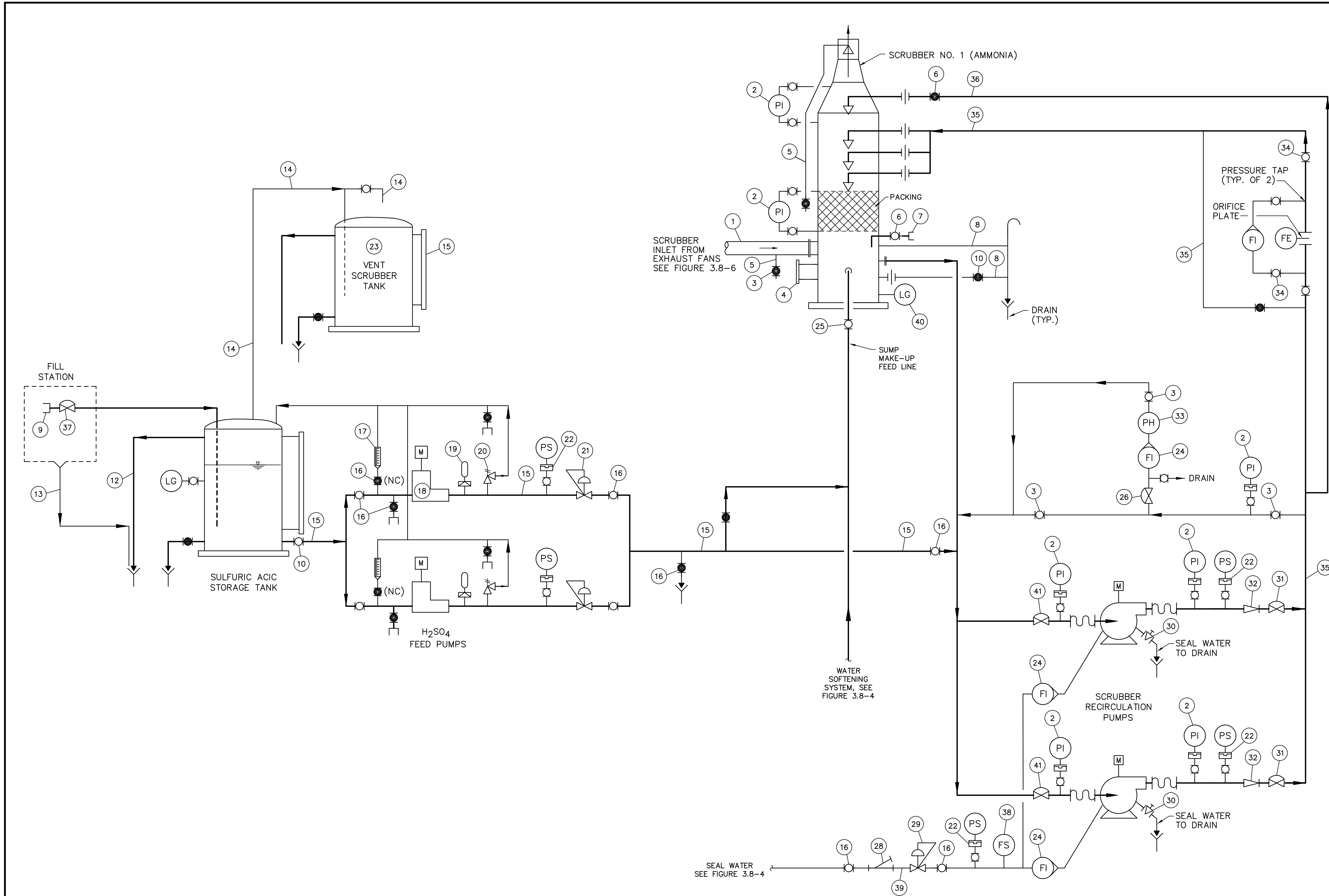
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SOLIDS PROCESSING AREA
POLYMER CONDITIONING
PROCESS SCHEMATIC

NOT TO SCALE

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FIGURE 3.8-2
CAD REF. NO. I2OM FIG 3.8-2

XREFS: \\TLBLK.dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:c:\proj\1991037\Q&M schematics\I2OM FIG 3.8-3.DWG Scale:1:1 Date:03/25/2011 Time:13:19 Layout:Blank



PARTIAL ASSEMBLY SCHEDULE	
ITEM	DESCRIPTION
1	60" FRP DUCT
2	DIFFERENTIAL PRESSURE INDICATOR
3	1" BALL VALVE (CPVC)
4	SITE LEVEL GAUGE
5	1" AIR SAMPLING LINE (CPVC)
6	6" BALL VALVE (CPVC)
7	CHEMICAL FILL CONNECT. W/2" QUICK DISCONNECT (CPVC)
8	2" BLOWDOWN AND SCRUBBER DRAIN PIPING (CPVC)
9	2" QUICK DISCONNECT COUPLING
10	2" BALL VALVE (CPVC)
11	NOT USED
12	3" OVERFLOW (CPVC)
13	1" PANEL DRAIN PIPING (CPVC)
14	3" VENT (CPVC)
15	1/2" H2SO4 PIPE (CPVC)
16	1/2" BALL VALVE (CPVC)
17	CALIBRATION CYLINDER
18	H2SO4 FEED PUMP
19	PULSATION DAMPENER
20	PRESSURE RELIEF VALVE (CPVC)
21	BACKPRESSURE SELF-REGULATING VALVE (CPVC)
22	DIAPHRAGM SEAL WITH SHUTOFF VALVE
23	VENT SCRUBBER TANK
24	FLOW INDICATOR (ROTOMETER)
25	1" BALL VALVE (CPVC)
26	1" DIAPHRAGM VALVE (PVC)
27	NOT USED
28	1/2" PVC STRAINER, 20 MESH
29	1/2" PRESSURE REDUCING VALVE
30	1/2" NEEDLE VALVE (CPVC)
31	6" DIAPHRAGM VALVE (CPVC)
32	6" CHECK VALVE
33	PH ANALYZER AND TRANSMITTER
34	6" BALL VALVE (CPVC)
35	6" RECIRCULATION PUMP DISCHARGE PIPE (CPVC)
36	6" PIPE (CPVC)
37	2" DIAPHRAGM VALVE
38	LOW FLOW SWITCH
39	1/2" NON-POTABLE WATER (PVC)
40	PRESSURE TRANSDUCER
41	8" DIAPHRAGM VALVE (CPVC)

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CKD LDT



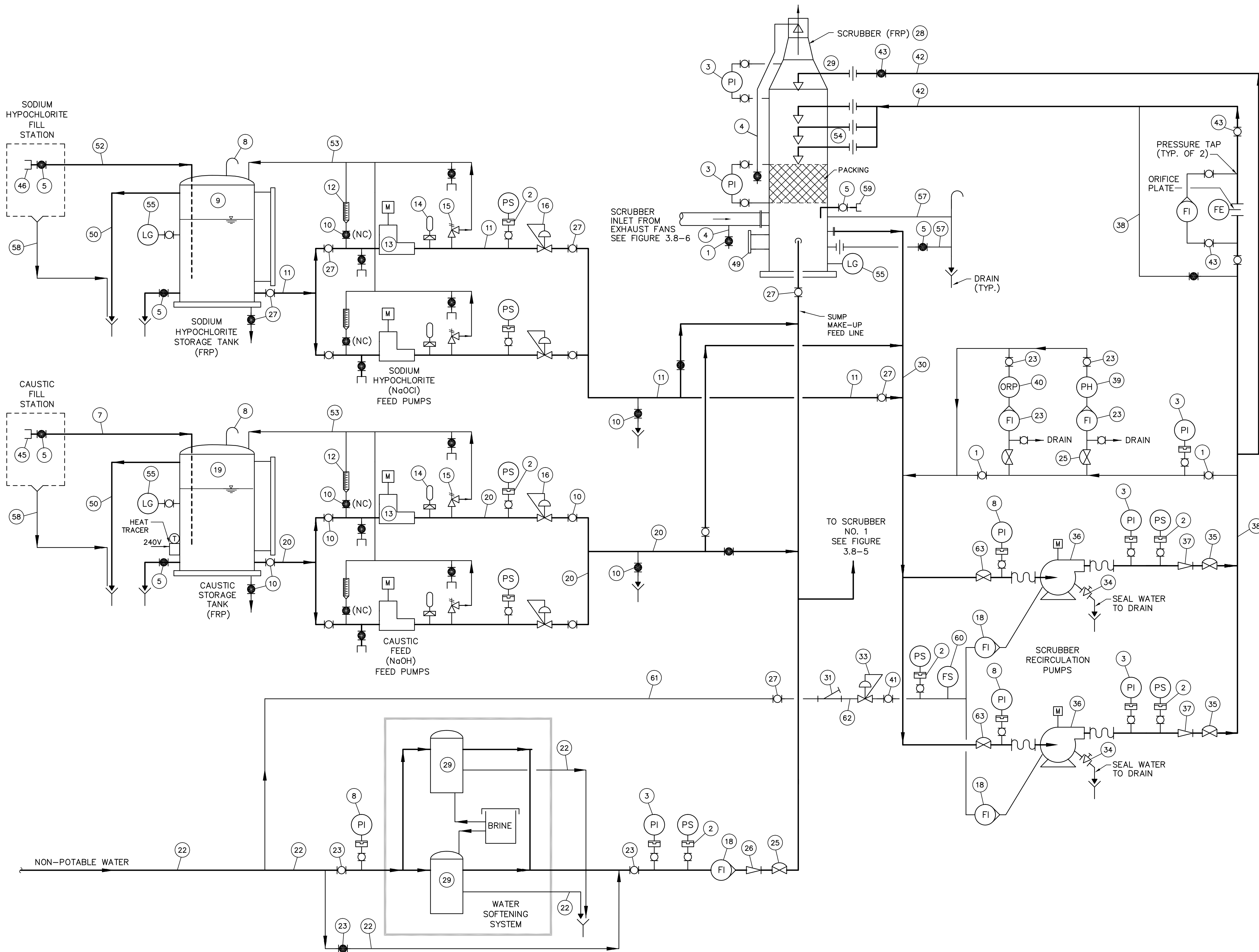
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SOLIDS PROCESSING AREA
ODOR REDUCTION SCRUBBER NO 1
PROCESS SCHEMATIC

NOT TO SCALE

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FIGURE 3.8-3
CAD REF. NO. I2OM FIG 3.8-3

XREFS: \\TLBUK.dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:t:\proj\1991037\3&M schematics\I2OM FIG 3.8-4.DWG Scale:1:1 Date:03/18/2011 Time:16:49 Layout:Blank



PARTIAL ASSEMBLY SCHEDULE	
ITEM	DESCRIPTION
1	1" BALL VALVE (CPVC)
2	DIAPHRAGM SEAL WITH SHUTOFF VALVE (CPVC)
3	DIFFERENTIAL PRESSURE INDICATOR
4	1" AIR SAMPLING LINE (CPVC)
5	2" BALL VALVE (CPVC)
6	NOT USED
7	2" PIPE (CPVC)
8	4" VENT (CPVC)
9	NaOCl STORAGE TANK (FRP)
10	1/2" BALL VALVE (CPVC)
11	1" NaOCl PIPE (CPVC)
12	CALIBRATION CYLINDER
13	NaOCl FEED PUMP
14	PULSATION DAMPENER
15	RELIED VALVE (CPVC)
16	BACKPRESSURE SELF-REGULATING VALVE (CPVC)
17	NOT USED
18	FLOW INDICATOR (ROTOMETER)
19	NaOH STORAGE TANK (FRP)
20	1/2" NaOH PIPE (CPVC)
21	NaOH FEED PUMP
22	1" NON-POTABLE WATER PIPE (PVC)
23	1" BALL VALVE (PVC)
24	WATER SOFTENER
25	1" DIAPHRAGM VALVE (PVC)
26	1" CHECK VALVE (CPVC)
27	1" BALL VALVE
28	SCRUBBER (FRP)
29	ACID CLEANING MANIFOLD
30	8" RECIRCULATION PUMP SUCTION (CPVC)
31	1" PVC STRAINER, 20 MESH
32	1/2" NON-POTABLE WATER PIPE (PVC)
33	1/2" PRESSURE REDUCING VALVE
34	1/2" NEEDLE VALVE (PVC)
35	6" DIAPHRAGM VALVE (CPVC)
36	RECIRCULATION PUMP
37	6" CHECK VALVE
38	6" RECIRCULATION PUMP DISCHARGE PIPE (CPVC)
39	PH ANALYZER AND TRANSMITTER
40	ORP ANALYZER AND TRANSMITTER
41	1/2" BALL VALVE (PVC)
42	6" SCRUBBER SOLUTION FEED PIPE (CPVC)
43	6" BALL VALVE (CPVC)
44	NOT USED
45	2" QUICK DISCONNECT COUPLING
46	4" QUICK DISCONNECT COUPLING
47	NOT USED
48	4" HYPOCHLORITE FILL PIPE (CPVC)
49	SITE LEVEL GAUGE WITH SWITCHES
50	4" OVERFLOW PIPING (CPVC)
51	NOT USED
52	4" PIPE (CPVC)
53	1/2" RELIEF PIPING
54	RECIRCULATION MANIFOLD
55	PRESSURE TRANSDUCER
56	NOT USED
57	2" BLOWDOWN AND SCRUBBER DRAIN PIPING (CPVC)
58	1/2" PANEL DRAIN PIPING (CPVC)
59	ACID FILL CONNECTION - 2" QUICK DISCONNECT (CPVC)
60	LOW FLOW SWITCH
61	1" NON-POTABLE WATER (PVC)
62	1/2" NON-POTABLE WATER
63	8" DIAPHRAGM VALVE (CPVC)

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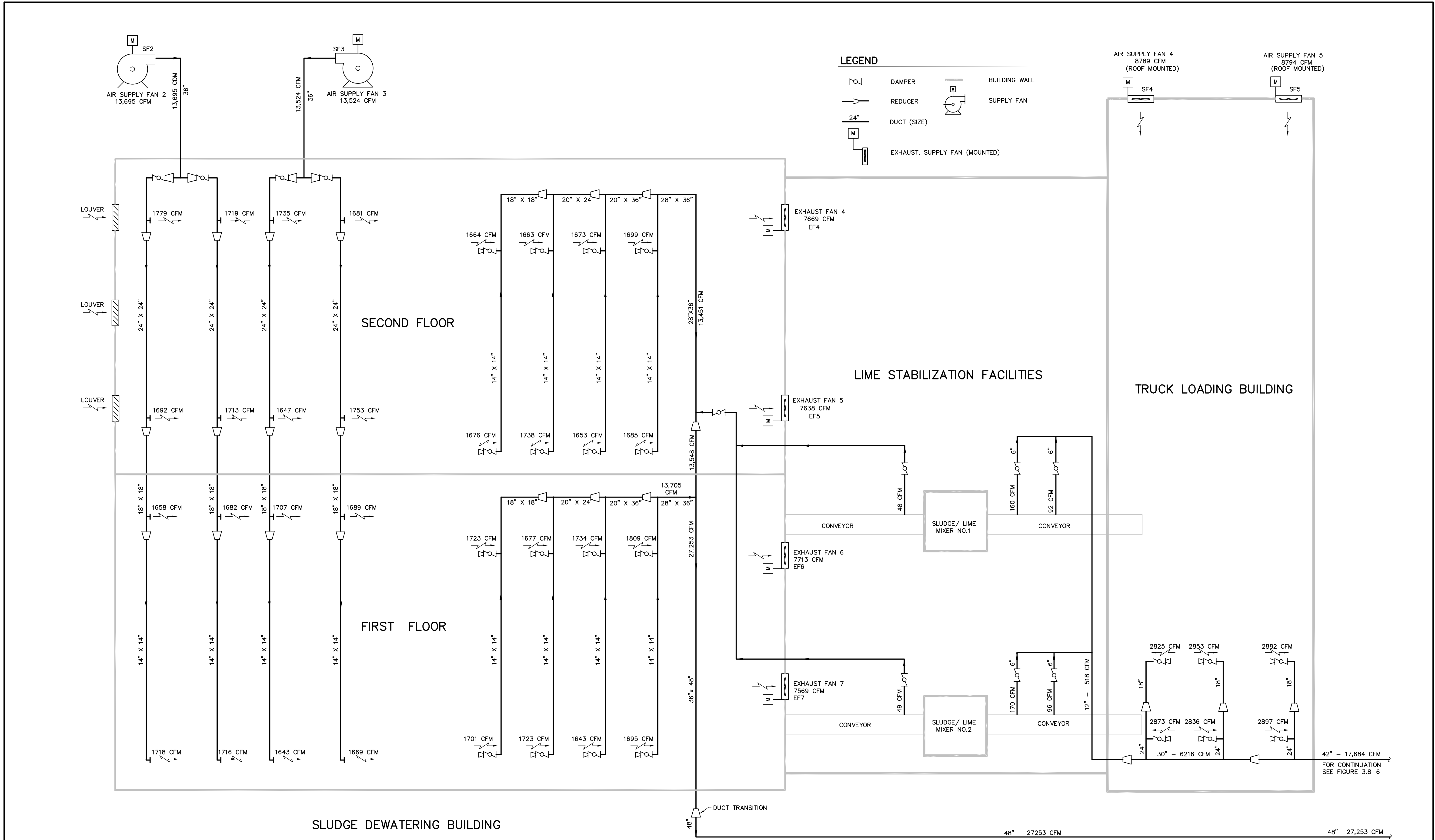
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SOLIDS PROCESSING AREA
ODOR REDUCTION SCRUBBER NO 2
PROCESS SCHEMATIC

NOT TO SCALE

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FIGURE 3.8-4
CAD REF. NO. I2OM FIG 3.8-4

XREFS: \\TLBUK.dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:1991037\0&M schematics\20M FIG 3.8-5.DWG Scale:1:1 Date:03/18/2011 Time:16:58 Layout:Blank



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DES TN/MW/SP
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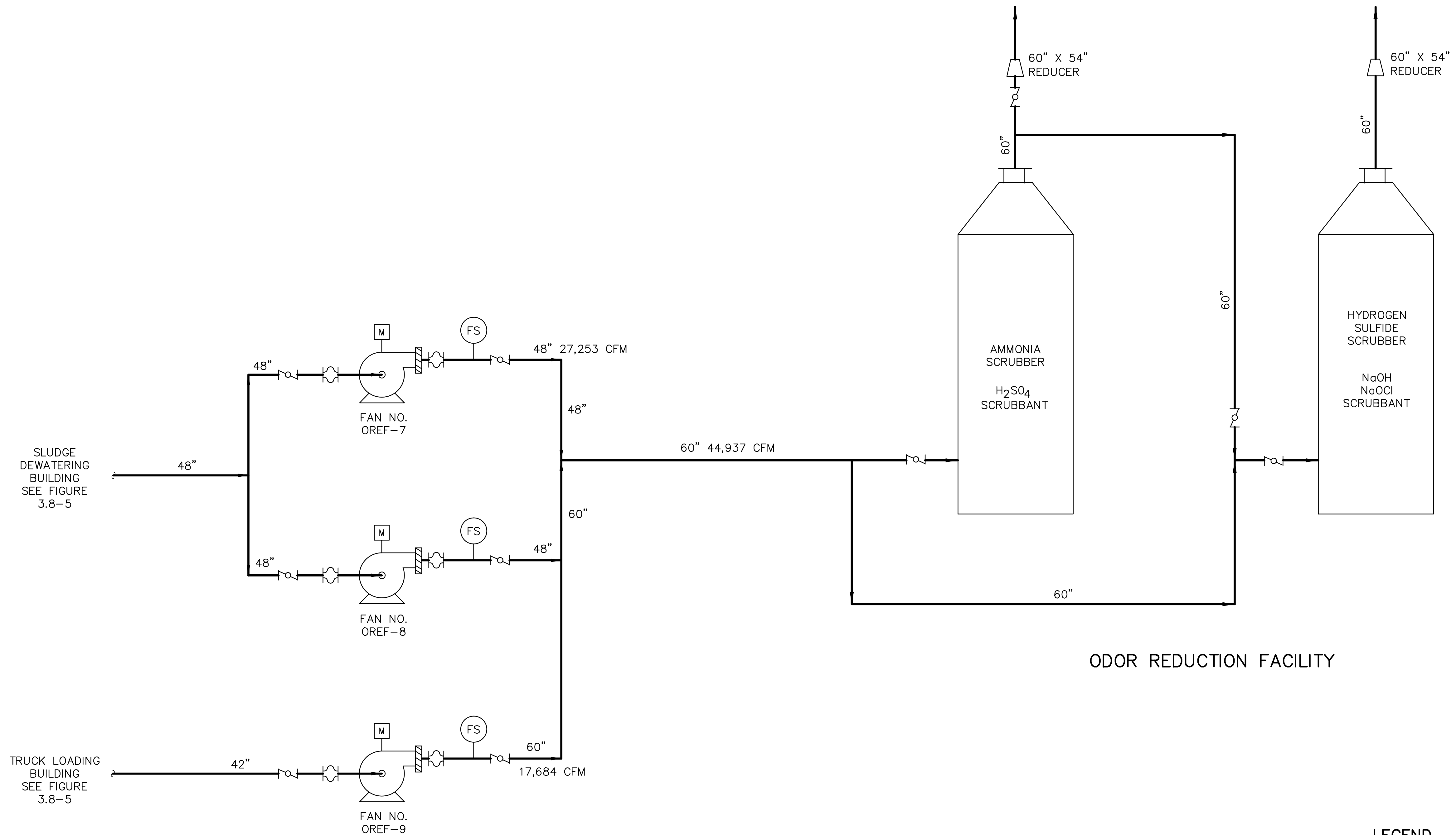


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**SOLIDS PROCESSING AREA
ODOR REDUCTION AIR FLOW
SCHEMATIC 1**
NOT TO SCALE

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FIGURE 3.8-5
CAD REF. NO. I20M FIG 3.8-5

XREFS: \\TLBLK.dwg IMAGES:None User:CARSON Spec:PIRNE STANDARD File:1:1991037\3&M schematics\20M FIG 3.8-6.DWG Scale:1:1 Date:03/18/2011 Time:17:04 Layout:Blank



ODOR REDUCTION
SCRUBBER EXHAUST FANS

ODOR REDUCTION FACILITY

LEGEND

- DAMPER
- EXPANSION JOINT
- REDUCER
- BACKDRAFT DAMPER
- 24" DUCT (SIZE)

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DWN MP
CKD LDT



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SOLIDS PROCESSING AREA
ODOR REDUCTION
AIR FLOW SCHEMATIC 2
NOT TO SCALE

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DATE MARCH 2011
FIGURE 3.8-6
CAD REF. NO. 120M FIG 3.8-6

3.9 SLUDGE CONVEYANCE AND LIME STABILIZATION FACILITIES

3.9.1 General

The Sludge Conveyance and Lime Stabilization Facilities are sized according to the design criteria defined in Section 2.9.3 under the average annual loading conditions defined in Section 1.6. Based on the above loading and design criteria, the Sludge Conveyance and Lime Stabilization Facilities consist of two (2) process modules. Each module includes one (1) belt filter press (BFP) conveyor train, one (1) lime storage silo with dedicated bin activator and a dust control equipment, one (1) volumetric lime feeder, one (1) lime transfer screw conveyor, and one (1) sludge/lime mixer that discharges stabilized sludge onto the dedicated truck loading conveyor.

A process schematic for the Lime Stabilization Facilities is presented in Figure 3.9-1.

3.9.2 Dewatered Sludge Conveyance System

Dewatered sludge is discharged from the belt filter presses onto the BFP conveyors. BFP No. 1 and No. 2 discharge to BFP Conveyor No. 1A, BFP No. 3 and No. 4 to BFP Conveyor No. 2A. BFP Conveyors No. 1A and No. 2A subsequently discharge the cake onto BFP Conveyors No. 1B and No. 2B, respectively. This arrangement allows for additional component reliability because only two BFPs are out of service if any one of the BFP conveyor trains is taken out of service.

Each of BFP Conveyors No. 1B and No. 2B is inclined at approximately 17° and delivers the dewatered sludge to the Lime Stabilization Facilities located east of the Sludge Dewatering Building. BFP Conveyors No. 1A and No. 2A are 87ft 3-inch in length and BFP Conveyors No. 1B and No. 2B are 55 ft 6-inch in length.

The BFP conveyors are manufactured by Taunton Engineering Company, Inc., each having a 24-inch, Scandura No. 74, Type MOR-SC, 2-ply, nylon carcass belt with 1/8-inch by 1/16-inch covers, and a belt capacity of 220 lbs/inch of width. Each conveyor is driven by a TECO, Model No. MAX-E2, 3.0 hp, 1750 rpm, 3 phase, 60 hz, 460 v, TEFC motor. Each pair of BFP Conveyors (Nos. 1A, 1B and Nos. 2A, 2B) is equipped with a common variable frequency drive (VFD).

All conveyors have complete access from both sides, each 30-inch wide, non-skid surface equipped with a handrail and are equipped with two (one for each side) emergency shutdown taglines.

All discharge chutes include 10-inch high sidewall load skirts and removable cover plates along the full length of the BFP conveyors 1A and 2A and the receiving end of 1B and 2B to eliminate splatter. All conveyors are fitted with two counter-weighted scrapers installed in series on the underside of the rollers at the discharge end of the conveyors. The discharge and loading chutes of the sludge conveyance equipment is fabricated from 1/4-inch thick Type 316 stainless steel and extends a minimum of 2 ft beyond the limits of the discharge blade on each side.

Concrete troughs with sloped bottoms and curbs are provided under the portions of BFP conveyors located in the Sludge Dewatering Building to capture washdown water. The troughs are sloped to the drainage trenches. The incline portions of the BFP conveyors located outside the Sludge Dewatering Building are provided with fiberglass reinforced plastic (FRP) drip troughs sloped to the drainage trenches located inside the building and are equipped with the odor control covers.

All conveyor bearings are roller type with a minimum B-10 life of 100,000 hours and have guard coverings to protect operational personnel. All conveyors are provided with Rexnord, 20° troughing impact idlers, catenary idlers, return idlers and side guide idlers with factory sealed bearings.

Each of the BFP Conveyors No. 1B and No. 2B are provided with an air, vapor and dust-tight FRP enclosure equipped with the hinged hatches.

Each BFP Conveyor No. 1A and No. 2A frame is constructed of steel, hot dipped galvanized after fabrication in accordance with ASTM A123. Each BFP Conveyor No. 1B and No. 2B frame is constructed of Type 304 stainless steel.

3.9.3 Lime Storage Facilities

One (1) quicklime storage silo having 90 tons of capacity is provided for each lime stabilization module.

Each quicklime storage silo is a vertical, cylindrical, steel Type ASTM A36, with conical bottom, manufactured by Taunton Engineering Co., Inc. The silos are 12 ft in diameter and have 54 ft straight wall overall height. The conical bottom is provided with a 6 ft diameter vibrating type bin activator manufactured by Metalfab, having a 45° cone with a suspended secondary baffle. The activator is equipped with a Metalfab, Inc., Model No. CD18-5370, 3.0 hp, 1732 rpm, 3 phase, 60 hz, 230/460 v, TENV motor. The discharge flange of the bin activator is supplied with a manually operated 8-inch knife gate valve.

Each lime storage silo is skirted to the foundation, providing an equipment area inside the silo that houses a ventilation fan, lime volumetric feeder, and a lime transfer conveyor.

The ventilation fan in each lime storage silo equipment area is an aluminum panel type fan, manufactured by Hartzell Fan, Inc. model Series No. 02L-24-LF4, having a rated capacity of 1,590 cfm at 3/8-inch static pressure. Each silo ventilation fan is equipped with a Reliance Electric, 3/4 hp, 1140 rpm, 3 phase, 60 hz, 460 v, TEFC motor. Each fan is equipped with a filter box supplied with three (3) UL Class 1 30/30 replaceable filters. The filter media is of high density glass micro fibers laminated to all glass woven mesh backing with an average efficiency of 25 - 30% and an average arrestance of 94 - 96%.

An adjustable, wall-mounted thermostat manufactured by United Electric, Model No. E105-485, having a 25-100°F range is provided in the lime storage silo equipment area to start/stop operation of the ventilation fan when the temperature runs above/below a predetermined setpoint.

Each lime storage silo has a 4-inch diameter, schedule 40, lime fill pipe with one (1) 90° elbow with a 4 ft long sweep radius of the twin back type. The lime fill pipe runs up on top of the silo where it terminates at the 18-inch diameter target (turbulence) box on top of the silo provided to significantly reduce the turbulence of the lime being transferred.

Each lime storage silo is also provided with an individual dust collector located on top of the silo. The dust collector is a shaker type manufactured by Dust Control Equipment,

model UMA250H with 250 square feet total filtration area of polypropylene fabric media. The dust collector is provided with an exhaust fan that has a minimum capacity of 1200 cfm at 6-inch static pressure, equipped with a Reliance Electric 5.0 hp, 1140 rpm, 3 phase, 60 hz, 460 v, TEFC motor. The dust collector is also provided with a shaker assembly equipped with a Reliance Electric 1/4 hp, 1140 rpm, 3 phase, 60 hz, 460 v, TEFC motor.

The Lime Storage Facilities are also provided with one (1) 5-stage, 55 gallon steel tank UL listed vacuum cleaner specially designed for removal of ultrafine dust. The vacuum cleaner is of 95 cfm capacity and has a 1.1 hp, TEFC motor (120V power).

In addition, each lime storage area (north and south) is provided with an emergency eyewash/shower station.

3.9.4 Lime Conveyance Facilities

The lime is discharged from each silo via a dedicated lime volumetric feeder into a dedicated lime transfer screw conveyor.

The volumetric feeder, manufactured by Metalfab Inc., Model DB1-3, is 316 stainless steel construction, double auger design, having a 3-inch feeder size rated for a minimum capacity of 3 cubic feet/per hour and a maximum capacity of 32 cubic feet/per hour. Each volumetric feeder is equipped with a Baldor Electric, Model CD5318, 1.0 hp, 1800 rpm, 1 phase, 60 hz, 240 v, TEFC motor with a variable speed DC drive with SCR controller. The lime inlet port of the feeder includes a 6-inch diameter, full pitch agitator/conditioner screw, and a 3-inch diameter, full pitch metering screw. The volumetric feeder also has an inspection port at the discharge end.

A discharge chute of the volumetric feeder is a 6-inch, Schedule 40, 316 stainless steel pipe, sized to accommodate the various lime feed rates.

Each lime transfer screw conveyor is a 316 stainless steel screw conveyor, manufactured by Taunton Engineering Co., Inc., of standard sectional flight type, having a single flight, with a 9-inch diameter screw. Each conveyor is designed to convey 32 cubic feet per hour of the quicklime at a 30% maximum trough loading, at a speed not to exceed 20 rpm. The conveyor is enclosed in a 9-inch, dust-tight, angle flanged “U” type trough,

fabricated from 1/4-inch 316 stainless steel. The conveyor is equipped with a TECO, Model No. MAX-E2 premium efficiency, 3.0 hp, 1750 rpm, 3 phase, 60 hz, 460 v, TEFC constant speed motor.

Each conveyor has hinged hatch covers and is equipped with two (one for each side) emergency shutdown taglines and an emergency stop pushbutton in the area attached to the discharge joint.

3.9.5 Sludge/Lime Mixing Facilities

Each lime stabilization system is supplied with a sludge/lime mixer to mix the dewatered sludge cake, delivered by the BFP conveyors, with the quicklime, delivered by the lime transfer conveyors. Each sludge/lime mixer, manufactured by Taunton Engineering, Co., Inc., is a twin-screw type enclosed in a dust-tight and odor-tight mixer body. The sludge/lime mixer body, shafts, flight and paddle assemblies, covers, and drive supports are constructed of 316 stainless steel. Each mixer body is 24 ft long and is inclined at approximately 10 inches.

Each sludge/lime mixer includes two (2) 8-inch diameter 316 stainless steel shafts, each with 17.5-inch diameter by 12-inch pitch, 3/8-inch thick by 2.5-inch wide 316 stainless steel, hardened ribbon flights that are 8 ft long. The next 15 ft 4-inch of each shaft is constructed with 3/8-inch thick Ni-Hard paddles at four (4) paddles per 12-inch pitch. The shafts are supported by anti-friction roller bearings. Each sludge/lime mixer is driven by two (2) TECO, Model No. MAX-E2, premium efficiency, 7.5 hp, 1750 rpm, 3 phase, 60 hz, 460 v, TEFC motor. The two motors are provided with a common VFD.

Each mixer has complete access from both sides, each approximately 29-inch wide, with non-skid surface and handrail, and is equipped with two (one for each side) emergency shutdown taglines and an emergency stop pushbutton. The discharge chutes for each sludge/lime mixer is equipped with a rectangular 14-inch by 28-inch knife gate valve of 316 stainless steel construction with a Limitorque electric valve actuator.

3.9.6 Stabilized Sludge Conveyance/Truck Loading System

Each lime stabilization module discharges the stabilized sludge onto a dedicated truck loading conveyor, which delivers the stabilized sludge to the roof of the Truck Loading Building located east of the Lime Stabilization Facilities. Each conveyor is inclined at approximately 17°.

The truck loading conveyors are manufactured by Taunton Engineering Co., Inc., each having a 24-inch, Scandura No. 74, Type MOR-SC, 2 ply, nylon carcass belt with 1/8-inch by 1/16-inch covers, and a belt capacity of 220 lbs/inch of width. Each conveyor is driven by a TECO, Model No. MAX-E2, 3.0 hp, 1750 rpm, 3 phase, 60 hz, 460 v, TEFC motor.

Each conveyor has complete access from both sides, each 29-inch wide, with non-skid surface and handrail. The truck loading conveyors are provided with an air, vapor, and dust-tight FRP enclosure equipped with the hinged hatches. The bottom part of each FRP enclosure acts as a fiberglass drip pan sloped to the drainage connections. Each conveyor is equipped with two (one for each side) emergency shutdown taglines. All discharge chutes include 8-inch high sidewall load skirts and removable cover plates of sufficient length along the conveyor length to eliminate splatter. All conveyors are fitted with two counter-weighted scrapers installed in series on the underside of the rollers at the discharge end of the conveyors. The discharge and loading chutes of the sludge conveyance equipment is fabricated from 1/4-inch thick Type 316 stainless steel and extends a minimum of 2 ft beyond the limits of the discharge blade on each side.

All conveyor bearings are roller type with a minimum B-10 life of 100,000 hours and have guard coverings to protect operational personnel. All conveyors are provided with Rexnord, 20° troughing impact idlers, catenary idlers, return idlers and side guide idlers with factory sealed bearings.

Each truck loading conveyor frame is constructed of Type 304 stainless steel.

The truck loading area is provided with two (2) 80 ft x 10 ft Cast Lever-Pit-Type truck scales. The truck scale capacity is 0 - 160,000 lbs with a sectional capacity of 80,000

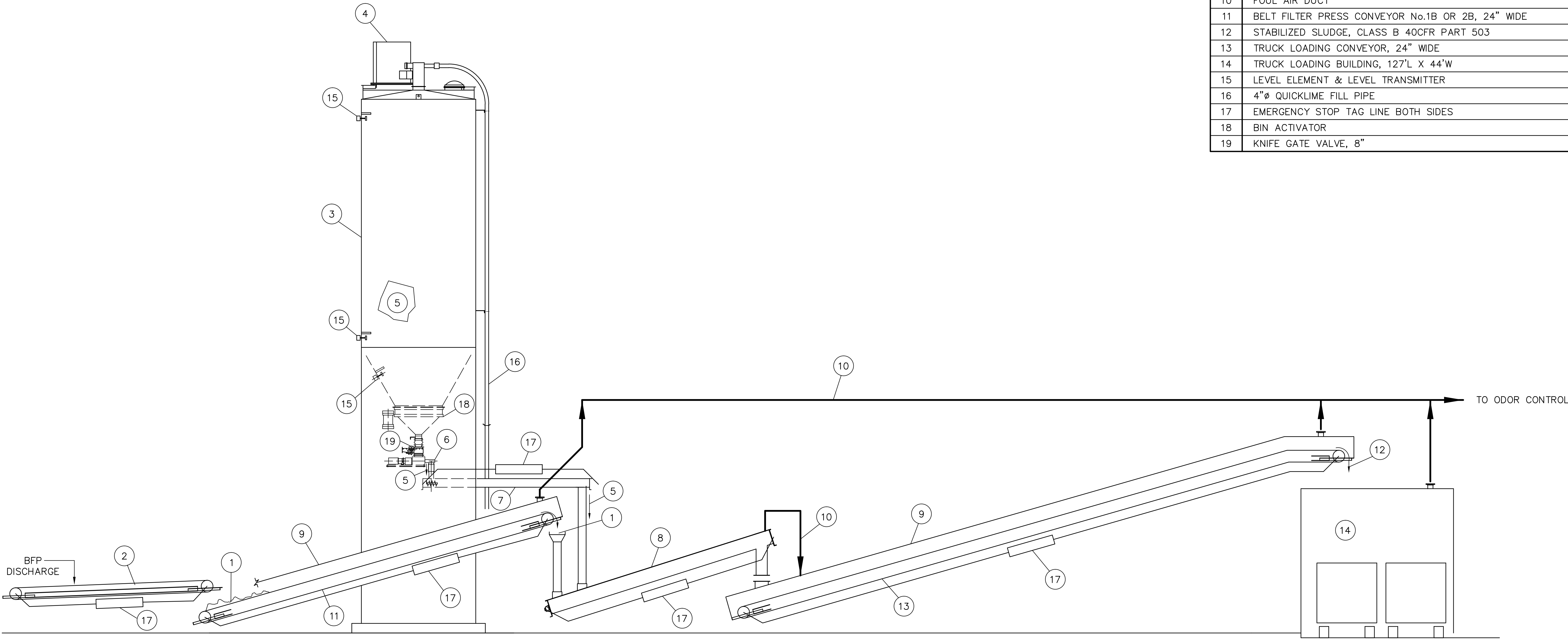
lbs. The scales are Type “S”, 5 section motor truck scales manufactured by Fairbanks Scales, Model 11-3485.

Each scale is equipped with one (1) digital weight transaction instrument manufactured by Fairbanks Scales, Model 90-9201-1 “Datasource” indicator and located in the Solids Processing Local Control Center. Provided with each weight transaction instrument is a dot matrix, impact, bi-directional ticket painter, Fairbanks Scales, Model 50-3925. Additionally, each scale is provided with one (1) remote 4-inch outdoor type display, MATKO, IR Series located at the View Platform in the Truck Loading Building.

Integral to the concrete scale pits are sump drains that provide pit drainage back to the Headworks Area.

PARTIAL ASSEMBLY SCHEDULE

ITEM	DESCRIPTION
1	DEWATERED SLUDGE 22 – 25% SOLIDS
2	BELT FILTER PRESS CONVEYOR No.1A OR 2A, 24” WIDE
3	QUICKLIME STORAGE SILO, 90 TONS
4	DUST COLLECTOR, 244 SF FILTRATION AREA
5	QUICKLIME, 93% CONCENTRATION
6	VOLUMETRIC SCREW FEEDER, 316SS
7	LIME TRANSFER SCREW CONVEYOR, 316SS
8	SLUDGE/LIME MIXER, DBL. SCREW, 316SS 5.8 TONS/HOUR
9	ODOR CONTROL COVER, FRP
10	FOUL AIR DUCT
11	BELT FILTER PRESS CONVEYOR No.1B OR 2B, 24” WIDE
12	STABILIZED SLUDGE, CLASS B 40CFR PART 503
13	TRUCK LOADING CONVEYOR, 24” WIDE
14	TRUCK LOADING BUILDING, 127’L X 44’W
15	LEVEL ELEMENT & LEVEL TRANSMITTER
16	4”Ø QUICKLIME FILL PIPE
17	EMERGENCY STOP TAG LINE BOTH SIDES
18	BIN ACTIVATOR
19	KNIFE GATE VALVE, 8”



TYPICAL MANAGEMENT OF ONE LIME STABILIZATION MODULE

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NO.	BY	DATE		

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SOLIDS PROCESSING AREA
LIME STABILIZATION FACILITIES
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NOT TO SCALE

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DATE MARCH 2011
FIGURE 3.9–1
CAD REF. NO. I20M FIG 3.9–1

3.10 PRIMARY EFFLUENT STRUCTURES

3.10.1 Primary Effluent Channel and Primary Effluent Bypass Structure

As identified in Chapter 2, Section 2.10 the original purpose of the Primary Effluent Structures with only the *Chemically Assisted Advanced Primary Treatment Plant* on line was to collect all flows from the Primary Sedimentation Tanks, to meter this flow, and to direct the primary effluent flow to the flow to the Final Effluent Structures for ultimate disposal to the South Bay land Outfall (SBLO). UNDER NORMAL OPERATION WITH THE *SECONDARY TREATMENT PLANT* ON LINE, ALL PRIMARY EFFLUENT FLOWS UP TO A PEAK FLOW OF 48.74 MGD WILL BE SENT TO THE ACTIVATED SLUDGE SYSTEM AND NO FLOWS WILL BE BY-PASSED.

Fixed overflow weir plates are provided to set the level at which PST effluent overflows into the Primary Effluent Bypass Structure. A downward opening gate is provided to remove any skimmings that may build up in the Primary Effluent Channel. The skimmings flow to the tank drain system via a 12-inch PVC line.

Mixing air is supplied to the primary effluent channel via 96 EnviroQuip diffusers, coarse bubble, Snap Cap Plus 5 Model 750-T-10 to keep solids in suspension. Each diffuser is 3/4-inch with a capacity of 10 cfm.

A primary effluent bypass drain pump is provided outside the Primary Effluent Bypass Structure to pump down the structure and the 66-inch bypass line after an overflow/bypass event. The pump is a self-priming centrifugal pump manufactured by Gorman-Rupp, Model 83A52-B, 3-inch x 3-inch size. The pump has a capacity of approximately 160 gpm at a total dynamic head (TDH) of 30.2 ft and 200 gpm at TDH of 23 ft. The pump is supplied with a 3 hp, 1750 rpm, 3 phase, 60 hz, 460 v, high efficiency, constant speed, TEFC motor manufactured by U. S. Electric Motors.

A primary effluent sampler manufactured by America Sigma, Model 900 MAX with a maximum 27 ft vertical lift, 1 phase, 60 Hz, 115 v, and a 3 gallon sample bottle is provided to sample and store primary effluent samples. The sampler contains a programmable logic controller (PLC), a peristaltic sample pump, and a refrigeration unit.

A schematic for the Primary Effluent Structures is presented in Figure 3.10-1.

3.10.2 Primary Effluent Bypass Metering Structure

One 24-inch magnetic flowmeter and one 48-inch magnetic flowmeter manufactured by Bailey-Fischer & Porter, Series 10D1465 are provided in the Primary Effluent Bypass Metering Structure (PEBMS) for measurement of primary effluent. The meters are a flanged tube type, polyurethane lined, with 316 SS electrodes. They are capable of reading and indicating the following flow rates: 24-inch - 2,150 to 43,300 gpm, 48-inch - 9,300 to 184,900 gpm.

Two 24-inch x 18-inch reducers are installed in the 24-inch line to allow installation of an 18-inch motor operated flow control valve for purposes of controlling the water surface in the Primary Effluent Channel based on data received from the magnetic flowmeter. A similar arrangement is installed on the 48-inch line consisting of one 42-inch motor operated flow control valve and two 48-inch x 42-inch reducers. Two 48-inch knife gate valves and two 24-inch knife gate valves are installed in their respective lines for the purpose of isolating each magnetic flowmeter and the motor operated flow control valve system.

A PEBMS sump pump is provided to automatically drain liquid collected in the PEBMS to the tank drain system. The sump pump is a submersible, duplex pump manufactured by Barnes Pumps, Model 3SE2044. The pump is rated for 120 gpm at 45.4 ft of TDH or at 150 gpm at 28 ft of TDH, and is driven by a 3.7 hp, 1750 rpm, 3 phase, 60 hz, 480 v, constant speed, submersible NEMA 4X motor.

3.10.3 Primary Effluent Bypass Junction Structure

One 66-inch flanged flap gate valve is provided on the outlet of the 66-inch Primary Effluent Bypass Line to prevent primary effluent from entering the 66-inch bypass line and backing up into the Primary Effluent Bypass Structure.

An adjustable skimmer is installed in the Primary Effluent Bypass Junction Structure to remove any skimmings that may build up in the structure. The skimmings drain to the tank drain system.

A chlorination control system and primary chlorination dilution water pump are provided to accomplish chlorination in the Primary Effluent Junction Structure as described in Part 3.5. *This chlorination control system remains but is no longer in service.* The primary chlorination dilution water pump is a self-priming centrifugal pump manufactured by

Gorman-Rupp, Model 88A20-B, size 8-inch x 8-inch rated for 1150 gpm at a TDH of 45 ft. The pump is driven by a 25 hp, 1750 rpm, 3 phase, 60 hz, 460 volt, high efficiency, constant speed, TEFC motor manufactured by U. S. Electric Motors.

The chlorination control system includes a primary effluent residual sample pump, a pH controller system, and an ORP chlorine residual analyzer. The primary effluent residual sample pump is a self-priming centrifugal pump manufactured by Gorman-Rupp, Model 81-1/2 E3-E1, size 1.5-inch x 1.5-inch rated for 50 gpm at a TDH of 55 ft or 69 gpm at a TDH of 40 ft. The pump is driven by a 1.0 hp, 1750 rpm, 60 hz, 480 v, constant speed, TEFC motor manufactured by U. S. Electric Motors.

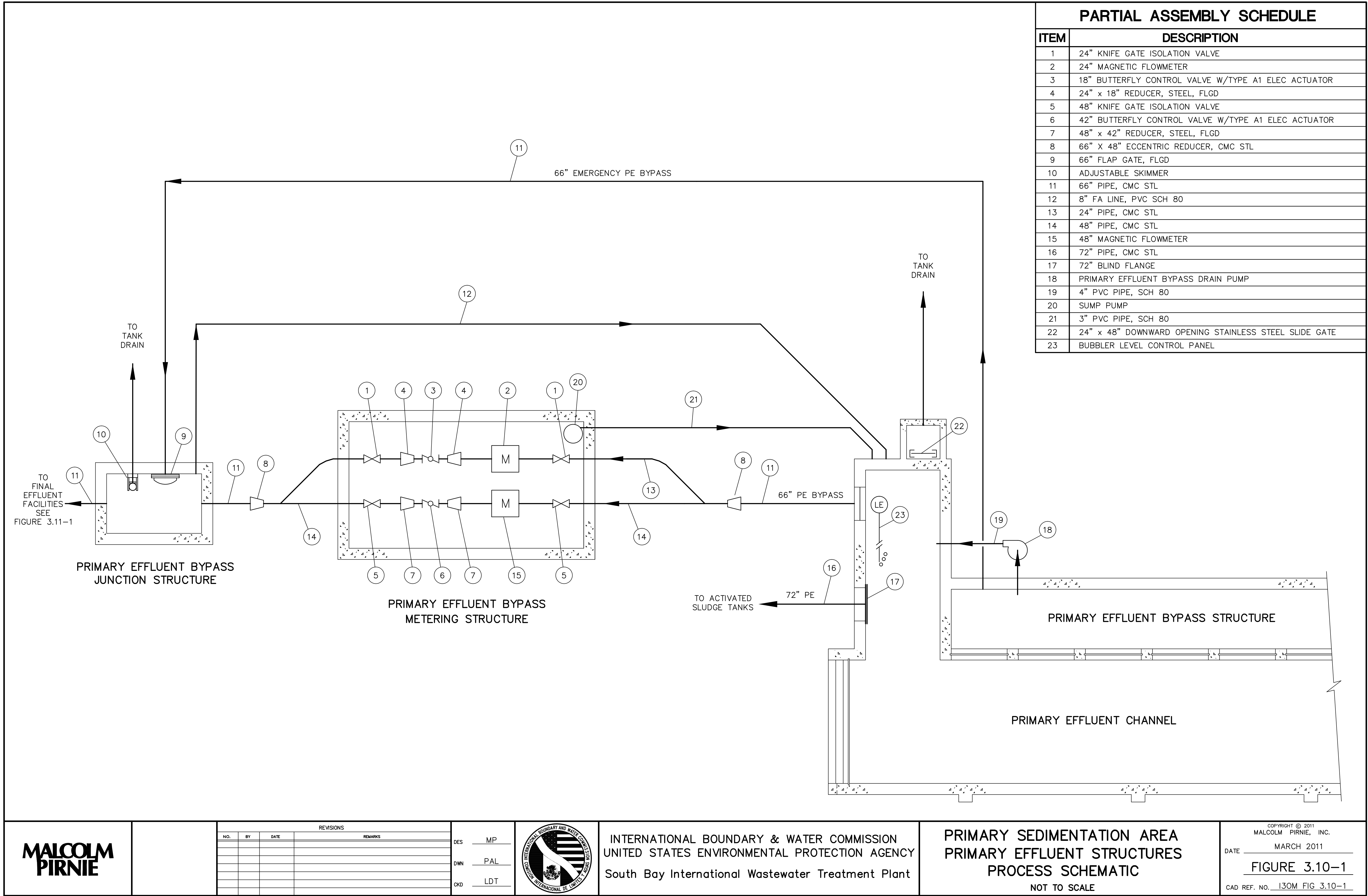
A pH/ORP Probe/Controller/Analyzer assembly is manufactured by GLI International and includes 672P pH Differential Electrode Probe and 672R ORP Differential Electrode Probe.

A schematic of the Chlorination Facilities is shown in Figure 3.10-2.

3.10.4 Primary Effluent Emergency Connection (PEEC)

As identified in Chapter 2, Section 2.10 the primary effluent emergency connection (PEEC) to the PST Primary Effluent Channel was installed to accommodate initial start-up of the original primary treatment portion of the plant. THESE FACILITIES ARE NO LONGER IN SERVICE.

XREFS: \\TLBLK.dwg IMAGES:None User:CARSON Spec:PIRNE STANDARD File:1:130M FIG 3.10-1.DWG Scale:1:1 Date:03/25/2011 Time:13:21 Layout:Blank



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PRIMARY SEDIMENTATION AREA
PRIMARY EFFLUENT STRUCTURES
PROCESS SCHEMATIC
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FIGURE 3.10-1
CAD REF. NO. 130M FIG 3.10-1

3.11 FINAL EFFLUENT STRUCTURES

3.11.1 Effluent Blending Structure (EBS)

Under normal operation, the EBS receives flows from the Secondary Effluent Channel via gravity through an 84-inch secondary effluent line. The EBS is equipped with a 66-inch x 66-inch primary effluent slide gate and an 84-inch x 84-inch secondary effluent slide gate to receive primary and/or secondary effluent flows. The EBS is also equipped with a 96-inch x 96-inch locally-controlled motor-operated slide gates for final effluent (secondary effluent or combined secondary effluent plus primary effluent) discharge to the Effluent Metering Structure (EMS) and ultimately to Effluent Distribution Structure (EDS) prior to discharge to the South Bay Land Outfall (SBLO).

Chlorine Dilution Water Pumps have been added at the EBS to allow plant effluent to be chlorinated prior to discharging to the EMS. Chlorine solution is discharged through a 4" PVC diffuser installed on the floor of the EBS, directly upstream of the 96" x 72" reducer at the opening for the final plant effluent discharge pipe.

A process schematic of the Final Effluent Structures is shown in Figure 3.11-1.

The Chlorine Dilution Water Pumps operate in a duty/standby configuration, and are self-priming centrifugal pumps manufactured by Crown, Model PO3LA-8D, 3-inch x 3-inch size. The pumps are constant speed, each rated for 250 gpm at a TDH of 40 ft. The pumps are driven by 7 ½ hp, 1750 rpm, 3 phase, 60 hz, 460 v, constant speed, TEFC motors, Model No. EM3710T manufactured by Baldor/Reliance.

*The existing de-chlorination feed control system is located at the Effluent Blending Structure but will **not** be used to dechlorinate secondary effluent.*

A schematic for the Primary Effluent Dechlorination Process is shown in Figure 3.11-2.

The primary bisulfite dilution water pump is a self-priming centrifugal pump manufactured by Gorman-Rupp, Model 88A20-B, 8-inch x 8-inch size. The pump is rated

for 1150 gpm at a TDH of 45 ft and 1400 gpm at a TDH of 38 ft. The pump is driven by a 2.8 hp, 1750 rpm, 3 phase, 60 hz, 480 v, constant speed, TEFC motor manufactured by U. S. Electric Motors.

3.11.2 Effluent Metering Structure

A 48-inch magnetic flowmeter manufactured by Bailey-Fischer & Porter, Series 10D1465, 1 phase, 60 Hz, 120 v is provided in the EMS for measurement of plant effluent flow. In order to remove the magnetic flowmeter for maintenance, the EMS can be isolated via a 96-inch x 96-inch slide gate located at the EBS.

The EMS also houses the total plant effluent sampler and the existing de-chlorination control system, and a new total chlorine residual analyzer. The chlorine residual analyzer is a HACH CL17 unit and will provide a chlorine residual signal via SCADA to control the effluent chlorination pumps.

The EMS sump pump is provided to automatically drain liquid collected in the EMS to the EBS. The sump pump is a submersible simplex pump manufactured by Barnes Pumps, Model 3SE1544. The pump is rated for 110 gpm at a 27.0 ft of TDH or for 150 gpm at 24 ft of TDH, and is driven by a 2.8 hp, 1750 rpm, constant speed, 3 phase, 60 hz, 480 v, submersible NEMA 4X motor.

The plant effluent sampler is provided to sample and store plant effluent samples. The sampler contains a programmable logic controller, a peristaltic sample pump and a refrigeration unit. The sampler is manufactured by America Sigma, Inc. Model 900 MAX with a maximum 27.0 ft vertical lift, 1 phase, 60 hz, 115 v, and a 3.0 gallon sample bottle.

3.11.3 Canyon Collector Meter Vault

One 16-inch and one 30-inch magnetic flowmeters manufactured by Bailey-Fischer & Porter, Series 10D1465, 1 phase, 60 Hz, 120 v are provided in the Canyon Collector Meter Vault for measurement of influent wastewater flows from the Hollister Street Pump Station to the tank drain system.

A schematic of the Canyon Collector Meter Vault is shown in Figure 3.11-3.

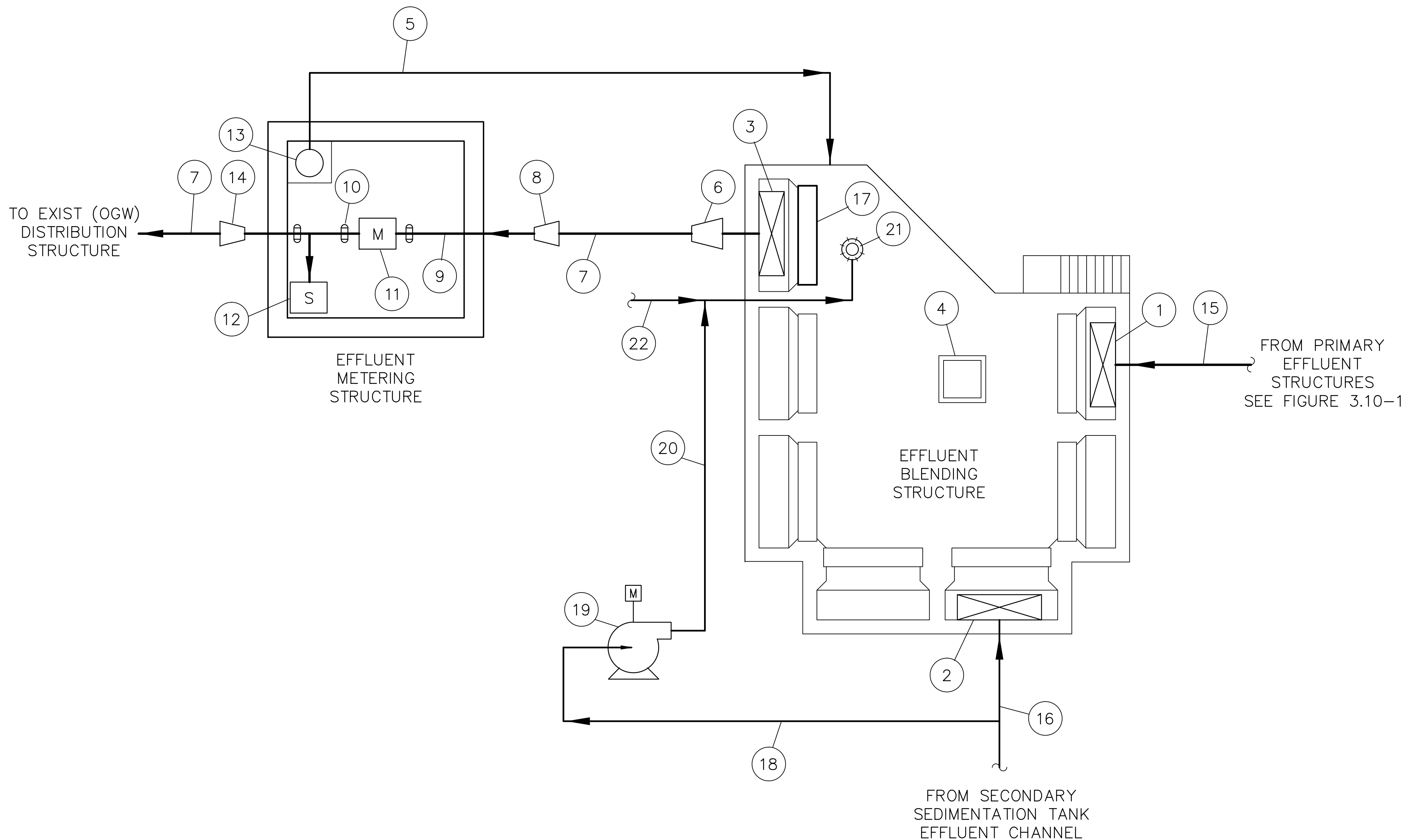
Two buried 16-inch plug valves are installed for purposes of isolating the sewer flows to the tank drain system. A similar arrangement is installed on the 30-inch line consisting of two 30-inch plug valves.

The canyon collector meter vault sump pump is provided to automatically drain the liquid collected in the Canyon Collector Meter Vault to the 16-inch pipeline in the Canyon Collector Meter Vault. The sump pump is a submersible simplex pump, manufactured by Barnes Pumps, Model 3SF1544. This pump is rated for 120 gpm at a 9.0 ft of TDH, and is driven by a 3.7 hp, 1750 rpm, 3 phase, 60 hz, 480 v, constant speed submersible NEMA 4X motor.

3.11.4 Tank Drain/Canyon Collector Structure

The automatic sampler is provided to sample and store samples of the fugitive wastewater flows pumped from the Hollister Street Pump Station. The sampler is located on the top of the Tank Drain/Canyon Collector Structure. The sampler contains a programmable logic controller, a peristaltic sample pump and a refrigeration unit. The sampler is manufactured by America Sigma, Inc. Model 900 MAX with a maximum 27 ft vertical lift, 1 phase, 60 hz, 115 v, and a 3.0 gallon sample bottle.

XREFS: \\TLBLK.dwg IMAGES:None User:CARSON Spec:PIRNE STANDARD File:1:1991037\Q&M schematics\130M FIG 3.11-1.DWG Scale:1:1 Date:03/25/2011 Time:13:27 Layout:Blank



PARTIAL ASSEMBLY SCHEDULE

ITEM	DESCRIPTION
1	66" x 66" 316 SS W/ELECTRIC ACTUATOR SLIDE GATE
2	84" X 84" 316 SS W/ELECTRIC ACTUATOR SLIDE GATE
3	96" X 96" 316 SS W/ELECTRIC ACUTATOR SLIDE GATE
4	48" SQUARE ACCESS HATCH
5	3" PVC SUMP PUMP DISCHARGE
6	96" X 72" ECCENTRIC REDUCER, RCPP
7	72" PLANT EFFLUENT, RCPP
8	72" X 48" ECCENTRIC REDUCER, RCPP
9	48" PLANT EFFLUENT, STL
10	VICTAULIC COUPLING, OR EQUAL (TYP OF 3)
11	48" MAGNETIC FLOW METER
12	REFRIGERATED COMPOSITE SAMPLER
13	SUMP PUMP
14	48" X 72" ECCENTRIC REDUCER, RCPP
15	66" PE BYPASS, RCPP
16	84" SECONDARY EFFLUENT, RCPP
17	96" 316 SS SAFETY GATE
18	4" PVC NON POTABLE WATER
19	CHLORINE DILUTION WATER PUMP (TYP OF 2)
20	4" PVC CHEMICAL DILUTION WATER
21	4" PVC NaOCL DIFFUSER
22	4" PVC NaOCL CONTAINED)

NOTES:

1. SEE FIGURES 3.5-1 AND 3.5-2 FOR CHLORINATION AND DECHORINATION EQUIPMENT.

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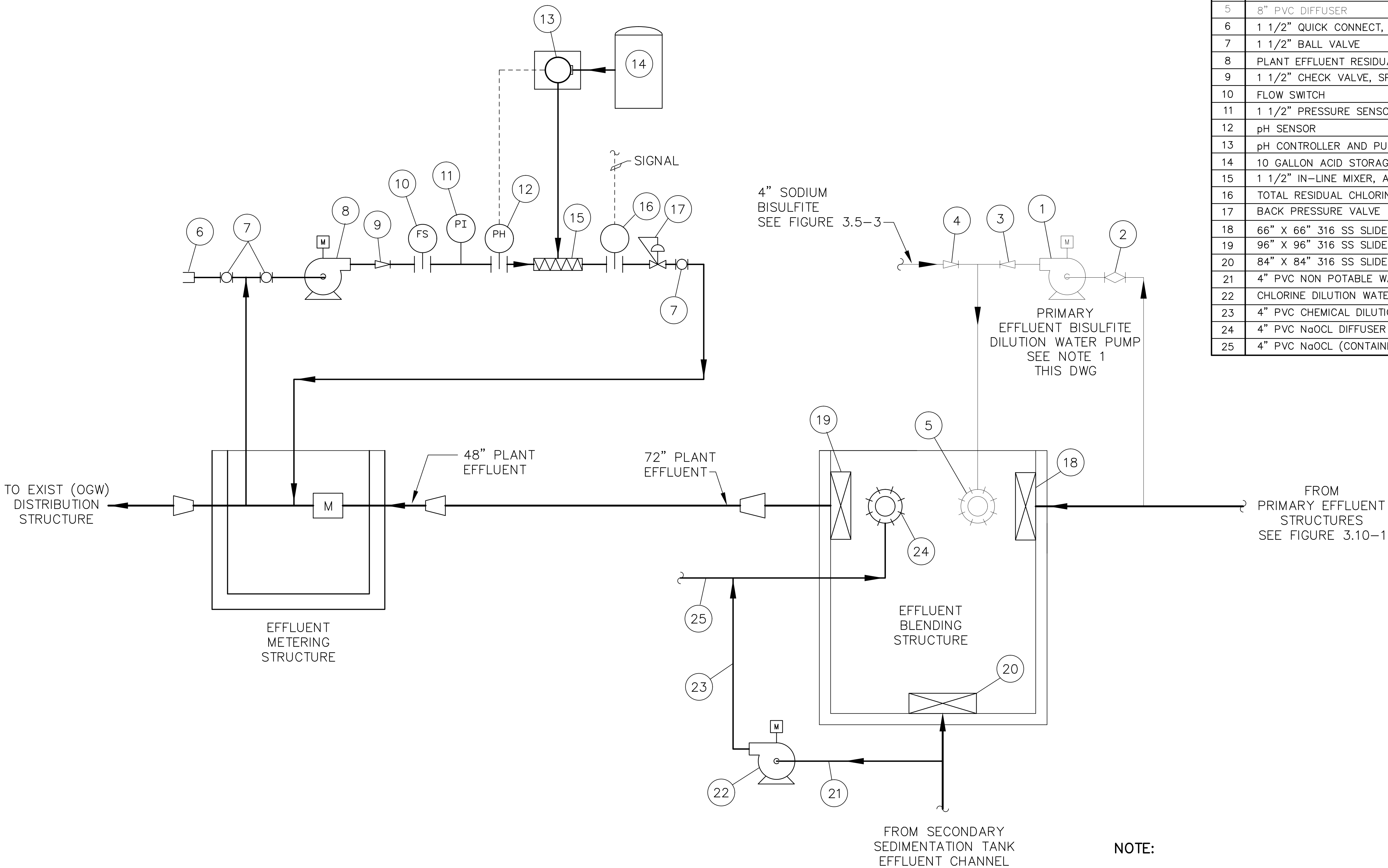
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FINAL EFFLUENT STRUCTURES
PROCESS SCHEMATIC

NOT TO SCALE

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FIGURE 3.11-1
CAD REF. NO. 130M FIG 3.11-1

XREFS: \\TLBLK.dwg IMAGES:None User:CARSON Spec:PIRNE STANDARD File:c:\proj\1991037\3&M schematics\130M FIG 3.11-2.DWG Scale:1:1 Date:03/25/2011 Time:13:44 Layout:Blank



PARTIAL ASSEMBLY SCHEDULE

ITEM	DESCRIPTION
1	PRIMARY EFFLUENT BISULFITE DILUTION WATER PUMP
2	8" PLUG VALVE, FLANGED
3	8" CHECK VALVE, FLANGED W/LIMIT SWITCH
4	4" CHECK VALVE, FLANGED
5	8" PVC DIFFUSER
6	1 1/2" QUICK CONNECT, PVC
7	1 1/2" BALL VALVE
8	PLANT EFFLUENT RESIDUAL SAMPLE PUMP, SELF PRIMING
9	1 1/2" CHECK VALVE, SPRING TYPE
10	FLOW SWITCH
11	1 1/2" PRESSURE SENSOR, 0-30 PSI RED VALVE SERIES 42
12	pH SENSOR
13	pH CONTROLLER AND PUMP
14	10 GALLON ACID STORAGE TANK
15	1 1/2" IN-LINE MIXER, ACID FEED
16	TOTAL RESIDUAL CHLORINE ANALYZER
17	BACK PRESSURE VALVE
18	66" X 66" 316 SS SLIDE GATE W/ELECTRIC ACTUATOR
19	96" X 96" 316 SS SLIDE GATE W/ELECTRIC ACTUATOR
20	84" X 84" 316 SS SLIDE GATE W/ELECTRIC ACTUATOR
21	4" PVC NON POTABLE WATER
22	CHLORINE DILUTION WATER PUMP (TYP OF 2)
23	4" PVC CHEMICAL DILUTION WATER
24	4" PVC NaOCL DIFFUSER
25	4" PVC NaOCL (CONTAINED)

- NOTE:
1. PRIMARY EFFLUENT BISULFITE DILUTION WATER PUMP REMAINS IN PLACE, BUT NO LONGER IN SERVICE.

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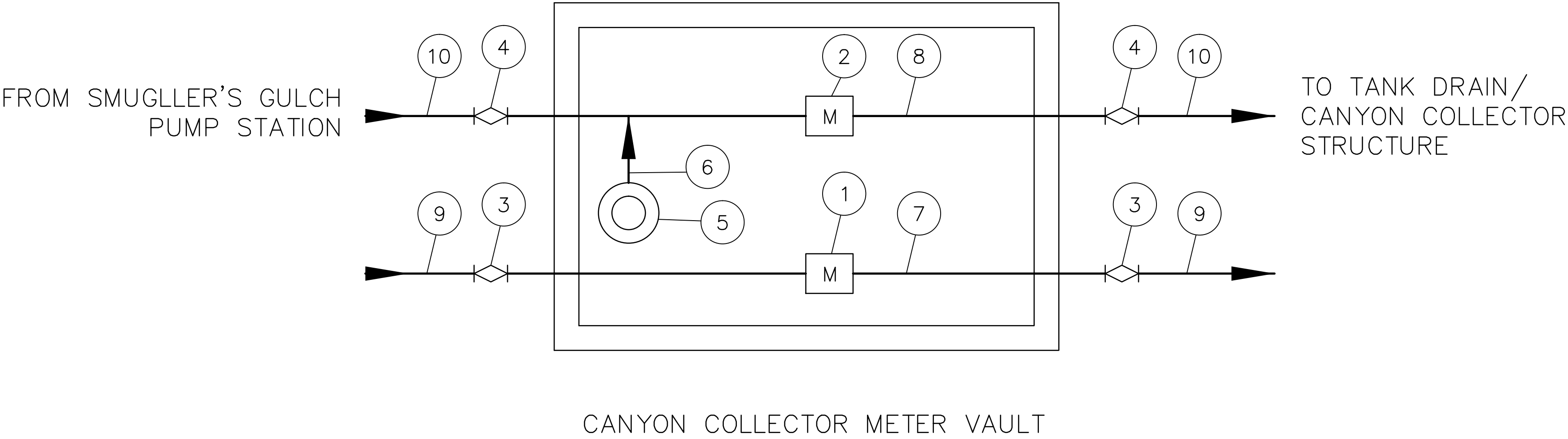
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CHLORINATION FACILITIES
ADVANCED PRIMARY TREATMENT PLANT
(CC-2/CC-2B)
PRIMARY EFFLUENT DECHLORINATION
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FIGURE 3.11-2
CAD REF. NO. 130M FIG 3.11-2

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User:LARSON Spec:PIRNE STANDARD File:c:\proj\1991037\Q&M schematics\2CM FIG 3.11-3.DWG Scale:1:1 Date:03/25/2011 Time:13:11 Layout:Blank

PARTIAL ASSEMBLY SCHEDULE	
ITEM	DESCRIPTION
1	30" MAGNETIC FLOW METER
2	16" MAGNETIC FLOW METER
3	30" PLUG VALVE W/BURIED GEAR OPERATOR
4	16" PLUG VALVE W/BURIED GEAR OPERATOR
5	SUMP PUMP
6	3" PIPE, PVC
7	30" PIPE, DI
8	16" PIPE, DI
9	30" PIPE, PVC
10	16" PIPE, PVC



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**CANYON COLLECTOR METER VAULT
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FIGURE 3.11-3
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3.12 STANDBY POWER GENERATION FACILITIES

3.12.1 Containerized Standby Generators

The two standby generators are each rated for 2000 kW, 2500 kVA, 12 kV when equipped with all accessories and consist of two main parts: the alternator and the diesel engine. Each alternator and engine is housed in a separate mobile ISO container enclosure.

The generator power is distributed to the plant main switchgear MS-1 by generator 12 kV switchgear SG-GDB.

Standby Generator No.1 (G1) engine was manufactured by Caterpillar and the alternator was manufactured by Kato Engineering. Standby Power Generator No.2 (G2) engine was manufactured by MTU Detroit Diesel and the alternator by Marathon Electric. Both alternators operate at a 0.8 power factor and are 3 phase, 4 wire, 60 Hz, 1800 rpm. Each generator set is rated for continuous 24 hour per day operation for the duration of any normal utility outage up to a maximum of 30 days. Each generator is equipped with a 12 kV, 4-pole revolving field brushless type alternator. Standby Generator No.1 includes a Model PMG series pilot exciter and a Model KCR 760 solid state voltage regulator, both manufactured by Kato Engineering; and Standby Generator No.2 includes a DGC-2020 Digital Genset Controller manufactured by Basler Electric, and a DVR 2000E Voltage Regulator manufactured by Marathon Electric.

The G1 generator has a four-stroke cycle, 16-valve engine, Caterpillar Model 3516, 2T. The G2 generator has a four-stroke cycle, 16-valve engine, MTU Detroit Diesel Model 16V4000G43. The engines have sufficient power to produce the specified rating when operating at synchronous speed with all accessories required for normal operation. The engine includes the following systems and accessories: starting system, cooling system, jacket water heater, exhaust silencer, fuel system, electronic governor, and lubrication system.

Each standby generator includes a 24 VDC starting system that consists of the container mounted starting batteries, battery charger and connecting cables between the batteries and engine, and the engine mounted battery charging alternator. Generator G1 batteries are lead acid type manufactured by Caterpillar, Model 8D, Part 9G4231. The battery charger is an automatic 20 amp float charger and is capable of recharging the batteries

to full charge in not more than 6 hours after three crank cycles. The battery charger is manufactured by La Marche, Model A46-20-24V. The battery charging alternator is manufactured by Caterpillar, Model PA2354, and provides 35 amp, 24 VDC to the batteries while the generator is operating. Generator G2 batteries are lead acid type manufactured by MTU Onsite Energy, Model COM-8D, Part No. 71410. A 24V battery charging alternator is provided with the system, and uses a Model NRG 24-20-RCLS 20 amp battery charger, manufactured by SENS, to recharge the batteries while the generator is operating.

The cooling system for each engine consists of cooling fan and a radiator which contains a 50 percent solution of ethylene glycol.

Two (2) jacket water heaters are provided internal to each engine and are thermostatically controlled to keep the jacket water at suitable temperature for trouble-free starting. The heaters are manufactured by Watlow Industries. Each heater is rated at 3 kW and 480 V.

The exhaust system for each Genset consists of a hospital critical silencing muffler which is internal to the ISO container. The silencers are manufactured by Hapco Engine Products, Model 8828CFHI8.

Each Genset has a separate fuel system using No. 2 diesel fuel oil. The systems consist of day tank, return tank, fuel filters, dry element air cleaners, local transfer and return fuel oil pumps and remote bulk diesel fuel storage. The diesel fuel usage at 100 percent load is approximately 133 gallons per hour.

The engine governors are solid state electro-mechanical type and manufactured by Woodward Governor Company, Model 2301A. When a demand is placed on the generator, the governor controls the fuel input to the engine to meet the new demand.

The engine lubrication systems are force fed to all bearings with an engine mounted gear-type pump with oil filters, oil level indicator, and oil temperature and pressure gages.

A schematic of the stand-by power generation facilities is shown in Figure 2.12-3. The Plant Power Block Diagram is shown in Figure 2.12-4.

3.12.2 Diesel Fuel Storage Tanks

Each on-site double-walled 10,000 gallon diesel fuel above-grade storage tank (one per standby generator) will operate the respective standby generator at a fully rated load for

approximately 72 hours. Below-grade supply and return lines run to the generator housing. The G1 storage tank was manufactured by Associated Concrete Products, Model ConVault CVT-10000-3-SPEC.

The G2 storage tank was manufactured by Core Engineered Solutions, Model ConVault UL 2085. Each tank is welded steel within a 6-inch thick reinforced concrete vault. The concrete vault provides two-hour fire protection, and ballistic and vehicle impact protection. The diesel fuel storage tank dimensions are approximately 28 ft 7-inch long by 8 ft wide and have a height of 8 ft 9-inches. Fill piping discharges through the top of the tank. Fuel suction piping to supply the day tank and fuel return piping to return overflow to the storage tank are also through connections at the top of the tank. Other appurtenances, such as a direct reading level gauge, atmospheric vent, emergency pressure relief vent, steel tank failure leak detector, and secondary containment vent are provided with the storage tank. A monitoring and alarm panel FCP-FOST1 manufactured by Warrick is located adjacent to the Standby Generator No. 1 tank for indication of high and low level and tank leakage. A similar monitoring and alarm panel FPP-FOST2 manufactured by Simplex is located at Standby Generator No.2 tank. A 20 gallon spill containment box of welded steel construction is provided for Standby Generator No.1 for ground level filling of the 10,000 gallon storage tank. For the Standby Generator No.2 tank, 7 gallon spill/overflow containment is provided.

3.12.3 Diesel Fuel Transfer Pump Stations

3.12.3.1 Diesel Fuel Transfer Pumps

Two (2) diesel fuel transfer pumps are provided per diesel fuel day tank to pump the diesel fuel from the 10,000 gallon storage tank to the diesel fuel day tank. For the Standby Generator No.1 tank, each of the transfer pumps is a gear-type fuel pump from Oberdorfer, Model 992M. Each pump is capable of delivering 4 gallons per minute at a maximum head of 20 ft. Each pump is driven by a constant speed, TEFC, Marathon Electric, 0.5 hp, 1800 rpm, 3 phase, 60 Hz, 460 v motor. The pumps have 3/8-inch inlet and 3/8-inch outlet piping connections. Each pump is equipped with an isolation ball valve on the suction side and an isolation ball valve and check valve on the discharge side.

For the Standby Generator No.2 tank, each of the diesel fuel transfer pumps is a gear-type fuel pump from Haight Pump, Model 5UR. Each pump is capable of delivering 4 gallons per minute at a rated head of 10 feet of water. Each pump is driven by a constant speed, TEFC, Leeson, 0.33 hp, 1800 rpm, 3 phase, 60 hz, 460 v motor. The pumps have 3/8-inch inlet and 3/8-inch outlet piping connections. Each pump is equipped with an isolation ball valve on the suction side and an isolation ball valve and check valve on the discharge side.

3.12.3.2 Diesel Fuel Day Tanks

A 300 gallon double-walled diesel fuel day tank is provided for each standby generator located on the generator container access platforms. The diesel fuel day tank 300 gallon capacity is approximately twice the hourly fuel consumption of the generator at rated load.

The diesel fuel day tank is manufactured by Pryco, Model PY300ULDW for Standby Generator No.1. The day tank is an epoxy lined steel tank, approximately 34 inches wide by 72 inches deep and 60 inches high.

For Standby Generator No.2, the diesel fuel day tank is approximately 34 inches wide by 78 inches deep and 73 inches high and is provided by Simplex, Model SRS300. The day tank provided is lined with a corrosion inhibitor by Nox-Rust, painted on the outside.

For both diesel fuel day tanks, the fuel supply piping to the generator, fuel return piping from the generator, and fuel supply piping from the 10,000 gallon storage tank are through connections on the top of the tank. Other appurtenances, such as level gauge, float switch, high and low level switches, tank leak detection switch, manual fill opening, atmospheric vent for tank and for double wall tank, emergency relief for tank and for double wall tank, and tank drain and overflow for tank and double wall tank are provided with the day tank. A tank leakage monitoring and alarm panel FCP-DT1 is located on grade adjacent to the Mobile Standby Generator No.1 platform for indication of high and low levels and tank leakage. A tank leakage monitoring and alarm panel FCP-DT2 is provided mounted on Standby Generator No.2's diesel fuel day tank.

3.12.3.3 Diesel Fuel Overflow Tanks

A 25 gallon double-walled diesel fuel overflow tank is provided for each diesel fuel tank and is located on grade at the generator containers. The overflow tank collects diesel fuel overflow from the diesel fuel day tank.

For Standby Generator No.1, the diesel fuel overflow tank is manufactured by Pryco, Model PY25LD. The overflow tank is an epoxy lined steel tank, 30 inches wide by 18 inches deep and 36 inches high.

For Standby Generator No.2, the diesel fuel overflow tank is manufactured by Simplex, Inc, Model SST-25. The overflow tank is 12 gauge steel lined with a corrosion inhibitor by Nox-Rust, and is 12-inches wide by 24-inches deep and 38 ½-inches high.

The return piping from the day tank and piping to the return pump suction are through connections at the top of the tank. Other appurtenances, such as level gauge, float switch, high and low level switches, tank leak detection switch, atmospheric vent for tank and for double wall tank, emergency pressure relief vent for tank and double wall tank, and tank drain for tank and for double wall tank are provided with the overflow tank.

3.12.3.4 Diesel Fuel Return Pumps

One (1) diesel fuel return (overflow) pump and 25 gallon tank is provided for each generator to deliver the overflow diesel fuel from each of the 300 gallon day tanks to each of the 10,000 gallon diesel fuel storage tanks.

For Standby Generator No.1, the return pump is a gear-type fuel pump from Oberdorfer, Model 3000R. The pump is capable of delivering 7 gallons per minute at a maximum head of 20 ft. The pump is driven by a constant speed, TEFC, Marathon Electric, 0.5 hp, 1800 rpm, 3 phase, 60 Hz, 460 VAC motor. The pump has 3/8-inch inlet and 3/8-inch outlet connections. The pump is equipped with an isolation ball valve on the suction side and an isolation ball valve and check valve on the discharge side.

For Standby Generator No.2, the return pump is a gear-type fuel pump from Haight Pumps, Model 8U. The pump is driven by a constant speed, TEFC, Leeson, 0.5 hp, 1800 rpm, 3 phase, 60 hz, 460 VAC motor. The pump has 3/8-inch inlet and 3/8-inch outlet connections. The pump is equipped with an isolation ball valve on the suction side and an isolation ball valve and check valve on the discharge side.

3.12.4 Fuel Oil System Control Panels

3.12.4.1 Generator No. 1 Fuel Oil Control Panel

The fuel oil system control panel for Standby Generator No. 1 is LCP-FOSI, wall mounted in the Generator Control Building LCC-GEN. The panel contains motor starters, reset buttons, hand-off-automatic switches and on/off indicating lights for the transfer and return pumps. An annunciator alarms motor overloads and 10,000 gallon storage tank low and high levels.

3.12.4.2 Generator No. 2 Fuel Oil Control Panel

The fuel oil system control panels for Standby Generator No. 2 are located as follows:

Panel for Transfer Pumps: On the 300 gallon day tank

Panel for Return Pump: On the 25 gallon return tank

The control panel for the transfer pumps includes reset buttons, hand-off-automatic switches, and on/off indicating lights for both transfer pumps and return pump.

The control panel for the return pump includes a motor starter and a local-off-remote switch.

3.12.5 12 kV Generator Switchgear SG-GDB

3.12.5.1 Generator Breakers VCB-G1, VCB-G2

The generator outputs are connected to the SG-GDB bus via circuit breakers VCB-G1 and VCB-G2 which are vacuum type, drawout, 1200 A frame type manufactured by Eaton Corp.

3.12.5.2 Standby Power Tie Breakers VCB-AGT, VCB-BGT

Power from the generator switchgear SG-GBD bus is fed to the plant main switchgear MS-1 via circuit breaker AGT or BGT which are vacuum type, drawout, 1200 A frame type manufactured by Eaton Corp.

3.12.5.3 Generator Paralleling Control Panels

Generators G1 and G2 will normally be online and run in parallel. The control panels for the generators are LCP-G1, LCP-G2 and the generator main control panel MCP located in the GEN-LCC.

3.13 COLLECTION AND CONVEYANCE FACILITIES

3.13.1 Diversion Structures

Five diversion structures, one each at Goat Canyon, Smuggler's Gulch, Canyon del Sol, Silva's Drain, and Stewart's Drain, are provided as part of the Collection and Conveyance Facilities.

Each of the diversion structures consist of a concrete approach apron, a dual-compartment concrete diversion intake box with a side inlet weir, a 12-inch diameter PVC perforated underdrain (PUD) to direct low flows to the diversion box, and a storm overflow weir across the main portion of the drainage channel.

Wastewater flows across the border and onto the concrete apron approach. In dry weather, flows are prevented from continuing downstream by a concrete storm overflow weir. A perforated underdrain is provided to capture the flow and convey it by gravity to the diversion box. During wet weather, or otherwise high flow conditions, rising flow will enter the diversion box via an inlet weir window. Wastewater flows over the inlet weir into the first chamber of the diversion box, where heavy sand and grit is trapped, and through a flared, 90-degree elbow to the second chamber. Wastewater exits the second chamber and is conveyed downstream by a PVC gravity sewer. A typical flow schematic is included as Figure 1.3-4.

At Canyon del Sol and Silva's Drain, wet weather flow exiting the diversion structures is regulated via a vortex valve, based on depth of liquid over the valve.

Table 3.13-1 summarizes the key hydraulic design parameters of the diversion structures.

TABLE 3.13-1
SOUTH BAY INTERNATIONAL WASTEWATER TREATMENT PLANT
CONVEYANCE AND COLLECTION FACILITIES

DIVERSION STRUCTURE DESIGN PARAMETERS

Diversion Structure	Fugitive Flow Facilities				100 Year Flood			
	Side Inlet Weir				Length (ft)	Weir Crest Elevation	Depth Over Weir @ Pk	Water Elev. Over Weir
	Length (ft)	Weir Elevation	Depth @Pk	Water Elevation				
Goat Canyon	10'-0"	84.48	0.52	85.00	110.8	85.00	2.43	87.43
Smuggler's Gulch	20'-0"	72.48	0.52	73.00	66.25	73.00	4.25	77.25
Canyon Del Sol	5.0	132.67	0.33	133.00	30.0	133.00	2.55	135.55
Silva's Drain	5.0	99.79	0.21	100.00	20.0	100.00	2.52	102.52
Stewart's Drain	10.0	41.12	0.38	41.50	70.8	41.50	0.57	42.07

3.13.2 Conveyance Pipelines

The conveyance pipelines are shown schematically in Figure 1.3-1 and the location of the conveyance pipelines for sewage flows from Mexico are shown in Figure 1.3-3.

3.13.2.1 Gravity Piping

Tijuana Pump Plant No.1 (TPP) Junction Structure, located in Mexico adjacent to the U.S.-Mexico border, receives wastewater by gravity from the Tijuana collection system via 72-inch International Interceptor. Junction Box No. 1 (JB No.1), which is located in the U.S., receives flow from the TPP Junction Structure via a 72-inch sewer. JB No.1 receives additional wastewater by gravity from the Stewart's Drain Diversion Structure through an 18-inch sewer. JB No.1 diverts the combined wastewater through a 96-inch influent line by gravity to the plant Headworks via Junction Box No.2 (JB No.2). Flowrate out of JB No. 1 is regulated by way of a manually controlled motor-operated 96-inch sluice gate. JB No.2

receives additional wastewater by gravity from Silva's Drain and Canyon del Sol through a 20-inch sewer along Monument Road. An isolation plug valve is located on the 20-inch line at the intersection of Monument Road and the treatment plant access road.

Wastewater flows by gravity from the Goat Canyon (GC) Diversion Structure through a 24-inch sewer to the Goat Canyon Pump Station (GCPS). Wastewater also flows by gravity from the Smuggler's Gulch (SG) Diversion Structure through a 30-inch sewer to the Hollister Street Pump Station (HSPS).

The gravity conveyance pipelines typically operate partially full between their respective diversion structure and the corresponding point of termination. The pipelines may however, surcharge and back up to the elevation of the diversion structures in the event that respective isolation valves are closed due to hydraulic overloading at the pump stations or treatment plant.

All gravity conveyance pipelines are PVC; sizes, slope and capacities are as summarized in Table 3.13.-2.

TABLE 3.13-2
SOUTH BAY INTERNATIONAL WASTEWATER TREATMENT PLANT
CONVEYANCE AND COLLECTION FACILITIES

GRAVITY CONVEYANCE PIPELINES DESIGN PARAMETERS

FROM	TO	SIZE	SLOPE	DEPTH	CAPACITY
GC Diversion	GCPS	24"	> 0.3%	3/4-full	7.0 mgd
SG Diversion	HSPS	30"	> 0.35%	3/4-full	14.0 mgd
CDS Diversion	Monument Road Sewer	16"	> 0.9%	½-full	2.0 mgd
Silva's Drain Diversion	Monument Road Sewer	12"	> 0.8%	½-full	1.0 mgd
Monument Road Sewer	JB No.2	20"	> 0.13%	3/4-full	3.0 mgd
Stewart' Drain Diversion	JB No.1	18"	> 0.65%	3/4-full	5.0 mgd
Tijuana Pump Plant No.1 Diversion Structure	Tijuana Pump Plant No.1	72"	> 0.12%	3/4-full	100.0 mgd

TABLE 3.13-2
SOUTH BAY INTERNATIONAL WASTEWATER TREATMENT PLANT
CONVEYANCE AND COLLECTION FACILITIES

GRAVITY CONVEYANCE PIPELINES DESIGN PARAMETERS

FROM	TO	SIZE	SLOPE	DEPTH	CAPACITY
International Interceptor	Tijuana Pump Plant No.1 Diversion Structure	72"	> 0.12%	3/4-full	100.0 mgd
Tijuana Pump Plant No.1 Diversion Structure	JB No.1	72"	> 0.12%	3/4-full	100.0 mgd
JB No. 1	JB No.2	96"	>0.20%	3/4 full	200.0 mgd
JB No. 2	SB IWTP Headworks	96"	> 0.20%	3/4-full	200.0 mgd

3.13.2.2 Force Main Piping

Wastewater is pumped from the Goat Canyon Pump Station to the Hollister Street Pump Station through parallel 12-inch and 16-inch force mains. The two force mains tie into a 30-inch gravity sewer immediately upstream of the pump station isolation valve. The Hollister Street Pump Station pumps the combined flow through parallel 16-inch and 30-inch force mains to the treatment plant's Tank Drainage System. All force main piping is PVC.

3.13.3 Goat Canyon Pump Station

A process schematic for the Goat Canyon Pump Station is presented in Figure 3.13-1.

3.13.3.1 Isolation Valve, Wetwell, and Pumps

Isolation Valve

A 24-inch cast iron, non-modulating, motor-operated plug valve (MOV-1), located in a concrete valve vault, is provided on the 24-inch PVC gravity sewer just upstream of the pump station. The valve is manufactured by Milliken Valve Company, Series 600, with a Limitorque Model L120-10, 460 v electric actuator. The remotely controlled influent plug valve is used to isolate flow to the pump station. With MOV-1 open, sewage flows into an influent splitter box at the wetwell. In the event of a high water level condition, a float switch in the wetwell is activated, automatically sounding an alarm and signaling the plug

valve to close. The valve closure speed is approximately 1 minute. With the valve closed, flow will back up in the 24-inch pipeline. If the line surcharges back to the Goat Canyon Diversion Structure, further capture of transboundary flow is prevented.

Wetwell

With MOV-1 open, sewage flows into an influent splitter box at the wetwell. Two 24-inch flanged DIP spool pieces are provided to split the influent flow between two wetwells. Access to the wetwell is provided through hinged aluminum access hatches.

Liquid level measurement is provided by an air pressure bubbler system. The bubbler level measurement system consists of an enclosure, an air supply system, pressure and level gauges, shut-off valves, and a differential pressure regulator and rotometer. All mechanical components are housed in control panel BCP-GCPS. The air supply system consists of built-in duplex air compressors with automatic alternation, and a 2-gallon receiving tank capable of providing 0.8 scfm at 8.5 psig. The air compressors are 1/6 hp, oilless piston units manufactured by GAST, Model 1HAB-11T-M100X. Liquid level measurement is provided as input for starting and stopping the sewage lift pumps.

A float switch is provided to indicate high wet well level at the Goat Canyon Pump Station local control panel (LCP-GCPS). High level also initiates closure of MOV-1. The float switch is a Flygt Model ENM-10.

Air pulled out of the wet well and conveyed to the Odor Reduction Station passes by a duct-mounted, combustible gas sensor. Sensing of gas above 25% Lower Explosive Limit provides “WET WELL HIGH COMBUSTIBLE GAS” annunciation at LCP-GCPS. The monitor is an Ultima Gas Monitor, manufactured by MSA Instruments.

Sewage Lift Pumps

Four non-clog, submersible sewage lift pumps are provided at the pump station wetwell. The wetwell is divided such that Pump Nos. P-1 and P-2 pump from one half to the 12-inch force main and Pump Nos. P-3 and P-4 pump from the other half of the wetwell to the 16-inch force main. Smaller capacity Pump Nos. P-1 and P-2 operate in a LEAD-STANDBY mode. Larger capacity Pump Nos. P-3 and P-4 operate in a LEAD-STANDBY mode. Each of the pumps P-1 and P-2 is a submersible, non-clog, centrifugal pump and is manufactured by Ebara International Corporation, Model 150DSC3-G0852-1760. Each pump is rated for 1835 gpm capacity at a TDH of 105 feet. Each pump is started by a

variable frequency drive programmed to ramp to 100 percent speed and then is operated at constant speed. Each pump is driven by a 75 hp, 1760 rpm, 3 phase, 60 Hz, 460 volt submersible motor. An 8-inch flanged check valve and an 8-inch isolation plug valve are provided on each of the pump discharge lines and are located in a concrete valve vault. Downstream of the valve vault, the individual 8-inch discharge lines are manifolded into a single 12-inch force main.

Each of the pumps P-3 and P-4 is a submersible, non-clog, centrifugal pump and is manufactured by Ebara International Corporation, Model 200DSC3-E1052-1760. Each pump is rated for 3085 gpm capacity at a TDH of 70 feet. Each pump is started by a variable frequency drive programmed to ramp to 100 percent speed and then is operated at constant speed. Each pump is driven by a 75 hp, 1760 rpm, 3 phase, 60 Hz, 460 volt submersible motor. A 12-inch flanged check valve and a 12-inch isolation plug valve are provided on each of the pump discharge lines and are located in a concrete valve vault. Downstream of the valve vault, the individual 12-inch discharge lines are manifolded into a single 16-inch force main.

The pumps are provided with 316 stainless steel chain and a guide rail system to allow pump removal while the pump station remains in service.

Sump Pumps

Two submersible sump pumps, S-1 and S-2, are provided at the pump station for site drainage. The below grade sump receives drainage from 4-inch PVC floor drains at the odor reduction station, surge arrestor area, generator building, isolation valve vault, and the sewage lift pump valve vaults. In addition, a constant flow of approximately one half gallon per minute is received from the odor control facility while the facility is in operation. The pumps operate in a lead-lag mode and discharge to the station wet well. Level control is provided by a series of float switches. The switches are Flygt Model ENM-10.

Each of the sump pumps is a submersible, vortex centrifugal pump and is manufactured by Ebara International Corporation, Model DVFU. Each pump is rated for 119 gpm capacity at a TDH of 9.9 feet. Each pump is driven by a 2 hp, 1740 rpm, 3 phase, 60 Hz, 460 volt submersible motor as manufactured by Ebara International Corporation. A 3-

inch check valve and a 3-inch plug valve are provided on each of the pump discharge lines and are located in a concrete valve vault.

Water Supply Facilities

A water supply well, approximately 250 ft deep, is located on the Goat Canyon Pump Station site. The well provides water, considered non-potable, to the Goat Canyon Pump Station. The water supply facilities consist of a water supply well and pump, a hydropneumatic pressure tank, and associated controls. Hose bibbs are located outside of the generator building, at the sewage wet well, and both inside and outside the surge control/odor reduction area.

The well is constructed using a 10-inch PVC casing. The well screen is constructed so as to meet an allowable sediment concentration in the discharge water of less than 5 mg/L. The well is capable of sustaining a continuous pumping rate of 75 gpm.

The well water supply pump is a submersible pump manufactured by Grundfos, Model 75S75-12. The pump is rated for 75 gpm capacity at a TDH of 260 ft. The pump is driven by a 7 1/2 hp, 3450 rpm, 3 phase, 60 Hz, 450 volt motor. The pressure tank is a vertical, steel, hydropneumatic bladder tank, as manufactured by Amtrol, Well-X-TROL, Model WX-350. The tank has a diameter of 26 inches, a height of 62 inches, and a capacity of 119 gallons. Tank accessories include a pressure switch, relief valve, and drain valve.

The well water supply operates on pressure control in the hydropneumatic tank. When the pressure in the tank falls below 60 psig, the water supply pump is called to run. When the pressure exceeds 80 psig, the pump deactivates.

3.13.3.2 Surge Control System

Pump discharge force main piping associated with the Goat Canyon Pump Station is subject to surge pressure during sudden flow velocity changes that may occur due to an interruption in utility power. To limit surge and associated water hammer, each of the two force mains is provided with a surge arrestor. The 12-inch force main is provided with Surge Arrestor (SA)-1. The 16-inch force main is provided with SA-2.

The surge arrestor tanks are horizontal, steel, hydropneumatic pressure vessels, manufactured by Young Engineering and Manufacturing, Inc. SA-1 has a diameter of 6 ft-0 inches, a shell length of 8 ft-3 inches, an overall length of 11 ft-3 inches, a usable capacity of

280 cubic feet, a design flowrate of 2,435 gpm, a maximum design pressure of 100 psi, and a maximum working pressure of 40 psi. SA-2 has a diameter of 7 ft-0 inches, a shell length of 12 ft-4 inches, an overall length of 15 ft-11 inches, a capacity of 550 cubic feet, a design flowrate of 4,000 gpm, a maximum design pressure of 100 psi, and a maximum working pressure of 24 psi. Surge tank accessories include a liquid level gauge, a safety relief valve, an air release valve, and a vacuum relief valve.

Each surge arrestor tank contains a blanket of air over a volume of water. Initial water level inside the tank is set by the relative placement (elevation) of an air relief valve on the side of the tank. Nine threaded connections are provided on the side of the tank, each at a different elevation. The higher the placement of the air relief valve, the higher the water level in the tank.

In the event of a power failure, the surge arrestors absorb and dampen out the resulting pressure surges that occur in the force mains. The surge arrestors are equipped with vacuum release valves to allow air to enter the system when negative air pressures occur within the tanks. Operating parameters are included below:

	<u>12" Force Main</u>	<u>16" Force Main</u>
Surge Arrestors	SA-1	SA-2
Diameter	6 ft-0"	7-0"
Length	11 ft-3"	15-11"
Maximum Parameters		
Head	89 feet	54 feet
Water Level	7 feet	7.5 feet
Air Volume	256 cf	506 cf
Minimum Parameters		
Head	-22.9 feet	-24.1 feet
Water Level	2.89 feet	2.55 feet
Air Volume	30 cf	60 cf

3.13.3.3 Odor Reduction Station

Odorous air from the pump station wetwell is continuously ventilated and treated by the Goat Canyon Pump Station (GCPS) Odor Reduction Station, located in the northeast corner of the Odor Control and Surge Arrestor Building.

Air is drawn from the wetwell via two 12-inch PVC ducts. The ducts are manifolded together and tie into a 12-inch intake to the scrubber unit.

The GCPS Odor Reduction Station consists of a blower, a three-stage counter-current scrubber, pH and ORP controllers, metering pumps, chemical storage tanks, recirculation pumps, a control system, and a make-up water system.

The GCPS Odor Reduction Station Process Schematic is presented in Figure 3.13-2.

Odor Reduction Scrubber

The odor scrubber removes hydrogen sulfide and other odorous compounds from the air stream via mass transfer to an aqueous solution. Mass transfer is accomplished via counter-current contact of the air stream with aqueous solution on random packing material in the scrubbing towers. The scrubber consists of three modular stages, each configured to eliminate short circuiting of the air stream and to maximize contact with a chemical solution of water, sodium hypochlorite (NaOCl), and sodium hydroxide (NaOH).

The three-stage counter current odor scrubber is a Triplex Air Scrubber System, manufactured by U.S. Filter/Davis Process. The scrubber vessels are manufactured from high density, cross linked polyethylene (HDXLPE). The towers are about 7 feet high. The towers contain a bed of media which consists of 2-inch polyethylene packing, manufactured by Jaeger Products, Inc. Above the packing in each stage is a manifold with two 2-inch teflon fog nozzles, manufactured by Bete Fog Nozzles, Inc., which distribute scrubber solution over the bed. Above the scrubber solution manifold in stage 3 is a mist eliminator (demister), manufactured by Kimre Incorporated, to minimize liquid droplets exiting through the discharge of the towers to the blower. The scrubber is designed to meet the following:

Flow rate	670 cfm
Number of Stages	3
Inlet H ₂ S Concentration	25 ppm
Minimum System Efficiency	99%
Static Pressure Drop (max.)	5-inch water column
Total Packing Height, min	11 ft- 9 inches
Tower Size	1- 8 inches x 21 inches
Height (excluding exhaust stack)	7 ft-0 inches
Exhaust Stack Height	13 ft-6 inches

Chemical Service:	
NaOH	20 to 25% by weight
NaCl	15 to 20% by weight
Spray Header Capacity:	
Recirculated Scrubbant	20 gpm
Fresh Scrubbant:	
25% NaOH	1.8 gpd
12.5% NaCl	2.8 gpd

Odor Reduction Blower

One (1) blower is provided to draw odorous air from the pump station wetwell, through the scrubber vessels, discharging the scrubbed air to atmosphere. The fiberglass, belt driven blower is located adjacent to the ORS scrubber towers. The blower is manufactured by The New York Blower Company, Model RFE-315. The blower has a 15-inch diameter wheel which produces 670 cfm at a static pressure of 5 inches of water at 2279 rpm. The blower is driven by an explosion proof, 2 hp, 1725 rpm, 3 phase, 60 Hz, 230/460 volt motor, manufactured by Baldor Electric, Inc.

Odor Reduction pH and ORP Controllers

Scrubber solution is continuously monitored for pH and ORP. pH and ORP sensors are installed in the suction lines to recirculation pump numbers 2 and 3 respectively. The pH and ORP analyzers are manufactured by Great Lakes Instruments, Model 672P and 672R, respectively. The pH sensor is LCP-encapsulated with a measurement range of 0.0 to 14.0 pH. The ORP sensor is LCP-encapsulated with a measurement range of 0 to +1000 mV.

Odor Reduction Chemical Metering Pumps

One (1) NaOH and one (1) NaOCl positive displacement, bellows type metering pumps are housed within the makeup water control stand. The pumps are manufactured by Davis Industries, Model 15907-001, and are capable of delivering 0.792 gallons per hour at a maximum pressure of 40 psig and a maximum stroke speed of 10 strokes per minute.

Each pump is driven by a fractional horsepower, 1500 rpm, 1 phase, 60 Hz, 115 volt motor manufactured by Oriental Motor Co., Ltd.

Odor Reduction Chemical Storage Tanks

NaOH and NaOCl tanks are located just east of the scrubber towers and provide bulk chemical storage. The tanks are manufactured from polyethylene. Each tank is 46 inches in

diameter with a 4 ft-0 inch shell height, has a 300 gallon capacity, and is manufactured by Snyder-Crown Industrial Products. The NaOH tank is designed for 20 to 25 percent NaOH solution. The NaOCl tank is designed for 10 to 15 percent NaOCl solution.

The tanks are provided with 2-inch fill piping and a 3-inch vent. The tanks are also equipped with sight tubes for determining the level of chemical in each tank. The tanks are located within a curbed area to provide spill containment in the event of tank failure.

Odor Reduction Recirculation Pumps

Scrubber solution is continuously re-circulated within each stage from the sump to the spray nozzles. The scrubber solution flows by gravity through the packing media to the sump. Three (3) centrifugal, frame mounted recirculation pumps are located adjacent to the odor reduction scrubber towers. One pump is dedicated to each stage. The pumps are manufactured by Serfilco, Ltd, Model HC1-3/4 CK. Each pump has a 1-inch inlet, 3/4-inch outlet, and 9-inch impeller which provide a maximum flow of 35 gpm at 47 ft TDH.

Each pump is driven by a constant speed, TEFC, 3/4 hp, 3450 rpm, 1 phase, 60 Hz, 115 volt motor, manufactured by Serfilco, Ltd.

Odor Reduction Make-Up Water and Conditioning System

Make-up water controls are provided to supply water to the system at constant pressure and flow rate. The make-up water control system consists of a main shut-off ball valve, a backflow prevention check valve, a pressure regulator, an anti-scaling unit, a rotometer type flow meter, an adjustable flow control valve, all located within the makeup water control stand.

An automatic ion exchange water conditioning system is provided to treat make-up water for the scrubber. The unit consists of a three tank system; two softening ion exchange vessels and a brine tank. The duplex water conditioner is manufactured by Hague Quality Water, Hydro-Clean System 24, Model 9000 Econominder, and is capable of producing 13 gpm at a pressure drop of 15 psi. The unit is provided with automatic controls to alternate tanks and regulate the regeneration cycles. The control system operates on 120 volt electrical current. The brine tank, constructed of HDPE, is manufactured by Clack Corporation. It has salt capacity of 375 lbs and liquid capacity of 36 gallons.

An anti-scaling water treatment system is provided to treat make-up water for the scrubber by dispensing a sequestering agent. The anti-scaling unit is manufactured by

Moore Solutions, Model Hydro-Kote, HK-40, and is capable of producing a continuous flow of 20 gpm with 40,000 gallons of water treatment capability per cartridge. The unit is fully self-contained, requiring no external power sources or adjustments, and consists of a replaceable media cartridge in which media delivery is accomplished by solubility pressure differential created by two small ports within the media delivery head.

3.13.3.4 Standby Generator

The standby generator set for the Goat Canyon Pump Station is rated for 350 kW, 438 kVA and consists of two main parts: the generator and the diesel engine. The generator set is manufactured by Kohler Power Systems, Model 350ROZD. The generator and engine are housed in a waterproof outdoor enclosure with a pitched roof.

The single bearing generator is manufactured by Marathon Electric, Model 4M4019. The generator operates at a 0.8 power factor and is 3 phase, 4 wire, 60 Hz, 277/480 volt, and 1800 rpm. The generator is 4-pole revolving field brushless type. The pilot exciter and the solid state voltage regulator are manufactured by Marathon Electric, Model Fast Response PMG series, and Model DRV2000, respectively.

The two-stroke cycle, 8-valve engine is manufactured by Detroit Diesel, Model 8V-92TA. The engine has sufficient power to produce the specified rating when operating at generator synchronous speed with all accessories required for normal operation. The engine includes the following systems and accessories: starting system, cooling system, jacket water heater, exhaust silencer, lubrication system, fuel system, and fuel storage base tank.

The 24 VDC engine starting system consists of the starting batteries, the remote-mounted battery charger and connecting cables between the batteries and engine, and the battery charging alternator. The batteries are nickel cadmium (nicad) type manufactured by Alcad, Model XHP45. The battery charger is an automatic 20 amp float charger and is capable of recharging the batteries to full charge in not more than 6 hours after three crank cycles. The battery charger is manufactured by SENS, Model FCA24-20-2431. The battery charging alternator is manufactured by Detroit Diesel, Model Series 92, and provides 65 amp, 24 VDC to the batteries while the generator is operating.

The engine cooling system consists of cooling fan and a radiator which contains a 50 percent solution of ethylene glycol. The cooling system is capable of cooling the engine when operating under full load conditions in an ambient temperature of 110 degrees F. The cooling system is manufactured by Detroit Diesel. The 28 hp V-belt driven fan has a 40-inch diameter.

An engine jacket water heater is provided internal to the engine and is thermostatically controlled to keep the jacket water at suitable temperature for trouble-free starting. The heaters are manufactured by Kim Hotstart Manufacturing Co, Model CB1252XX-000. Each heater is rated at 2500 W and 240 volt.

The engine exhaust system includes a hospital critical silencing muffler which is internal to the generator enclosure. The silencer is manufactured by Hapco Engine Products, Model 5214-SFH-8.

The engine lubrication system is force fed to all bearings with a gear-type pump with oil filters, oil level indicator, and oil temperature and pressure gages. The engine lubrication system is manufactured by Marathon Electric.

The engine fuel system uses No. 2 diesel fuel oil and consists of fuel filters, dry element air cleaners, and diesel fuel storage and transfer pump station. The diesel fuel usage at 100 percent load is 27 gallons per hour. The engine governor is an isochronous electronic type. When a demand is placed on the generator, the governor controls the fuel input to the engine to meet the new demand.

The double-walled 250 gallon fuel storage base tank is sized to provide enough diesel fuel oil capacity to the standby generator at fully rated load for approximately 8 hours. The storage base tank is manufactured by BN Manufacturing, Model BN 10291-774. The base tank dimensions are 13 ft long by 7 ft 6-inch wide and has a height of 7.5-inches. Fill piping enters the tank through the top. Fuel suction piping to supply the generator and fuel return piping to return overflow to the base tank are also through connections at the top of the tank.

Other appurtenances, such as a level gauge and switch, atmospheric vent for the internal tank and secondary containment tank, emergency pressure relief vent for the internal tank and secondary containment tank, internal tank failure leak detector, internal tank drain, and secondary containment tank drain are provided with the base tank.

3.13.4 Hollister Street Pump Station

A process schematic for the Hollister Street Pump Station is presented in Figure 3.13-3.

3.13.4.1 Isolation Valve, Wetwell, and Pumps

Isolation Valve

A 30-inch cast iron, non-modulating, motor-operated plug valve (MOV-1), located in a concrete valve vault, is provided on the 30-inch PVC gravity sewer just upstream of the pump station. The valve is manufactured by Milliken Valve Company, Series 600, with a Limitorque Model L120-10, 460 v electric actuator. The remotely controlled influent plug valve is used to isolate flow to the pump station. With MOV-1 open, sewage flows into an influent splitter box at the wetwell. In the event of a high water level condition, a float switch in the wetwell is activated, automatically sounding an alarm and signaling the plug valve to close. The valve closure speed is approximately 2 minutes. With the valve closed, flow will back up in the 30-inch pipeline. If the line surcharges back to the Smuggler's Gulch Diversion Structure, further capture of transboundary flow is prevented.

Wetwell

With MOV-1 open, sewage flows into an influent splitter box at the wetwell. Two 30-inch flanged DIP spool pieces are provided to split the influent flow between two wetwells. Access to the wetwell is provided through hinged aluminum access hatches.

Liquid level measurement is provided by an air pressure bubbler system. The bubbler level measurement system consists of an enclosure, an air supply system, pressure and level gauges, shut-off valves, and a differential pressure regulator and rotometer. All mechanical components are housed in control panel BCP-HSPS. The air supply system consists of built-in duplex air compressors with automatic alternation, and a 2 gallon receiving tank capable of providing 0.8 scfm at 8.5 psig. The air compressors are 1/6 hp, oilless piston units manufactured by GAST, Model 1HAB-11T-M100X. Liquid level measurement is provided as input for starting and stopping the sewage lift pumps.

A float switch is provided to indicate a high wetwell level at the Hollister Street Pump Station local control panel (LCP-HSPS).

Air pulled out of the wet well and conveyed to the Odor Reduction Station passes by a duct-mounted, combustible gas sensor. Sensing of gas above 25% Lower Explosive Limit provides “WET WELL HIGH COMBUSTIBLE GAS” annunciation at LCP-HSPS. The monitor is an Ultima Gas Monitor, manufactured by MSA Instruments.

Sewage Lift Pumps

Four non-clog, submersible sewage lift pumps are provided at the pump station wetwell. The wetwell is divided such that smaller capacity Pump Nos. P-1 and P-2 pump from one half to the 16-inch force main. Larger capacity Pump Nos. P-3 and P-4 pump from the other half of the wet well to the 30-inch force main. Pump Nos. P-1 and P-2 operate in a LEAD-STANDBY mode. Pump Nos. P-3 and P-4 operate in a LEAD-LAG mode.

Each of the pumps P-1 and P-2 is a submersible, non-clog, centrifugal pump and is manufactured by Ebara International Corporation, Model 200DSC3-E1052-1760. Each pump is rated for 2660 gpm capacity at a TDH of 78 feet. Each pump is started by a variable frequency drive programmed to ramp to 100 percent speed and then is operated at constant speed. Each pump is driven by a 100 hp, 1760 rpm, 3 phase, 60 Hz, 460 volt submersible motor. An 8-inch flanged check valve and an 8-inch isolation plug valve are provided on each of the pump discharge lines and are located in a concrete valve vault. Downstream of the valve vault, the individual 8-inch discharge lines are manifolded into a single 16-inch force main.

Each of the pumps P-3 and P-4 is a submersible, non-clog, centrifugal pump and is manufactured by Ebara International Corporation, Model 400DSC3-E1553-1175. Each pump is rated for 9750 gpm capacity at a TDH of 61 feet. Each pump is started by a variable frequency drive programmed to ramp to 100 percent speed and then is operated at constant speed. Each pump is driven by a 200 hp, 1175 rpm, 3 phase, 60 Hz, 460 volt submersible motor. A 16-inch flanged check valve and a 16-inch isolation plug valve are provided on each of the pump discharge lines and are located in a concrete valve vault. Downstream of the valve vault, the individual 16-inch discharge lines are manifolded into a single 30-inch force main.

The pumps are provided with 316 stainless steel chain and a guide rail system to allow pump removal while the pump station remains in service.

Sump Pumps

Two submersible sump pumps, S-1 and S-2, are provided at the pump station for site drainage. The below grade sump receives drainage from 4-inch PVC floor drains at the odor reduction station, surge arrestor area, the generator building, isolation valve vault, and the sewage lift pump valve vaults. In addition, a constant flow of approximately one half gallon per minute is received from the odor control facility while the facility is in operation. The pumps operate in a lead-lag mode and discharge to the station wetwell. Level control is provided by a series of float switches. The switches are Flygt Model ENM-10.

Each of the sump pumps is a submersible, vortex centrifugal pump and is manufactured by Ebara International Corporation, Model DVFU. Each pump is rated for 119 gpm capacity at a TDH of 9.9 feet. Each pump is driven by a 2 hp, 1740 rpm, 3 phase, 60 Hz, 460 volt submersible motor, as manufactured by Ebara International Corporation. A 3-inch check valve and a 3-inch plug valve are provided on each of the pump discharge lines and are located in a concrete valve vault.

3.13.4.2 Surge Control System

Surge Arrestors

Pump discharge force main piping associated with the Hollister Street Pump Station is subject to surge pressure during sudden flow velocity changes that may occur due to an interruption in utility power. To limit surge and associated water hammer, each of the two force mains is provided with a surge arrestor. The 16-inch force main is provided with Surge Arrestor (SA)-1. The 30-inch force main is provided with SA-2.

The surge arrestor tanks are horizontal, steel, hydropneumatic pressure vessels, manufactured by Young Engineering and Manufacturing, Inc. SA-1 has a diameter of 6 ft-0 inches, a shell length of 8 ft-3 inches, an overall length of 11 ft-3 inches, a usable capacity of 280 cubic feet, a design flowrate of 3,680 gpm, a maximum design pressure of 125 psi, and a maximum working pressure of 33 psi. SA-2 has a diameter of 8 ft-6 inches, a shell length of 24 ft-4 inches, an overall length of 28 ft-8 inches, a capacity of 1500 cubic feet, a design flowrate of 16,950 gpm, a maximum design pressure of 125 psi, and a maximum working pressure of 30 psi. Surge tank accessories include a liquid level gauge, a safety relief valve,

an air release valve, a vacuum relief valve, a solenoid valve, ball valves, check valves, exhaust silencer, air volume control panel, level gauge glass, and a pressure gauge.

Each surge arrestor tank contains a blanket of air over a volume of water. Initial water level inside the tank is controlled by level sensors. As initial water level exceeds a set elevation, compressed air is forced into the tank, thereby pushing the water level down and increasing the air blanket. As initial water level falls below a set elevation, compressed air inside the tank is released, thereby allowing the water level to rise and decreasing the air blanket.

In the event of a power failure, the surge arrestors absorb and dampen out the resulting pressure surges that occur in the force mains. The surge arrestors are equipped with vacuum release valves to allow air to enter the system when negative air pressures occur within the tanks.

Operating parameters are included below:

	<u>16" Force Main</u>	<u>30" Force Main</u>
Surge Arrestors	SA-1	SA-2
Diameter	6 ft-0"	28-8"
Length	11 ft-3"	15-11"
Maximum Parameters		
Head	76 feet	69 feet
Water Level	8 feet	10.5 feet
Air Volume	232 cf	1389 cf
Minimum Parameters		
Head	-18 feet	-24 feet
Water Level	4.78 feet	6.15 feet
Air Volume	75 cf	300 cf

Surge Arrestor Air Compressor/Receiver

Surge arrestor compressed air is supplied by a compressor located in the MCC Room of the MCC/Generator Building, with a capacity of 17.1 acfm at 125 psig. The compressor is mounted to a rigid steel frame which straddles an 80 gallon, steel, horizontal receiver tank, with a minimum working pressure of 150 psi.

The compressor, which is manufactured by Ingersoll-Rand, Model 2475, is a two-cylinder, splash lubricated air compressor driven by a 5 hp, 1760 rpm, 3 phase, 60 Hz, 230/460 volt motor, manufactured by Baldor Electric Company. The compressor provides air to the two surge arrestors through an air receiver tank. Associated appurtenances include check valves, isolation valves, muffler, inlet silencer, discharge tap and pressure relief valve, manual drain valve, end caps, and pressure gauge.

3.13.4.3 Odor Reduction Station

Odorous air from the pump station wetwell is continuously ventilated and treated by the Hollister Street Pump Station (HSPS) Odor Reduction Station, located in the northeast corner of the Odor Control and Surge Arrestor Building.

Air is drawn from the wetwell via two (2) 12-inch PVC ducts. The ducts are manifolded and tie into a 12-inch intake to the scrubber unit.

The HSPS Odor Reduction Station consists of a blower, a three-stage counter-current scrubber, pH and ORP controllers, metering pumps, chemical storage tanks, recirculation pumps, a control system, and a make-up water system.

The HSPS Odor Reduction Station Process Schematic is presented in Figure 3.13-4.

Odor Reduction Scrubber

The odor scrubber removes hydrogen sulfide and other odorous compounds from the air stream via mass transfer to an aqueous solution. Mass transfer is accomplished via counter-current contact of the air stream with aqueous solution on random packing material in the scrubbing towers. The scrubber consists of three modular stages, each configured to eliminate short circuiting of the air stream and to maximize contact with a chemical solution of water, sodium hypochlorite (NaOCl), and sodium hydroxide (NaOH).

The three-stage counter current odor scrubber is a Triplex Air Scrubber System, manufactured by U.S. Filter/Davis Process. The scrubber vessels are manufactured from high density, cross linked polyethylene (HDXLPE). The towers are about 7 feet high. The towers contain a bed of media which consists of 2-inch polyethylene packing, manufactured by Jaeger Products, Inc. Above the packing in each stage is a manifold with two 2-inch teflon fog nozzles, manufactured by Bete Fog Nozzles, Inc., which distribute scrubber

solution over the bed. Above the scrubber solution manifold in stage 3 is a mist eliminator (demister), manufactured by Kimre Incorporated, to minimize liquid droplets exiting through the discharge of the towers to the blower. The scrubber is designed to meet the following:

Flow rate	1000 cfm
Number of Stages	3
Inlet H ₂ S Concentration	25 ppm
Maximum Systems Efficiency	99%
Static Pressure Drop (max.)	8-inch water column
Total Packing Height, min	11 ft-9 inches
Tower Size	18 inches x 21 inches
Height (excluding exhaust stack)	7 ft-0 inches
Exhaust Stack Height	15 ft-9 inches
Chemical Service:	
NaOH	20 to 25% by weight
NaCl	15 to 20% by weight
Spray Header Capacity:	
Recirculated Scrubbant	20 gpm
Fresh Scrubbant:	
25% NaOH	1.8 gpd
12.5% NaCl	2.8 gpd

Odor Reduction Blower

One (1) blower is provided to draw odorous air from the pump station wet well, through the scrubber vessels, discharging the scrubbed air to atmosphere. The fiberglass, belt driven blower is located adjacent to the ORS scrubber towers. The blower is manufactured by The New York Blower Company, Model RFE-315. The blower has a 15-inch diameter wheel which produces 1000 cfm at a static pressure of 8 inches of water at 2951 rpm. The blower is driven by an explosion-proof 3 hp, 1725 rpm, 3 phase, 60 Hz, 230/460 volt motor, manufactured by Siemens.

Odor Reduction pH and ORP Controllers

Scrubber solution is continuously monitored for pH and ORP. pH and ORP sensors are installed in the suction lines to recirculation pump numbers 2 and 3 respectively. The pH and ORP analyzers are manufactured by Great Lakes Instruments, Model 672P and 672R, respectively. The pH sensor is LCP-encapsulated with a measurement range of 0.0 to 14.0 pH. The ORP sensor is LCP-encapsulated with a measurement range of 0 to +1000 mV.

Odor Reduction Chemical Metering Pumps

One (1) NaOH and one (1) NaOCl positive displacement, bellows type metering pumps are housed within the makeup water control stand. The pumps are manufactured by Davis Industries, and are capable of delivering 0.792 gallons per hour at a maximum pressure of 40 psig and a maximum stroke speed of 10 strokes per minute.

Each pump is driven by a fractional horsepower, 1500 rpm, 1 phase 60 Hz, 115 volt motor manufactured by Oriental Motor Co., Ltd.

Odor Reduction Chemical Storage Tanks

NaOH and NaOCl tanks are located just north of the scrubber towers and provide bulk chemical storage. The tanks are manufactured from polyethylene. Each tank is 46 inches in diameter with a 4 ft-0 inch shell height, has a 300 gallon capacity, and is manufactured by Snyder-Crown Industrial Products. The NaOH tank is designed for 20 to 25 percent NaOH solution. The NaOCl tank is designed for 10 to 15 percent NaOCl solution.

The tanks are provided with 2-inch fill piping and a 3-inch vent. The tanks are also equipped with sight tubes for determining the level of chemical in each tank. The tanks are located within a curbed area to provide spill containment in the event of tank failure.

Odor Reduction Recirculation Pumps

Scrubber solution is continuously re-circulated within each stage from the sump to the spray nozzles. The scrubber solution flows by gravity through the packing media to the sump. Three (3) centrifugal, frame mounted recirculation pumps are located adjacent to the odor reduction scrubber towers. One pump is dedicated to each stage. The pumps are manufactured by Serfilco, Ltd, Model HC1-3/4 CK. Each pump has a 1-inch inlet, 3/4-inch outlet, and 9-inch impeller which provide a maximum flow of 35 gpm at 47 ft TDH.

Each pump is driven by a constant speed, TEFC, 3/4 hp, 3450 rpm, 1 phase, 60 Hz, 115 volt motor, manufactured by Serfilco, Ltd.

Odor Reduction Make-Up Water System

Make-up water controls are provided to supply water to the system at constant pressure and flow rate. The make-up water control system consists of a main shut-off ball valve, an air gap system, a pressure regulator, an anti-scaling unit, a rotometer type flow meter, an adjustable flow control valve, all located within the makeup water control stand.

The air gap system, manufactured by Aurora Pump, is a Simplex Water Seal Unit, Model 681, consisting of a water tank and pump. The water tank is a galvanized steel tank, with a diameter of 23 inches, a height of 36 inches and a volume of 50 gallons. Water flow into the tank is controlled by a brass float valve. The pump is a turbine pump, Model 134 (F), rated for 5 gpm capacity at a TDH of 10 ft. The pump is driven by a 1/2 hp, 1725 rpm, 3 phase, 60 Hz, 460 volt motor.

An anti-scaling water conditioning system is provided to treat make-up water for the scrubber by dispensing a sequestering agent. The anti-scaling unit is manufactured by Moore Solutions, Model Hydro-Kote, HK-40, and is capable of producing a continuous flow of 20 gpm with 40,000 gallons of water treatment capability per cartridge. The unit is fully self-contained, requiring no external power sources or adjustments, and consists of a replaceable media cartridge in which media delivery is accomplished by solubility pressure differential created by two small ports within the media delivery head.

3.13.4.4 Standby Generator

The standby generator set for the Hollister Street Pump Station is rated for 600 kW, 750 kVA and consists of two main parts: the generator and the diesel engine. The generator set is manufactured by Kohler Power Systems, Model 600ROZD. The generator and engine are housed in a waterproof outdoor enclosure with a pitched roof.

The single bearing generator is manufactured by Marathon Electric, Model 5M4032. The generator operates at a 0.8 power factor and is 3 phase, 4 wire, 60 Hz, 277/480 volt, and 1800 rpm. The generator is 4-pole revolving field brushless type. The pilot exciter and the solid state voltage regulator are manufactured by Marathon Electric, Model Fast Response PMG series, and Model DRV2000, respectively.

The two-stroke cycle, 8-valve engine is manufactured by Detroit Diesel, Model 12V-92TA. The engine has sufficient power to produce the specified rating when operating at generator synchronous speed with all accessories required for normal operation. The engine includes the following systems and accessories: starting system, cooling system, jacket water heater, exhaust silencer, lubrication system, fuel system, and fuel storage base tank.

The 24 VDC engine starting system consists of the starting batteries, the remote-mounted battery charger and connecting cables between the batteries and engine, and the

battery charging alternator. The batteries are nickel cadmium (nicad) type manufactured by Alcad, Model XHP70. The battery charger is an automatic 20 amp float charger and is capable of recharging the batteries to full charge in not more than 6 hours after three crank cycles. The battery charger is manufactured by SENS, Model FCA24-20-2431. The battery charging alternator is manufactured by Detroit Diesel, Model Series 92, and provides 65 amp, 24 VDC to the batteries while the generator is operating.

The engine cooling system consists of cooling fan and a radiator which contains a 50 percent solution of ethylene glycol. The cooling system is capable of cooling the engine when operating under full load conditions in an ambient temperature of 110 degrees F. The cooling system is manufactured by Detroit Diesel. The 39 hp V-belt driven fan has a 52-inch diameter.

An engine jacket water heater is provided internal to the engine and is thermostatically controlled to keep the jacket water at suitable temperature for trouble-free starting. The heaters are manufactured by Kim Hotstart Manufacturing Co, Model CE1402XX-000. Each heater is rated at 4000 W and 240 volt.

The engine exhaust system includes a hospital critical silencing muffler which is internal to the generator enclosure. The silencer is manufactured by Hapco Engine Products, Model 6616-SFH-8x8x12.

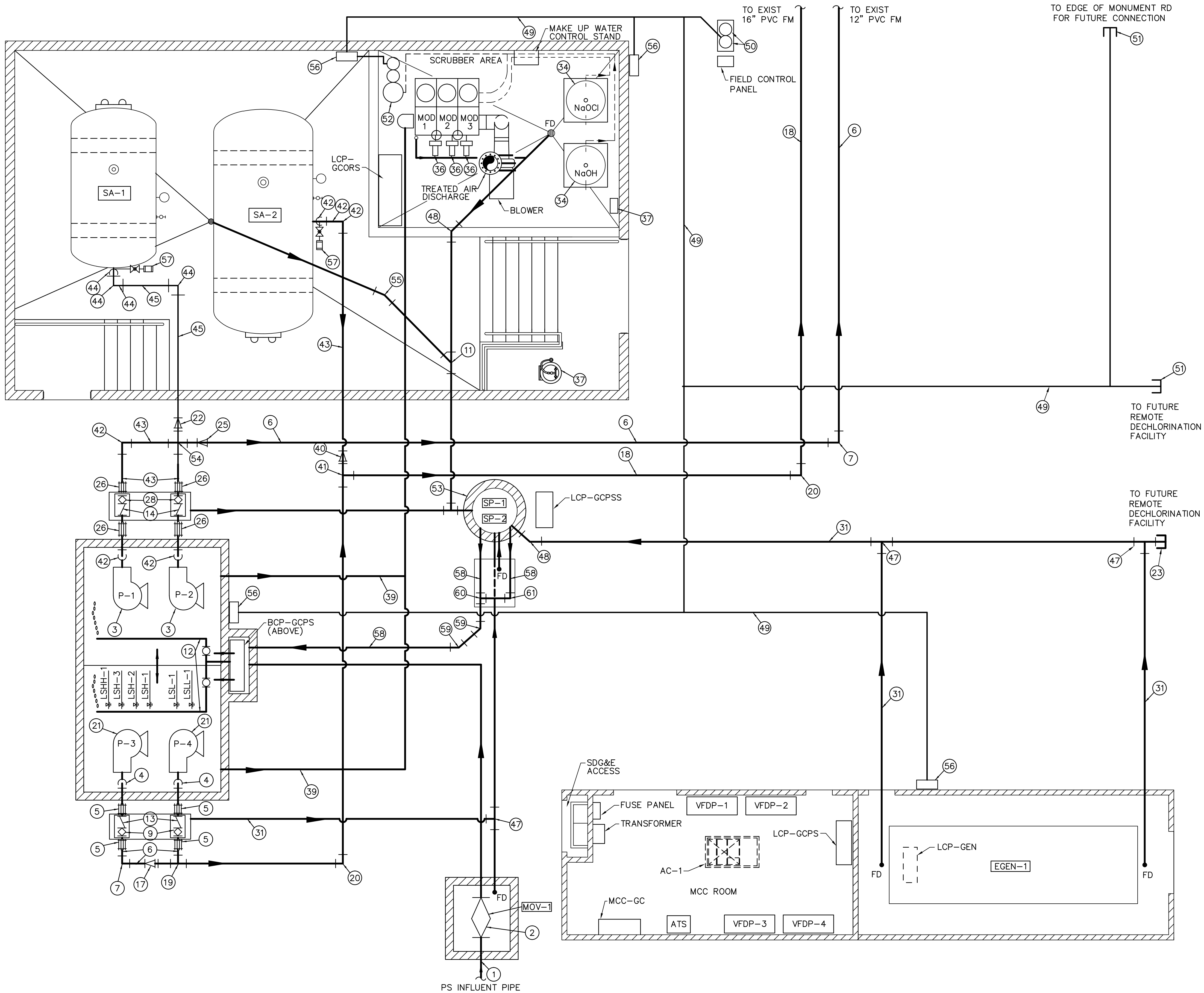
The engine lubrication system is force fed to all bearings with a gear-type pump with oil filters, oil level indicator, and oil temperature and pressure gages. The engine lubrication system is manufactured by Marathon Electric.

The engine fuel system uses No. 2 diesel fuel oil and consists of fuel filters, dry element air cleaners, and diesel fuel storage and transfer pump station. The diesel fuel usage at 100 percent load is 48 gallons per hour. The engine governor is an isochronous electronic type. When a demand is placed on the generator, the governor controls the fuel input to the engine to meet the new demand.

The double-walled 400 gallon fuel storage base tank is sized to provide enough diesel fuel oil capacity to the standby generator at fully rated load for approximately 8 hours. The storage base tank is manufactured by BN Manufacturing, Model BN 10292-775. The base tank dimensions are 13 ft 4-inch long by 8 ft wide, and has a height of 10-inches. Fill piping

discharges through the top of the tank. Fuel suction piping to supply the generator and fuel return piping to return overflow to the base tank are also through connections at the top of the tank. Other appurtenances, such as a level gauge and switch, atmospheric vent for the internal tank and secondary containment tank, emergency pressure relief vent for the internal tank and secondary containment tank, internal tank failure leak detector, internal tank drain, and secondary containment tank drain are provided with the base tank.

XREFS: \\TLBUK.dwg IMAGES:None
User:CARSON Spec:PIRNE STANDARD File:t:\proj\1991037\Q&M schematics\20M FIG 3.13-1.DWG Scale:1:1 Date:03/18/2011 Time:17:49 Layout:Blank



PARTIAL ASSEMBLY SCHEDULE	
ITEM	DESCRIPTION
1	24" INFLUENT PVC PRESSURE GRAVITY LINE
2	24" FLG'D ECC PLUG VALVE 16" W/TYPE A ELECTRIC ACTUATOR
3	75 HP SUBMERSIBLE WASTEWATER PUMP
4	12" FLG'D 90° ELL
5	12" FLEXIBLE COUPLING
6	12" DI PIPE (POLYETHYLENE LINED)
7	12" MJ 90° ELL
8	NOT USED
9	12" FLG'D ECC PLUG VALVE 16"
10	2" PVC WATERLINE
11	4" PVC WYE
12	316 STAINLESS STEEL TUBING IN STILLING WELL
13	12" FLG'D CHECK VALVE 8"
14	8" FLG'D CHECK VALVE 8"
15	12" MJ ECC PLUG VALVE 16"
16	12" PVC FORCEMAIN
17	12"x16" MJ ECC REDUCER
18	16" DI PIPE (POLYETHYLENE LINED)
19	16"x16"x12" MJ TEE
20	16" MJ 90° ELL
21	75 HP SUBMERSIBLE WASTEWATER PUMP
22	8"x6" MJ ECC REDUCER
23	4" PVC CAP
24	NOT USED
25	12"x8" MJ ECC RED
26	8" FLEXIBLE COUPLING
27	16" MJ ECC PLUG VALVE 16"
28	8" FLG'D ECC PLUG VALVE 16"
29	350 KW STANDBY GENERATOR W/ INTEGRAL DIESEL TANK
30	RECEIVER MOUNTED COMPRESSOR
31	4" PVC DRAIN
32	12" PVC
33	ODOR SCRUBBER UNIT
34	300 GALLON POLYETHYLENE STORAGE TANK
35	EXHAUST BLOWER - 600 CFM
36	RECIRCULATION PUMP - 1/6 HP
37	EYEWASH-SELF CONTAINED WATER SUPPLY
38	3/4" GALVANIZED STEEL PIPE
39	12" PVC DUCT
40	16"x8" MJ ECC REDUCER
41	16"x16"x16" MJ TEE
42	8" MJ 90° ELL
43	8" DI PIPE (POLYETHYLENE LINED)
44	6" MJ 90° ELL
45	6" DI PIPE (POLYETHYLENE LINED)
46	4" PVC 90° ELL
47	4"x4"x4" PVC TEE
48	4" PVC 45° BEND
49	2" PVC WELL WATER SUPPLY (NPW)
50	WELL PUMP, BLADDER TANK, & FIELD CONTROL PANEL
51	2" PVC CAP
52	WATER SOFTENER
53	DUPLEX SUMP PUMPS W/LEVEL CONTROLS & DISCHARGE PV'S & CV'S
54	8" MJ CROSS
55	4" PVC 22-1/2" BEND
56	2" HOSE BIBB AND RACK
57	2" AIR RELEASE VALVE 24"
58	3" PVC
59	3" PVC 45° BEND
60	3"x3"x3" DIP TEE
61	3" PVC 90° ELL

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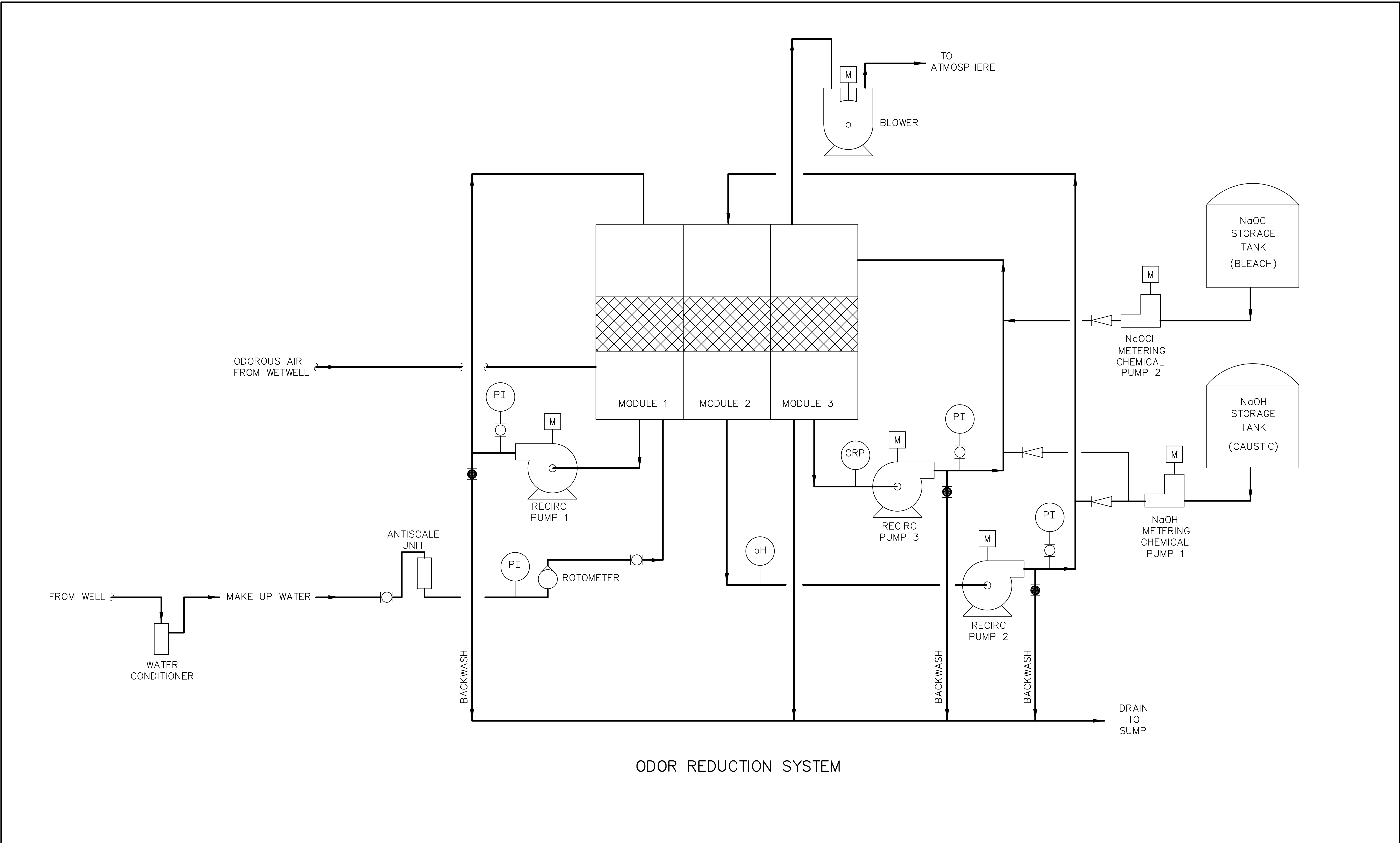
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**GOAT CANYON PUMP STATION
PROCESS SCHEMATIC**

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FIGURE 3.13-1
CAD REF. NO. I20M FIG 3.13-1

XREFS: \\TLBUK.dwg IMAGES:None User:CARSON Spec:Pirnie STANDARD File:c:\proj\1991037\3&M schematics\20M FIG 3.13-2.DWG Scale:1:1 Date:03/21/2011 Time:09:44 Layout:Blank



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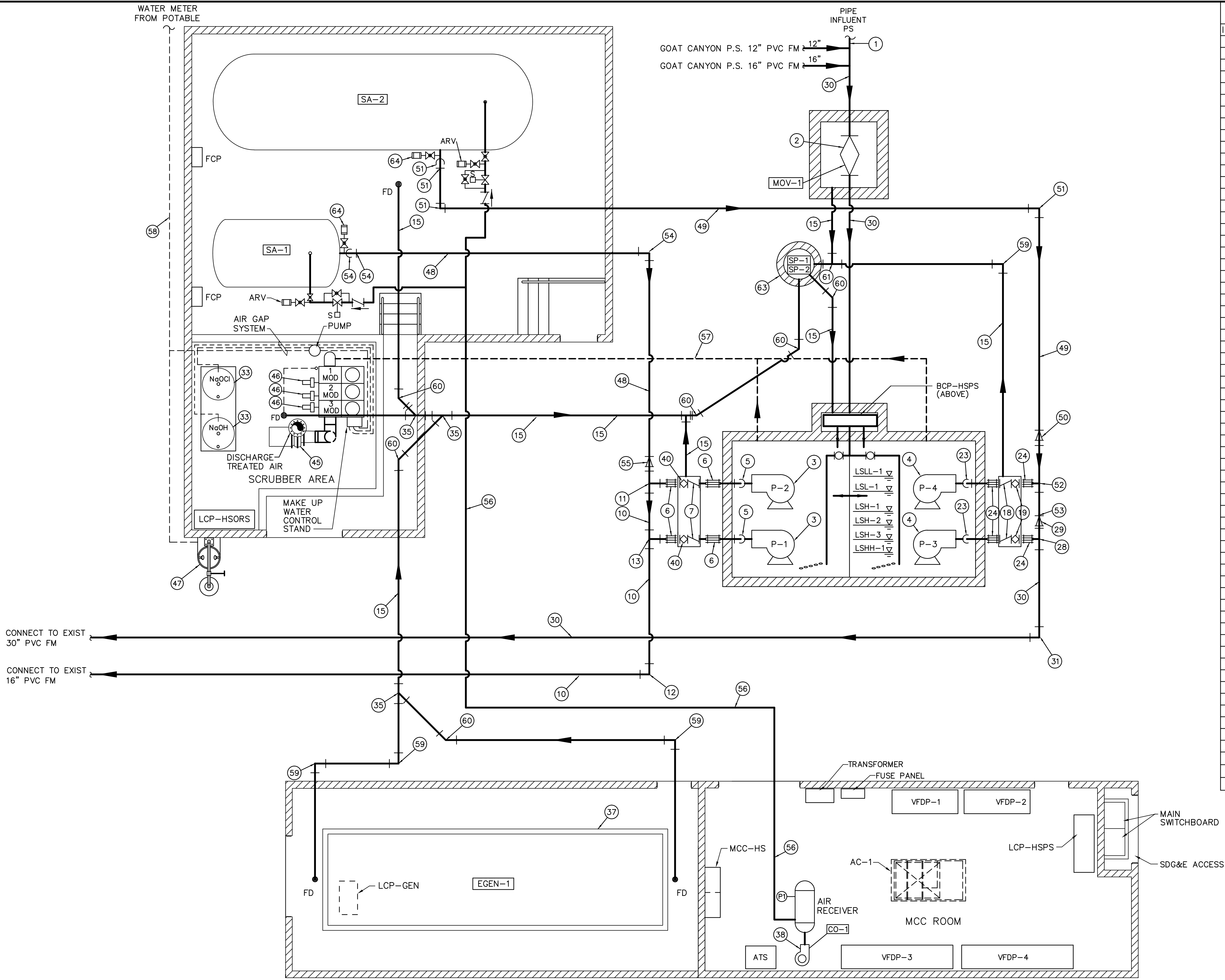
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GOAT CANYON PUMP STATION
ODOR REDUCTION SYSTEM
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FIGURE 3.13-2
CAD REF. NO. 120M FIG 3.13-2

XREFS: \\TLBLK.dwg IMAGES:None User:LARSON Spec:PIRNE STANDARD File: \\pro\\1991037\\O&M schematics\\20M FIG 3.13-3.DWG Scale: 1:1 Date: 03/21/2011 Time: 09:56 Layout: Blank



PARTIAL ASSEMBLY SCHEDULE	
ITEM	DESCRIPTION
1	30" INFLUENT PVC PRESSURE GRAVITY LINE
2	30" FLG'D ECC PLUG VALVE 16" W/TYPE B ELECTRIC ACTUATOR
3	SUBMERSIBLE WASTEWATER PUMP - MAX 100 HP
4	SUBMERSIBLE WASTEWATER PUMP - MAX 215 HP
5	8" FLG'D 90° ELL
6	8" FLEXIBLE COUPLING
7	8" FLG'D CHECK VALVE
8	12" DI PIPE (POLYETHYLENE LINED)
9	12"x16" MJ ECC REDUCER
10	16" DI PIPE (POLYETHYLENE LINED)
11	12"x12"x8" MJ TEE
12	16" MJ 90° ELL
13	16"x16"x8" MJ TEE
14	NOT USED
15	4" PVC DRAINLINE
16	NOT USED
17	4" PLUG VALVE
18	16" FLG'D CHECK VALVE
19	16" FLG'D ECC PLUG VALVE
20	NOT USED
21	NOT USED
22	NOT USED
23	16" FLG'D 90° ELL
24	16" FLEXIBLE COUPLING
25	16" DI PIPE (POLYETHYLENE LINED)
26	24" MJ 90° ELL
27	16"x24" MJ ECCENTRIC REDUCER
28	30"x30"x16" MJ TEE
29	24"x30" MJ ECCENTRIC REDUCER
30	30" DI PIPE (POLYETHYLENE LINED)
31	30" MJ 90° ELL
32	NOT USED
33	300 GAL POLYETHYLENE STORAGE TANK
34	NOT USED
35	4" PVC WYE
36	30" PVC GRAVITY/PRESSURE PIPELINE
37	600 KW STANDBY GENERATOR W/ INTEGRAL DIESEL TANK
38	RECEIVER MOUNTED COMPRESSOR
39	NOT USED
40	8" FLG'D ECC PLUG VALVE
41	12" MJ 90° ELL
42	16" MJ ECC PLUG VALVE
43	24" FLG'D ECC PLUG VALVE
44	NOT USED
45	EXHAUST BLOWER RATED FOR 1000 CFM
46	1/6 HP RECIRCULATION PUMP
47	EYEWASH & SHOWER
48	8" DI PIPE (POLYETHYLENE LINED)
49	18" DI PIPE (POLYETHYLENE LINED)
50	18"x24" MJ ECCENTRIC REDUCER
51	18" MJ 90° ELL
52	24"x24"x16" MJ TEE
53	24" DI PIPE (POLYETHYLENE LINED)
54	8" MJ 90° ELL
55	16"x8" MJ ECCENTRIC REDUCER
56	3/4" GALVANIZED STEEL PIPE
57	12" PVC DUCT
58	2" PVC POTABLE WATER SUPPLY AND HOSE BIBBS PER SITE PLAN
59	4" PVC 90° ELL
60	4" PVC 45° ELL
61	NOT USED
62	3/4" 316 STAINLESS STEEL TUBING
63	DUPLEX SUMP PUMPS W/LEVEL CONTROLS & DISCHARGE PV'S & CV'S
64	2" AIR RELEASE VALVE

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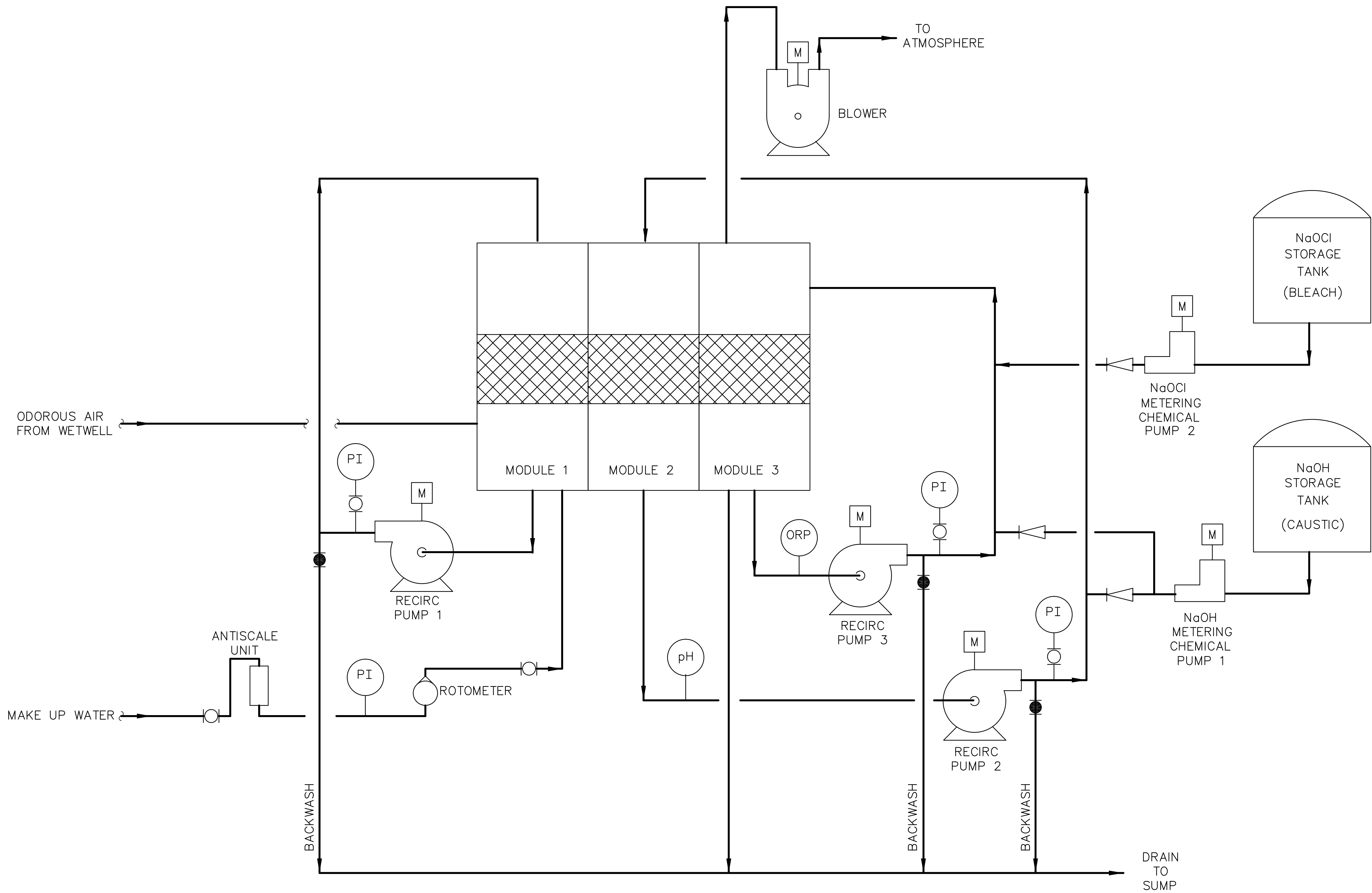
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HOLLISTER STREET PUMP STATION
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FIGURE 3.13-3
CAD REF. NO. 120M FIG 3.13-3

XREFS: \\TILELK.dwg IMAGES:None
User: LARSON Spec: PIRNIE STANDARD File: \\pro\\1991037\\O&M schematics\\20M FIG 3.13-4.DWG Scale: 1:1 Date: 03/21/2011 Time: 10:03 Layout: Blank



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**HOLLISTER STREET PUMP STATION
ODOR REDUCTION SYSTEM
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FIGURE 3.13-4
CAD REF. NO. 120M FIG 3.13-4



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VOLUME 2 OF 4

OPERATIONS AND MAINTENANCE MANUAL

SOUTH BAY INTERNATIONAL WASTEWATER TREATMENT PLANT

VOLUME 2 OF 4

**INTERNATIONAL BOUNDARY
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WATER COMMISSION**

**OPERATION AND MAINTENANCE
MANUAL**

**FOR THE
SOUTH BAY**

INTERNATIONAL WASTEWATER TREATMENT PLANT

Volume 2 of 4

**MALCOLM PIRNIE, INC.
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(760) 602-3800**

April 2011

Chapter 4

OPERATIONAL PROCEDURES

NOTICE AND CAUTIONS TO USERS OF THIS O&M MANUAL

This O&M Manual provides a general overview only of the South Bay International Wastewater Treatment Plant (SBIWTP).

This O&M Manual relies on information obtained from the various equipment manufactures and the Construction Contractors that were involved in construction of the SBIWTP. The information obtained from equipment manufacturers and construction Contractors was reviewed by Malcolm Pirnie only for general compliance with the submittal requirements specified in construction Contract Documents.

All USERS of this O&M Manual shall be required to consult the detailed O&M Manuals provided by the equipment manufactures and Construction Contractors and to understand and follow the directions given therein for safe operation and maintenance of all equipment and systems prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all safety manuals published and provided by their employer(s) and to understand and follow all directions given therein, including but not limited to *Personnel Protective Equipment (PPE), Electrical Lock-Out Procedures, Fall Prevention Procedures and Confined Space Entry Procedures* prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all “record” drawings and to understand how equipment and systems are intended to be operated and controlled prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to understand and acknowledge that the SBIWTP contains chemicals and equipment that if not operated and/or maintained in a responsible and safe manner can result in serious injury or death.

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4.0 FOREWORD

This chapter describes the general operational procedures for the South Bay IWTP and incorporates the following main elements for each of the major unit treatment processes.

1. General Description of Controls and Operations
2. General Step by Step Start-Up Procedures
3. General Step by Step Shutdown Procedures
4. Alarm and Status Annunciation
5. General Daily Operational Checks
6. General Training Record

Included below are general operational procedures and requirements applicable to all major unit treatment processes of the plant.

4.0.1 Process Control and Instrumentation

4.0.1.1 General Concept

The South Bay IWTP was constructed under two primary construction contracts that lagged each other by approximately 12 years.

- In early summer 1998, the primary treatment portion of the plant (known as the Advanced Primary Treatment Plant) was put into service. The control philosophy for this portion of the plant relied primarily on hard-wired local controls with status and annunciation to the Plant Control Center (PCC) located in the Solids Processing Personnel Building just east of the USSTs.
- In early winter 2010, the secondary treatment portion of the plant (known as the secondary treatment plant) was put into service. The control philosophy for this portion of the plant relied primarily on SCADA control with status and annunciation, and remote control at the Operations Building Control Center (OBCC) just north of the PSTs.
- As part of the construction for the secondary treatment portion of the plant both of the control systems were integrated into the SCADA system but the local controls for the primary treatment portion of the plant as described herein were retained.

All process controls are located at the unit process local control center (LCC) for each respective process area. Each LCC houses the local control panels (LCP) for the process area components, and the switchboards, motor control centers and variable frequency drives as required.

The LCPs contain control switches, status lights, annunciators, essential instruments, indicators, recorders, and a programmable logic controller (PLC), as appropriate, for sequencing of equipment operation and adjustment of process and/or equipment set points.

Field controls at driven equipment include, in general, remote-off-test (ROT) switches at the motors. The “off” position is lockable. The “test” position is spring loaded. The “remote” positions arm controls located at the respective LCPs and/or a on the SCADA system. When the ROT switch is placed in the “off” positions, the unit is not energized by any means.

Both the Plant Control Center (PCC) and the Operations Building Control Center (OBCC) are provided for monitoring and recording of main process variables and annunciation of main process alarms and life threatening conditions as defined in Section 4.0.1.3. Both the PCC and OBCC have access to SCADA for control and monitoring.

4.0.1.2 Local Control Center Locations

The specific Local Control Center (LCC) locations are shown in Figure 4.0-1:

1. Headworks LCCs are located within the Headworks (HW) Building. Currently, HW-LCC-EAST is constructed. Under ultimate conditions, HW-LCC-WEST will also be included.
2. Primary Sedimentation LCCs are located adjacent to the Primary Sedimentation Tanks (PST). Currently, PST-LCC-EAST is constructed. Under ultimate conditions, PST-LCC-WEST will also be included.
3. Activated Sludge LCCs will be located in the North Blower Structure adjacent to the future Activated Sludge Tanks (AST). Currently, AST-LCC-N is constructed. Under ultimate conditions, South Blower Structure will also be included and house the AST-LCC-S.
4. Secondary Sedimentation LCCs are located adjacent to the Secondary Sedimentation Tanks (SST). Currently, SST-LCC-1 is constructed. Under

ultimate conditions, SST-LCC-2, SST-LCC-3, and SST-LCC-4 will also be included.

5. Dissolved Air Flotation LCC is located at the WAS Thickening Facilities adjacent to the DAF Polymer Storage Facilities. Currently DAF-LCC is constructed. Under ultimate conditions the WAS Thickening Facilities will be relocated to their permanent location as shown in Figure 4.0-1.
6. Solids Processing LCC is located in the Solids Processing (SP) LCC Building adjacent to the Sludge Dewatering Building. Currently, SP-LCC is constructed and subsequently will be expanded for ultimate conditions.
7. Future Anaerobic Digestion LCCs will be located adjacent to future Anaerobic Digesters (AD). Under ultimate conditions, AD-LCC-1, AD-LCC-2, AD-LCC-3, and AD-LCC4 will be constructed if the IBWC decides to incorporate anaerobic digestion into the South Bay IWTP.
8. The Sodium Hypochlorite LCC is located adjacent to the Sodium Hypochlorite Facilities. Currently, NaOCl-LCC is constructed. Future chlorination facilities may include chlorine gas addition and Chlorination System LCC (Cl₂-LCC) that will be located in a future Chlorination/Dechlorination Building if the IBWC decides to utilize chlorine gas for disinfection.
9. Standby Power Generator LCC is located adjacent to the generator. Currently, GEN-LCC is constructed.
10. MCC/Generator Building at the Goat Canyon Pump Station houses all associated control panels, MCCs, switchboards, and VFDs and acts as an LCC for this pump station.
11. MCC/Generator Building at the Hollister Street Pump Station houses all associated control panels, MCCs, switchboards, and VFDs and acts as an LCC for this pump station.

4.0.1.3 Plant Control Center & Operations Building Control Center (OBCC)

The Plant Control Center (PCC) located in the Solids Processing Building Personnel Building and the Operations Building Control Center (OBCC) include:

1. Common alarm indication and logging for each LCP at the plant.
2. Individual LCP alarm indication and logging, as appropriate for essential process and equipment components from the plant and from the Goat Canyon and Hollister Street Pump Stations.

3. Indication and logging of essential process recordings such as flows, temperature, liquid levels and chemical (chlorine residual) analysis.
4. Status (ON-OFF) indication for major process equipment such as Influent Pumps.
5. Individual emergency alarm indication and logging of life threatening conditions such as belt filter presses, conveyors, lime stabilization emergency stops, emergency eyewash/shower activation, high concentration of combustible gases, and high level in containment area sumps.
6. SCADA controls for equipment and systems when placed in the “remote” mode of operation.

Common alarm indications at the PCC and the OBCS are displayed on the SCADA system HMIs. Remote control from the PCC and/or the OBCS is also incorporated into the SCADA system.

4.0.1.4 Operational Control

In general, the Operator is required to select equipment operation (“ON”, “OFF”, “AUTO”), and adjust process control set points for each unit process at the local control panel (LCP) located at the LCC for the particular process and remote collection system pump stations associated with the original primary treatment portion of the plant. In some cases, such as for liquid level bubbler controls, the LCP associated with the process area may be located in the field.

In general, the Operator is required place the remote-off-test switches for all unit process equipment into the “remote” mode for systems that were constructed with the secondary treatment portion of the plant.

It should be noted, that process and equipment set points described in this manual represent only initial set points that should be (or have been) established for the processes and equipment of the South Bay IWTP during the plant start-up and testing period. The set points should be optimized during the plant operation based on the operating experience under directions of your Operations Supervisor.

Each LCP contains the necessary selector switches, controllers, and equipment status and failure indication for the unit process. When a system fails within a process area, the

individual equipment failure is indicated at the LCP in the LCC, and a separate single alarm is transmitted to and indicated at the SCADA to designate the LCP controlling the failed equipment or process. When a LCP failure is indicated on SCADA, the Operator is required to check the specific LCP to determine the specific failure within the unit process area. In addition to the common LCP alarm signal to SCADA, individual alarms for critical failures or conditions are also displayed on SCADA as appropriate.

Wastewater treatment plant facilities are started up and shut down upon direction of the responsible Operations Supervisor. General requirements for operation include:

- Use trained personnel who know the proper procedures.
- Equipment and safeties must work properly.
- Tanks are free of debris.
- All safety procedures and housekeeping practices are followed.
- Motor-driven equipment is started locally in order to observe proper operation.
- Control systems operate properly.

Refer to specific descriptions of controls and operation for each major unit treatment process presented in Sections 4.1 through 4.13.

4.0.2 General Start-Up Procedures

Prior to start-up, the Operator should follow the following general guidelines for each system:

1. Verify that the Operations Supervisor is aware of start-up.
2. Check all piping and connections.
3. Visually observe all tanks and structures for any signs of damage or improper installation.
4. Ensure that respective Local Control Panels and Electrical Distribution Panels are energized.
5. Ensure that all alarms are silenced and reset.
6. Ensure that Remote-Off-Test (ROT) switches for all selected in-service and out-of-service equipment are in their proper position.

7. Ensure that the circuit breakers at repetitive Motor Control Centers and Electrical Distribution Panels are energized for all equipment to be operated.
8. Ensure that the local disconnect switches are energized for all equipment to be operated, and de-energized for all equipment not in duty or standby service.
9. Ensure that all pressure, flow, pH, level, and combustible gas sensors and indicating transmitters to be operated are functional and energized from the respective panels. All sensors should be carefully calibrated before the system start-up.
10. Ensure that all isolation valves are open for all selected in-service (duty and standby) equipment.
11. Ensure the plant non-potable water system is in operation.

Refer to specific start-up procedures for each major unit treatment process presented in Sections 4.1 through 4.13.

4.0.3 General Shutdown Procedures

The plant facilities should be shut down according to the following general guidelines:

1. Verify that the Operations Supervisor is aware of shut-down.
2. Before shutting down the equipment, ensure that the standby units are ready for operation.
3. Notify your Operations Supervisor if the shutdown is an emergency.
4. Be prepared to reset alarms that are set off.
5. Follow the general procedures described in Sections 4.1 through 4.13. The procedures presented in these sections describe the routine operational (short-term) shutdowns of the elements of the plant facilities. If a component of the facilities is expected to be out of service for an extended period of time (for example, during maintenance and repair on the unit), in addition to procedures of the routine operational shutdown, use the following general procedures for each unit:

- a. Turn the respective circuit breaker (at the respective Motor Control Center) to the OFF position.
- b. Lock the appropriate ROT switch.
- c. Place “CAUTION-OUT OF ORDER” tag on the circuit breaker if any malfunction has occurred.
- d. De-energize the respective local disconnect switches.
- e. De-energize all pressure, flow, level gas, pH, ORP sensors and indicating transmitters and heat tracing systems associated with the component to be shut down at the respective panels.
- f. Shut off the seal water supply to the unit (if used).
- g. Close the isolation inlet and outlet (suction and discharge) valves.
- h. Drain water (or sludge) from the unit.
- i. Flush the unit with non-potable water using the flushing connections.
- j. Visually inspect all piping and connections associated with the unit.

4.0.4 General Alarm and Status Annunciation Strategies

The general status and alarm annunciation approach for the plant facilities includes the following major elements:

1. Field status and alarm annunciation at the respective field panels and on SCADA.
2. Status and alarm annunciation at the respective Local Control Panels (LCPs) in the respective Local Control Centers (LCCs) and on SCADA.
3. Motor control centers (MCC) located in the LCCs are equipped with motor “run,” “off” and “tripped” lights, and an auxiliary starter contact to activate a run light in the respective LCP and on SCADA for the associated piece of equipment.
4. All VFD driven motors and all motors larger than 75 HP are provided with a “motor failure” alarm at the respective LCP, and the VFD panels also include “high winding temperature” and “motor overload” indicators that activate an equipment failure alarm at the respective LCP and on SCADA.

5. Annunciation on SCADA of common LCP alarms and individual essential process alarms and life threatening conditions and selected status indication for major process equipment as defined in Section 4.0.1.3.

4.0.5 General Requirements to Daily Operations Checks

Daily operational checks are those routine procedures the Operator follows each day to maintain and ensure proper operation of the facility. Each operational check should be performed at least once per shift when the plant is in operation.

Any unusual operation, all noted problems, observed wear or damages, should be recorded and reported to your Operations Supervisor and to your Maintenance Supervisor. The Maintenance Supervisor should then schedule to assess the problem areas and make repairs as necessary.

During plant operation, only slight adjustments should be made at any one time. All adjustments should be recorded and reported to your Operations Supervisor.

Before each operational shift, the Operator should check the following:

1. Review the Daily Station Log in order to keep yourself up to date on what has occurred or what has been changed in the facility operation.
2. Check all annunciator charts, control panels and SCADA for proper operation and current status of equipment.

Consult appropriate sections of this Operation and Maintenance Manual for additional general monitoring instructions (see Sections 4.1 through 4.13).

4.0.6 Training Record

Sections 4.1 through 4.13 present specific record requirements to be used to ensure a complete understanding of the major unit treatment processes. These include reading assignment requirements and field instruction requirements to be utilized for the staff training.

The plant staff is advised to utilize, as a minimum, the following manuals of practices and training manuals for the reading assignments:

1. Operation of Municipal Wastewater Treatment Plants - MOP 11 (Fifth Addition). Water Environment Federation, 1996.

2. Operation of Wastewater Treatment Plants - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1993.
3. Advanced Wastewater Treatment - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1991.
4. Process and equipment specific manufacturer's Operation and Maintenance manuals for this project.

The plant staff should follow the field instruction requirements presented in Section 4.1 through 4.13 and should be thoroughly familiar with the locations, purpose, operation and controls, preventive maintenance, and troubleshooting of their facilities and each specific element of these facilities.

4.1 HEADWORKS

4.1.1 Description of Controls and Operation

4.1.1.1 General

Refer to the general control and operational philosophy description presented in 4.0.1.

The general control, status and annunciation strategies for the Headworks Area include field controls and local control panels (LCP) located in the field or in the Headworks Area Local Control Center (HWE-LCC-EAST). Grit chamber LCPs is located in the Primary Sedimentation Area Local Control Center (PST-LCC-EAST). Field controls at motor driven equipment include, in general, remote-off-test (ROT) switches at the motors. The “Off” position is lockable. The “test” position is spring loaded. The “Remote” position runs controls at the respective LCP.

The LCPs contain control switches, status lights, annunciators, essential recorders, and programmable logic controllers (PLCs), as appropriate for sequencing of equipment operation and adjustment of process and/of equipment setpoints. PLC-HWE is configured so that upon failure of the duty PLC, a redundant PLC takes over the process without interruption of controls or monitoring activities. On failure of a PLC-HWE, a “PLC-HWE FAILURE” alarm is initiated at the panel LCP-HWE located at the HWE-LCC-EAST and a “HWE-LCC-EAST PLC FAILURE” common alarm to the panel Plant Control Center (PCC).

The HWE-LCC-EAST and PST-LCC-EAST also house switchboards, motor control centers (MCC) and variable frequency drives, as required and further defined herein.

Influent samples are taken by Influent Wastewater Sampler No. 1 (IWS1) which is located at the Headworks Junction Structure, Influent Wastewater Sampler No. 2 (IWS2) which is located at the Canyon Collector Junction Structure, and Influent Wastewater Sampler No. 3 (IWS3) which is located at the influent channel of the Screening Area located in the Headworks Area Structure. Samples are taken based on the flow pacing signal, generated by means of the Influent Pump Station magmeter, received from the PLC-HWE, or on a timed interval.

A complete gas detection and monitoring system is provided in the Headworks Area for the purpose of monitoring a wide range of combustible and toxic gases. A six channel, wall mounted, monitoring system is provided in a NEMA 12 panel which receives signals from the Screening Area (Analyzer No. 1), Influent Pump Station (Analyzer No. 2), Storage Bin Area (Analyzer No. 3), and the Grit Dewatering Area (Analyzer No. 4). Area sensors/transmitters for the various combustible gases provide an alarm condition signal sent to the LCP-HWE for annunciation alarm and to the PCC annunciator panel.

Refer to Figure No. 3.1-1 for the Headworks Process Schematic.

4.1.1.2 Screening Equipment

Three (3) mechanical bar screens are provided for the Phase 1 facilities which along with three (3) manually cleaned bar screens are sized for one half of ultimate capacity. For the ultimate design, a mirror image headworks facility will be constructed which will provide six (6) additional screens. One (1) additional mechanical screen will replace a manual screen in the Phase 1 facility and four (4) additional mechanical screens will be added in the ultimate mirror image Headworks Facility.

The LCP-HWE is provided with an Operator Interface Workstation mounted on the front of the panel to allow the operator to view and change the PLC-HWE registers, timers, counters, contact and coils as programmed. The workstation allows the operators to modify the following:

- The influent channel differential level that determines the mechanical screen signal to rake.
- The timer frequency signal to cause mechanical screens to rake on a timed basis.
- High flow/Low flow Time Periods

Mechanical screen operation is controlled through PLC interval cycle and 24 hour cycle duration timer logic for the purpose of initiating raking cycles for all of the mechanical screens. The adjustable interval cycle timer is used to set the cycle intervals (time between cycles) for the automatic starting of Mechanical Screens No. 1 and No. 2. The adjustable

cycle duration logic (number of cycles) is used to initiate the duration of operation upon automatic start-up.

The system is governed by High Flow/Low Flow time periods. These periods are entered using the Operator Interface Workstation at the LCP-HWE. Four times are entered to define two high flow and two low flow periods each day. These time values are propagated to all affected PLCs via the Data Highway. Within each PLC, the times are examined to determine if the current time is a high flow or low flow period. Controls of individual elements are then based on this flag (Hi or Lo Flow). Each system action is described more completely below.

The following examples are offered to more clearly define this Hi/Lo Flow mode.

Example 1:

High Flow Starts at 7 AM and continues until 1 PM. High flow begins again at 5 PM and continues to 9 PM.

High Flow Start:	0700
Low Flow Start:	1300
High Flow Start:	1700
Low Flow Start:	2100

Example 2:

High Flow Starts at 8 AM and continues until 9 PM. Low Flow is from 9 PM to 8 AM.

High Flow Start:	0800
Low Flow Start:	2100
High Flow Start:	2400
Low Flow Start:	2400

Note in this scenario, the two entries set to 2400 are effectively skipped and will not be in effect.

Example 3:

High Flow at all times:

High Flow Start:	0000
Low Flow Start:	2400
High Flow Start:	2400
Low Flow Start:	2400

Example 4:

Low Flow at all times:

High Flow Start:	2400
Low Flow Start:	2400
High Flow Start:	2400
Low Flow Start:	2400

The PLC-HWE Operator Interface Workstation setpoints for High Flow/Low Flow Durations are as follows:

	<u>High Flow</u>	<u>Low Flow</u>
Period 1	0600 (HHMM)	2400 (HHMM)
Period 2	2400 (HHMM)	2400 (HHMM)

The following interval/duration times shall be entered at the LCP-HWE Operator Interface Workstation to define the operating characteristics of the mechanical screens and conveyors.

Start Rake; Hi Differential Level		Feet (2.0)
High Flow Cycle Interval	30	Minutes
Low Flow Cycle Interval	60	Minutes
Rake Durations	2	Seconds

The appropriate values are selected based on the Hi/Lo flow flag. Once selected, the cycle interval is the time between the start of each operation. Setting this value to 0 would cause a continuous interval. When a cycle starts, PLC-HWE will start the rake process for Screen 1 and start Conveyor 1. The rake command will stay on for the Screen 1 duration. Next, PLC-HWE will start the rake process for Screen 3 (leaving Conveyor 1 on). This command will stay on for the Screen 3 duration. When the Screen 3 duration period ends, the Conveyor 1 will remain on for the Conveyor 1 extended run duration. At the end of the setpoint duration, Conveyor 1 will be turned off and Conveyor 2 will be started at the same time the rake process is started for Screen 2. When the Screen 2 duration period ends, Conveyor 2 will remain on for the Conveyor 2 extended run period.

Note that cycle intervals are always measured from the start of the cycle. If the interval is less than the time to complete a cycle, the operation will be effectively continuous. Whenever a change between hi/lo flow is detected, the currently executing interval timer will be allowed to complete. When the time is complete, the cycle will execute and the new interval value will be assigned to the timer for the start of the next cycle. High differential level still initiates a rake cycle independent of the value of the cycle interval timer. Once started due to this condition, the cycle interval timer restarts.

Mechanical Bar Screens

Each mechanical screen is provided with a Hand-Off-Auto (HOA) selector switch and a Forward-Off-Reverse (FOR) switch mounted at the mechanical screen. In the “Hand” mode the screen runs continuously according to the position of the FOR switch. The “Reverse” position of the FOR switch is spring loaded and tests the screen operation in the reverse direction when used in conjunction with the “Hand” position of the HOA switch. The “Reverse” position is also used in order to briefly operate the screen in the reverse direction and help remove any obstruction in the rake arm line of travel through the bar rack. The screen does not operate in either direction when the FOR switch or the HOA switch is set in the “Off” position. In the “Auto” mode the screen operates via a PLC-HWE within the designated Local Control Center (HWE-LCC-EAST) which is used to set the screening cycle start interval and cycle duration. When the HOA switch is in the “Auto” position, the screen always operates in the forward direction through complete cycles, regardless of the position of the FOR switch.

A bubbler system is provided to measure the difference between water surface elevations upstream and downstream of the screens. When the difference in the water surface elevations upstream and downstream of the screens reaches a preset high differential level due to the clogging of the bar racks, the headworks bubbler level sensing system differential pressure switch located inside the Headworks Bubbler Control Panel (BCP-HW) overrides normal operation of the screens and initiates the screen raking cycle for all mechanical screens. System control returns to normal when the differential water surface elevation across the screens returns to a preset level. When the water surface upstream of the

screens continues to rise above a pre-set high differential level, a float activated level switch activates a “HEADWORKS INFLUENT CHANNEL HIGH-HIGH LEVEL” alarm which is annunciated at the HWE-LCC-EAST and PCC annunciator modules. The BCP-HW generates a common alarm due to compressor malfunction or low air pressure at the bubbler manifold, activating “BCP-HW COMMON ALARM” at the LCP-HWE and at the PCC.

Each screen is furnished with a locally mounted Lock-Out-Stop (LOS) switch. When the two position switch is pushed, screen operation is immediately stopped at its present location, overriding all other controls, and is lockable. When released, screen operation continues by the modes of the other switches.

A high torque switch is furnished at each screen in order to shut down screen operation in the event of an excessive load on the motor. The switch also activates a “MECHANICAL SCREEN FAILURE” alarm for each screen which appears at the LCP-HWE located at the HWE-LCC-EAST. In addition to the high torque alarm, a “MECHANICAL SCREEN FAILURE” alarm for each screen is also annunciated at the LCP-HWE for mechanical screen motor overload and drive temperature high indication. Light indication is provided at the LCP-HWE of mechanical screen motor “RUN”, “TORQUE OVERLOAD”, “MOTOR OVERLOAD”, and “DRIVE TEMPERATURE HIGH”. All mechanical screen LCP-HWE alarms are annunciated as a common “HEADWORKS MECHANICAL SCREEN FAILURE” at the PCC annunciator module.

A monitor “END OF TRAVEL” limit switch is located at the screen to indicate to the MCC that the screen has completed a cycle and is in the stored position. A monitor “REVERSE PERMISSIVE” limit switch is located at the screen and sends a signal to the MCC to shut off the motor at the rake position where further reverse travel will cause damage to the mechanical screen.

A probe type pH transmitter is installed in the influent channel of the Screening Area to monitor the pH of the influent wastewater. The pH probe is installed under the Screening Area influent channel cover on a removable insertion rod that fits into another pipe acting as a stilling well. PLC-HWE generates a “INFLUENT CHANNEL LOW pH” alarm when the pH gets below a pH of four (4), and a “INFLUENT CHANNEL HIGH pH “ alarm when the

pH gets above ten (10). Both alarms are annunciated at the LCP-HWE and a “INFLUENT CHANNEL pH HIGH/LOW” common alarm is annunciated at the PCC.

The Headworks Influent Channel and Storage Bin Area Combustible Gas (CG) sensors transmit a signal, corresponding to the CG detected, to the Headworks Gas Detection Monitoring Systems. The signal is indicated at the local panels. Sensor “FAILURE INDICATION”, “WARNING” condition at 2.5% of lower explosive limit (LEL) and “ALARM” condition at 3.5% of LEL are displayed at the local panel. “HEADWORKS INFLUENT CHANNEL COMBUSTIBLE GAS HIGH LEVEL” and “STORAGE BIN AREA COMBUSTIBLE GAS HIGH LEVEL” alarms are annunciated at the LCP-HWE and “SCREENINGS AREA COMBUSTIBLE GAS DETECTION” and “STORAGE BIN AREA COMBUSTIBLE GAS DETECTION” alarms are annunciated at the PCC.

Screening Area and Storage Bin Area H₂S sensors are provided which transmit a signal corresponding to the H₂S detected to the Headworks Gas Detection Monitoring System. This signal is also indicated at the local panels. Sensor “FAILURE”, “WARNING” condition at 8 ppm, and “ALARM” at 10 ppm are displayed at the local panels. A ‘HEADWORKS INFLUENT CHANNEL H₂S GAS HIGH LEVEL” and “STORAGE BIN AREA H₂S GAS HIGH LEVEL” alarm is annunciated at the LCP-HWE, and “SCREENINGS AREA HYDROGEN SULFIDE DETECTION” and “STORAGE BIN AREA HYDROGEN SULFIDE DETECTION” alarms are annunciated at the PCC.

Conveyors

An HOA switch for each conveyor motor is furnished at the LCP-HWE located at the HWE-LCC-EAST. In the “Hand” mode the conveyor runs continuously, and in the OFF mode the conveyor only operates in the “Test” mode associated with the ROT switch. In the “Auto” mode, each conveyor operates through PLC logic based on the operation of the mechanical screen that each conveyor serves. Each conveyor continues to operate for a preset adjustable period of time after a screen stops in order to dispose of material remaining on the conveyor.

A ROT switch is furnished locally at each conveyor. The “Remote” position arms controls located at the PLC-HWE. The “Off” position is lockable and prevents the conveyor

from operating, overriding all other controls. The “Test” position is spring loaded, and is used to test the operation of the screen with the HOA switch in the “Off” position.

Each conveyor is provided with a belt motion detector switch and an emergency tagline switch. The motion detector identifies conveyor failure and activates a “SCREENING CONVEYOR FAILURE” alarm at the LCP-HWE, and a common “HEADWORKS SCREENING CONVEYOR FAILURE” alarm which is annunciated at the PCC annunciator module. The tagline switch allows the operator to stop conveyor operation from anywhere along the run of the conveyor and is equipped with a positive safety lock to prevent accidental reset of the switch. The tagline switch activates a “SCREENING CONVEYOR TAGLINE” alarm at the LCP-HWE and a common “HEADWORKS CONVEYOR TAGLINE” alarm which is annunciated at the PCC.

A Screening Conveyor “RUN” and “MOTOR OVERLOAD” indication light is located at the LCP-HWE.

Each conveyor is provided with an electric plow blade operator mounted at the Storage Bin Area for the purpose of scraping the conveyor belt to remove debris into the Grit Storage Bins. Each conveyor is provided with a two position Up-Down Plow Switch located at the plow motor. The “Up” and “Down” positions are spring loaded. Plow “Up” and “Down” pushbuttons and indicator lights, furnished at the LCP-GCP1 located at the HWE-LCC-EAST, are provided which operate based on signals from end-of-travel limit switches when at the full “Up” and “Down” plow positions.

The PLC-HWE setpoints for the Screenings Conveyors are as follows:

Conveyor Extend Run Times	90 Seconds
Conveyor Alarm Inhibit Time	30 Seconds

The “Conveyor Extend Run Times” setpoint determines the length of time that a conveyor will run after a screen stops. The “Conveyor Alarm Inhibit Time” setpoint determines the delay between alarm annunciation and the detection of a conveyor failure by the motor switch.

4.1.1.3 Influent Pump Station

Five (5) Vertical Turbine Solids Handling Pumps and provisions for the installation of one (1) future pump are provided at the Influent Pump Station (IPS). Three (3) of the influent pumps (2, 4, and future 6) are driven by constant speed drives and three (3) pumps (1, 3, and 5) are driven by variable frequency drives (VFDs). In order to meet design flow requirements two (2) variable speed and two (2) constant speed pumps are operated, while the remaining variable speed pump serves as standby based on the water level in the IPS. Each pump is provided with an HOA switch mounted at the LCP-IPS located at the HWE-PCC-EAST. In the “Hand” mode the influent pump runs continuously. The speed of each variable speed influent pump may be controlled via a manual speed adjustment at the LCP-IPS when the hot switch is in the “Hand” mode. In the “Off” mode the influent pump only operates in the “Test” mode at the ROT switch. In the “Auto” mode the influent pumps are controlled via a redundant bubbler level control system at the IPS wetwell. A Three-position, Lead Variable Speed (VS) Influent Pump Selector Switch and a Two-position, Lead-lag Constant Speed (CS) selector switch are also installed at the LCP-IPS. The lead-lag status of the variable and constant speed pumps is determined by the setting of each respective switch. For example, the settings for the Lead VS pump Selector Switch are Pump No. 1, Pump No. 3 and Pump No. 5. When a lead VS position is selected, the lag and standby pumps are automatically designated in sequential order following the pump selected. For instance, if Pump No. 1 is selected as the lead VS pump, Pump No. 3 is designated as the lag VS pump and Pump No. 5 is designated as the standby VS pump. The VS and CS pump lead-lag-standby configurations are shown below.

Variable Speed Pump Lead-Lag-Standby Configuration

Lead Variable Speed Selector Switch Position	Lag Pump	Standby Pump
Pump No. 1	No. 3	No. 5
Pump No. 3	No. 5	No. 1
Pump No. 5	No. 1	No. 3

Constant Speed Pump Lead/Lag Configuration

Lead Constant Speed Selector Switch Position	Lag Pump
Pump No. 2	No. 4
Pump No. 4	No. 2

Each influent pump is furnished with a locally-mounted ROT switch. The “Remote” position arms controls located at the LCP-IPS and the respective influent pump. The “Off” position is lockable and prevents the influent pump from operating, overriding all other controls. The “Test” position is spring loaded, and is used to test the operation of the influent pump with the HOA switch in the “Off” position.

The failure of each influent variable speed pump is detected by a discharge check valve limit switch which is mounted on the check valve swing arm. If flow is not detected within an operator adjustable time period, PLC-HWE will shut down and lock out the pumps. The limit switch activates an “INFLUENT PUMP FAILURE” alarm at the LCP-IPS.

An IPS seal water flow switch is provided on the seal water influent pump supply header to activate an “INFLUENT PUMP STATION SEAL WATER FAILURE” alarm at the LCP-IPS and at the PCC. Both alarms are also annunciated at the PCC through a single “INFLUENT PUMP STATION FAILURE” common alarm. Loss of seal water flow after the IPS is in operation will shut down any pump that is running, even in hand mode, and will require the reset pushbutton to be pressed to reset the PLC logic, after corrective measures have been completed to determine the cause of failure. An IPS pump “RUN” indicating light is annunciated at LCP-IPS.

Each VFD located at the HWE-LCC-EAST is provided with the following control features:

- Elapsed time meter
- Adjustable acceleration time
- Adjustable ramp-down-to-stop time
- Local/remote switch for speed control

- Manual speed adjustment
- Normal/bypass switch
- Speed readout
- HOA for start/stop
- Lockable main circuit breaker disconnect
- Complete running and diagnostic fault readout

Two (2) independent bubbler level monitoring systems are provided at the IPS wetwell, providing 100 percent redundancy, with automatic startup of the redundant bubbler system upon failure of the primary bubbler system. Each bubbler system is equipped with an “INFLUENT PUMP STATION WETWELL HIGH LEVEL” and “INFLUENT PUMP STATION WETWELL LOW LEVEL” alarms annunciated at the LCP-IPS and at the PCC through a single “INFLUENT PUMP STATION BUBBLER FAILURE” common alarm. An analog signal proportional to wetwell water surface elevation is transmitted to the PLC for system control and high/low level annunciation. Each bubbler level detector is housed in a NEMA 4X bubbler control panel to be located at the IPS. Each bubbler panel contains built-in duplex compressors with automatic switchover to the standby compressor, should the operating compressor fail. If either compressor, or both, should fail, a common alarm is annunciated at the LCP-IPS and the PCC. A selector switch is provided on the front of the LCP-IPS to allow the operator to select BCP1-IPS or BCP2-IPS to control the IPS. In the “Auto” mode of the HOA switch, the influent pumps operate to maintain a set water surface elevation in the wetwell. If the IPS low level switch is annunciated, the IPS pumps shut down. If the water surface rises above the setpoint control elevation, the bubbler system sends a level proportional signal to the LCP-IPS to start the lead variable speed pump at the setpoint speed. If the water surface elevation continues to rise, the VFD for the lead pump increases motor speed according to the level-proportional signal from the bubbler system. When the lead variable speed pump reaches full speed, it decreases to a speed which corresponds to 50% of the maximum pump capacity and the lag variable speed pump then comes on line such that both pumps share load at 50% each and increase speed simultaneously to handle increasing influent flow. If the water surface elevation continues to rise, the variable speed pumps ramp up to full speed. When both variable speed pumps reach full

speed and the water surface elevation continues to rise, the lead constant speed pump comes on line after both variable speed pumps have simultaneously decreased to a speed which corresponds to 50% of the maximum pump capacity, thus sharing the influent flow above the capacity of the lead constant speed pump. As influent flows continue to increase above the combined capacity of the lead constant speed pump and both variable speed pumps, both variable speed pumps again decrease to a speed which corresponds to 50% of the maximum pump capacity, and the lag constant speed pump comes on line. As flows continue to increase to design peak flow, both variable speed pumps reach full speed and share the peak flow with both constant speed pumps. When the influent flow rate decreases the pumps operate such that the constant speed pumps drop off line when both variable speed pumps decrease to a speed which corresponds to 50% of the maximum pump capacity.

The PLC-HWE setpoints for the Influent Pump Station are as follows:

Pump Level Setpoint:	6.0 Feet
High Level Alarm:	8.7 Feet
Low Level Alarm:	3.0 Feet
Pump Low Flow Time Limit:	30 Seconds
Seal Water Fail Time Limit:	1 Second

The “Pump Level Setpoint” determines the water level which will be maintained in the wetwell. The “Pump Low Flow” and “Seal Water Fail” time limit setpoints establish delays between alarm annunciation and alarm condition signals.

An Influent Pump Station Combustible Gas (CG) sensor is provided which transmits a signal, corresponding to the CG detected, to the Headworks Gas Detection Monitoring System and is displayed at the local panel. Sensor “FAILURE”, “WARNING” condition at 2.5% of lower explosive limit (LEL), and “ALARM” condition at 3.5% of LEL are displayed at the local panel. An “INFLUENT PUMP STATION COMBUSTIBLE GAS HIGH LEVEL” alarm is annunciated at the LCP-HWE. An IPS H₂S sensor is provided which transmits a signal, corresponding to the H₂S detected, to the Headworks Gas Detection Monitoring System and is displayed at the local panel. Sensor “FAILURE”, “WARNING” condition at 8 ppm, and “ALARM” condition at 10 ppm is displayed at the local panel. An

“INFLUENT PUMP STATION H2S GAS HIGH LEVEL” alarm is annunciated at the LCP-HWE.

An influent flow meter is provided on the IPS discharge header, between the IPS and the Aerated Grit Chamber. The meter is a 60-inch magnetic flow meter with bypass, and is used to totalize plant influent flow. Influent flow signals from each flow meter are totalized and used to pace influent and effluent sampling (which can also be set by timer), primary sedimentation chemical addition, as well as sodium hypochlorite addition.

4.1.1.4 Grit Handling Equipment

The grit handling equipment consists of grit chamber blowers and grit pumps which are located at the Aerated Grit Chamber of the Primary Sedimentation Facilities, and Grit Classifier/Separator units which are located at the Grit Dewatering Area of the Headworks Building. PLC-PSTE is configured so that upon failure of the duty PLC, the redundant PLC takes over without interruption of controls and monitoring functions. On failure of PLC-PSTE, a “PLC-PSTE PRIMARY FAILURE” or “PLC-PSTE SECONDARY FAILURE” alarm is annunciated at the LCP-PSTE and a “PST-LCC-EAST PLC FAILURE” common alarm is initiated at the PCC.

Grit Chamber Blowers

Two (2) grit chamber blowers are provided as air supply to the Aerated Grit Chamber which is downstream of the IPS. One (1) unit operates while the second serves as standby. Each blower is provided with an HOA selector switch and a ROT switch which are located at the LCP-GB at the PST-LCC-EAST. In the “Hand” mode, the blower operates continuously, while the blower does not operate in the “Off” position unless the ROT switch is placed in the “Test” position. In the “Auto” mode, the grit blower selected for duty operates continuously. Temperature gauges are provided to give local temperature readings of the suction and discharge blower piping. A dual low/high pressure switch is provided on the discharge piping of each Grit Blower. If the duty blower fails, the standby blower automatically starts provided the field ROT switch is in “Remote” and the panel HOA switch is in “Auto”. A two-position Duty Select Switch is provided at the LCP-GB. A pressure gauge located on the suction piping of each blower will provide a local vacuum reading.

Blower failure is determined by a pressure gauge and switch located on the discharge piping of each blower. Each grit blower is provided with Low Pressure, High Pressure, and Run indicating lights annunciated at the LCP-GP. The grit blowers are stamped and locked out on low discharge pressure and a “GRIT BLOWER FAILURE” alarm is indicated at the LCP-GB and at the PCC.

A ROT switch is mounted at the grit chamber blower location. The “Remote” position arms controls located at the LCP-GB and the respective blower. The “Off” position is lockable and prevents the grit blower from operating, overriding all other controls. The “Test” position is spring-loaded, and is used to test the operation of the grit blower with the HOA switch in the “Off” position.

A total mass flowmeter is provided on the combined header of Grit Blower No.1 and No. 2 to measure the total flow volume of the blowers to the Aerated Grit Chamber. Flow rate and totalized flow rate are indicated at the Grit Blowers.

Grit Pumps

Six (6) recessed impeller Grit Pumps are provided to convey grit collected in the Grit Hoppers to the Grit Classifier/Separator units located in the Grit Dewatering Area of the Headworks Building. The grit pumps are located in a grit pump gallery located on the east side of the Aerated Grit Chamber.

Each grit pump is furnished with an HOA switch mounted at the LCP-GP which is located at the PST-LCC-EAST. In the “Hand” mode the grit pumps run continuously. In the “Off” mode the grit pump only operates in the “Test” mode associated with the ROT switch. In the “Auto” mode the grit pumps are controlled via PLC interval and 24-hour cycle duration timer logic which controls the length of time a grit pump operates for each interval. The PLC is programmed such that one interval timer controls the pumping intervals for grit pump Nos. 1, 2 and 3, and the second interval timer controls pumping intervals for grit pump Nos. 4, 5, and 6. Each set of grit pumps conveys grit to a designated Grit Classifier/Separator unit at the Headworks Building.

The interval/duration timer setpoints at the PLC-PSTE Operator Interface Workstation to define the operating characteristics of the grit pumps are as follows:

Grit Pump Group 1 High Flow Cycle Interval	30	Minutes (0-540)
Grit Pump Group 1 Low Flow Cycle Interval	30	Minutes (0-540)
Grit Pump 1 Run Duration	16	Minutes (0-540)
Grit Pump 2 Run Duration	17	Minutes (0-540)
Grit Pump 3 Run Duration	15	Minutes (0-540)
Grit Pump Group 2 High Flow Cycle Interval	30	Minutes (0-540)
Grit Pump Group 2 Low Flow Cycle Interval	30	Minutes (0-540)
Grit Pump 4 Run Duration	19	Minutes (0-540)
Grit Pump 5 Run Duration	21	Minutes (0-540)
Grit Pump 6 Run Duration	30	Minutes (0-540)

The grit pumps are divided into two groups. Within each group, a Hi/Lo flow cycle interval is used to start all pumps in the group. Each pump has an individual run duration timer assigned which is used for high or low flow conditions.

Each grit pump group is either assigned to a single classifier or a single value is provided to support special circumstances where all grit pumps supply multiple classifiers. In this case, the grit pumps are still assigned a single classifier and that classifier must be in operation but the system also requires a minimum of xx (xx entered as 1, 2, or 3 at PLC-HWE Panelview) classifiers to be in operation. If less than the required number are in operation, all grit pump operations are locked out.

Cycle intervals are always measured from the start of the cycle. If the interval is less than the time to complete a cycle, the operation is effectively continuous. Whenever a change between Hi/Lo flow is detected, the currently executing interval timer is allowed to complete. When the timer is complete, the cycle is executed and the new interval value is assigned to the timer for the start of the next cycle.

A ROT switch is mounted at the grit pump location. The “Remote” position arms controls located at the LCP-GP and the respective pump. The “Off” position is lockable and prevents the grit pump from operating, overriding all other controls. The “Test” position is spring-loaded, and is used to test the operation of the grit pump with the HOA switch in the “Off” position.

The failure of each grit pump due to the discharge piping being blocked is detected by a discharge check valve limit switch which is mounted on the check valve swing arm. After

the Grit Pump is running and the limit switch has detected the check valve is still closed, it will shutdown the Grit Pump (after an adjustable software timer has timed out) by disabling the starter at MCC-PSTE. If there are no Grit Classifier/Separators in operation, the Grit Pumps will be prevented from operating. If a Grit Pump is in operation at the time that any or all of the Grit Classifiers/Separators is shutdown or experiences failure, then any Grit Pump in operation will also be shutdown via the PLC-PSTE program. The limit switch activates a “GRIT PUMP FAILURE” alarm at the LCP-GP and at the PCC annunciator panel. A Grit Pump seal water flow switch is provided on the seal water supply header serving the grit pumps which activates a “GRIT PUMP SEAL WATER FAILURE” alarm at the LCP-GP and at the PCC annunciator panel. A pressure gauge is mounted on the discharge piping of each grit pump, before the check valve, to locally indicate pump discharge pressure.

Grit pump “RUN” indicating lights and an elapsed time meter for each pump are installed at the LCP-GP.

A magnetic flowmeter is provided on the header of Grit Pumps No. 1, No. 2, and No. 3 and the header of Grit Pumps No. 4, No. 5, and No. 6, to measure the total grit flow of the pumps to the Grit Classifier/Separators. A local flow rate indicator and totalizer is provided for each flowmeter.

A float switch is mounted 3 inches above the floor of the Grit Pump Gallery to send a signal to annunciate a “GRIT PUMP GALLERY WET FLOOR” alarm at the LCP-GP and that the PCC annunciator panel.

Grit Classifier/Separators

Three (3) Grit Classifier/Separator units are provided in the Grit Dewatering Area of the Headworks Building. Two (2) units are in operation at all times in order to handle initial design condition demands.

Each Grit Classifier/Separator is furnished with an On/Off switch mounted at the LCP-GC located at the HWE-LCC-EAST. In the “On” mode the Grit Classifier/Separator unit operates continuously. In the “Off” mode the Grit Classifier/Separator only operates in the “Test” mode associated with the ROT switch

A ROT switch is also provided for each Grit Classifier/Separator unit. The “Remote” position arms controls located at the LCP-GC and the respective Grit Classifier/Separator unit. The “Off” position is lockable and prevents the unit from operating, overriding all other controls. The “Test” position is spring-loaded, and is used to test the operation of the unit with the On-Off switch in the “Off” position.

Grit Classifier/Separator unit failure is determined by a motion detector mounted on the drive unit. If the unit ceases to operate, a “GRIT CLASSIFIER/SEPARATOR NOT IN OPERATION” alarm is annunciated at the LCP-GC panel and a “GRIT CLASSIFIER/SEPARATOR FAILURE” alarm at the PCC. The pumps designated to discharge at the Grit Classifier/Separator which fails automatically shut down on the “GRIT CLASSIFIER/SEPARATOR FAILURE” alarm. If there are no Grit Classifier/Separators in operation, the Grit Pumps are prevented from operating.

“RUN” lights for each Grit Classifier/Separator are provided at the LCP-GC.

The PLC-HWE setpoints for the Grit Classifier/Separators are as follows:

	GP1	GP2	GP3	GP4	GP5	GP6
Classifier Assignments	1	1	1	2	2	2
Minimum # of Classifiers	2					

The Classifier assignment setpoints designate which Classifier/Separator will be receiving flow from a given grit pump. If a classifier fails, the grit pump designated to discharge to that classifier will shut down. The “Minimum Number of Classifier” setpoints will shut down all of the grit pumps if the setpoint number of classifiers is not in operation. For instance, if all the grit pump discharge piping is set up such that grit is discharged to two classifiers, and one classifier shuts down, then all of the grit pumps will shut down.

A Grit Dewatering Combustible Gas (CG) sensor is provided which transmits a signal, corresponding to the CG detected, to the Headworks Gas Detection Monitoring System and is displayed at the local panel. Sensor “FAILURE”, “WARNING” condition at 2.5% of lower explosive limit (LEL), and “ALARM” condition at 3.5% of LEL are displayed at the local panel. A “GRIT DEWATERING AREA COMBUSTIBLE GAS HIGH LEVEL”

alarm is annunciated at the LCP-HWE and a “GRIT DEWATERING AREA COMBUSTIBLE GAS DETECTION” alarm is annunciated at the PCC.

A Grit Dewatering H₂S sensor is provided which transmits a signal, corresponding to the H₂S detected, to the Headworks Gas Detection Monitoring System and is displayed at the local panel. Sensor “FAILURE”, “WARNING” condition at 8 ppm, and “ALARM” condition at 10 ppm is displayed at the local panel.

A “GRIT DEWATERING AREA H₂S GAS HIGH LEVEL” alarm is annunciated at the LCP-HWE and a “GRIT DEWATERING AREA HYDROGEN SULFIDE DETECTION” alarm is annunciated at the PCC.

4.1.1.5 Grit/Screenings Storage Bin Winches

Each winch is provided with maintained contact, spring loaded (return to off) Forward/Off/Reverse Switch for operation. Each winch is also provided with a reset switch to reset the winch in the event of an overload condition.

4.1.1.6 Odor Reduction Station

The Headworks Odor Reduction Station is provided with a Local Control Panel LCP-ORHW, with a NEMA 4X enclosure for control of the scrubber unit and appurtenances. Process and air flow schematics for the Headworks Odor Reduction Station are presented in Figures 3.1-2 and 3.1-3, respectively.

Odor Reduction Station Scrubber Exhaust Fans

Each exhaust fan is furnished with a locally-mounted ROT switch and an HOA switch in LCP-ORHW located at the odor reduction station. The “Remote” position of the ROT switch enables controls located at LCP-ORHW. The “Off” position is lockable to prevent the exhaust fan from operating. The “Test” position is spring loaded and is used to test the operation of the exhaust fan with the HOA switch in the “Off” position. A duty/standby selector switch is provided at the LCP-ORHW for the operator to select the in-service exhaust fan. Run/Stopped/Trip lights and elapsed time meter are located in the MCC-cabinet. A flow switch is installed on the discharge side of the exhaust fan to indicate motor failure or blocked discharge. Failure of the exhaust fan de-energizes the motor and

activates alarms at the LCP-ORHW and “HEADWORKS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules.

Failure of both scrubber exhaust fans automatically shutdown recirculation pumps, start Exhaust Fan Nos. 1 and 2 in the storage bin/grit dewatering areas, start Exhaust Fan No. 3 and close FRP damper (ORV1) in the screenings discharge area. This automatic sequence provides local backup ventilation.

Odor Reduction Station Scrubber

Differential pressure indicators are installed across both the mist eliminator and packed bed to provide indication of pressure loss across the scrubber for local identification only. Indicators are mounted on the scrubber, approximately 5 ft above the finished floor.

A pressure transducer is installed on the scrubber sump. The low level set point is set to indicate six inches above the recirculation pump suction line and when tripped activates alarms at the LCP-ORHW and a common “HEADWORKS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. If the sump level continues to drop to three inches above the recirculation pump suction, the recirculation pumps shut down.

Odor Reduction Station pH Controller

The pH analyzer is installed in the odor reduction station recirculation pump bypass loop. The pH reading is displayed at the analyzer and at the pH controller mounted in LCP-ORHW. The pH operating range shall be set between 9 and 11 with a target set point of 10.5 pH. The pH controller can be operated in either manual or automatic mode. In manual mode the controller displays the setpoint dialed in by the operator on front of the panel mounted controller. In automatic mode the controller tracks the actual pH. pH setpoint is maintained through electric control of the stroke controller of the selected NaOH metering pump. Low and high pH annunciate at the LCP-ORHW.

Odor Reduction Station ORP Controller

An ORP analyzer is installed in the odor reduction station recirculation pump bypass loop. The ORP operating range is set between 575 mv to 725 mv. The desired operating ORP is maintained by manually adjusting the stroke control potentiometer on the NaOCl metering pumps. Low and high ORP are annunciated at the LCP-ORHW.

Odor Reduction Station Recirculation Pumps

Each recirculation pump is furnished with a locally-mounted ROT switch and an HOA switch in LCP-ORHW. The “Remote” position of the ROT switch enables the controls at LCP-ORHW. The “Off” position which is lockable prevents the recirculation pump from operating. The “Test” position is spring loaded, and is used to test the operation of the exhaust fan with the HOA switch in the “Off” position. A duty/standby selector switch is provided at the LCP-ORHW for the operator to select the in-service recirculation pump. Run/Stopped/Trip lights for each recirculation pump are provided at the MCC cabinet. A pressure switch is installed on the discharge side of each recirculation pump to indicate motor failure or blocked discharge. Failure of either recirculation pump results in de-energizing the corresponding motor and activates alarms at the LCP-ORHW and “HEADWORKS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. In the “Auto” position, failure of the in-service pump starts the standby unit.

Seal water is provided to each recirculation pump. Failure of seal water supply activates alarms at LCP-ORHW, and “HEADWORKS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules, and shuts down both recirculation pumps.

Odor Reduction Station NaOH Metering Pumps

Each NaOH metering pump has a locally-mounted ROT switch and an HOA switch in LCP-ORHW. The “Remote” position of the ROT switch enables the controls located at the LCP-ORHW. The “Off” position which is lockable prevents the NaOH metering pump from operating. The “Test” position is spring loaded and is used to test the operation of the NaOH metering pump with the HOA switch in the “Off” position. A duty/standby selector switch is provided at LCP-ORHW for the operator to select the in-service NaOH pump. Run/Stopped/Trip lights for each NaOH pump are provided at the MCC cabinet. A pressure relief valve is provided on the discharge side of each NaOH pump to bypass flow back to the storage tank. A conductivity sensor is installed in each NaOH metering pump to indicate diaphragm rupture. Failure of either NaOH pump de-energizes the motor and activates alarms at the LCP-ORHW and “HEADWORKS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. In the “Auto” position, failure of the in-service pump automatically starts the standby unit.

Each NaOH metering pump is of variable stroke length and has an integral non-reversing electric stroke control motor for purposes of varying the pump stroke. The stroke control is the direct-acting type and mounted directly to the pump in a NEMA 4 enclosure. Each NaOH metering pump stroke controller is capable of capacity adjustment for 0-100% by changing piston stroke length based on a 4-20mA signal input from panel mounted pH controller.

Odor Reduction Station NaOCl Metering Pumps

Each NaOCl metering pump has a locally-mounted ROT switch and an HOA switch in LCP-ORHW. The “Remote” position of the ROT switch enables the controls located at the LCP-ORHW. The “Off” position which is lockable prevents the NaOCl feed pump from operating. The “Test” position is spring loaded and is used to test the operation of the NaOCl metering pump with the HOA switch in the “Off” position. A duty/standby selector switch is provided at LCP-ORHW for the operator to select the in-service NaOCl pump. Run/Stopped/Trip lights for each NaOCl pump are provided at the MCC cabinet. A pressure relief valve is provided on the discharge side of each NaOCl pump to bypass flow back to the storage tank. A conductivity sensor is provided at each NaOCl pump to detect a diaphragm rupture. Failure of either NaOCl pump results in de-energizing the corresponding motor and activates alarms at the LCP-ORHW and “HEADWORKS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. In the “Auto” position, failure of the in-service pump automatically starts the standby unit.

Each NaOCl metering pump is of variable stroke length and equipped with an integral non-reversing electric stroke control motor for purposes of varying the pump stroke. The stroke control is the direct-acting type and mounted directly to the pump in a NEMA 4 enclosure. Each NaOCl metering pump stroke controller is capable of capacity adjustment for 0-100% by changing piston stroke length based upon the setting of the locally mounted potentiometer.

Odor Reduction Station NaOH Storage Tank

There is no mechanical equipment within the NaOH bulk storage tank. A pressure transducer is installed on the side of the NaOH storage tank. The low level setpoint is set to indicate when only five days of NaOH is remaining and activates alarms at the LCP-ORHW and “HEADWORKS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The low low level setpoint is set to indicate when NaOH is only three inches above the NaOH metering pump suction line and activates alarms at the LCP-ORHW and “HEADWORKS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The high level setpoint is set to indicate a liquid level 6 inches below tank

overflow and activates an alarm at the LCP-ORHW and the “HEADWORKS ODOR REDUCTION STATION FAILURE” alarm at the PCC annunciator modules.

At the fill station panel, a high level alarm indicator light and an alarm horn receive a signal from the PLC to indicate high level in the respective bulk storage tank. An acknowledge pushbutton is provided at the fill station panel to silence the alarm horn. The alarm indicator light will be illuminated until the tank level is lowered.

Odor Reduction Station NaOCl Storage Tank

A pressure transducer is installed on the side of the NaOCl storage tank. The low level setpoint is set to indicate when only five days of NaOCl is remaining and activates alarms at the LCP-ORHW and “HEADWORKS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The low low level setpoint is set to indicate when NaOCl is only three inches above the NaOCl metering pump suction line and activates alarms at the LCP-ORHW and “HEADWORKS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The high level setpoint is set to indicate a liquid level 6 inches below tank overflow and activates an alarm at the LCP-ORHW and the “HEADWORKS ODOR REDUCTION STATION FAILURE” alarm at the PCC annunciator modules.

At the fill station panel, a high level alarm indicator light and an alarm horn receive a signal from the PLC to indicate high level in the respective bulk storage tank. An acknowledge pushbutton is provided at the fill station panel to silence the alarm horn. The alarm indicator light will be illuminated until the tank level is lowered.

NaOH and NaOCl Containment Sump Pumps

Each containment area is provided with a permanently installed sump pump with no automatic control. To drain the area, the operator manually opens and closes the appropriate discharge isolation valves, then manually starts the pump.

The lockable On/Off pump disconnect switch, control On/Off switch, control power light, Pump Start and Pump Stop pushbuttons, and pump run lights are provided at the sump pump control panel located at the pump. The control On/Off switch, when in the “On” position, energizes the sump pump control panel and the control power light will illuminate.

The Pump Start pushbutton, when pressed, starts the sump pump which operates until a low level is signaled by the float switch. A Pump Stop pushbutton is provided to manually stop the pump. The Stop pushbutton is provided with a key release lock so that a key is required to unlock the stop pushbutton after it has been pressed. The stop button must be released before the pump can be started.

Odor Reduction Station Water Softening System

The water softener duplex systems are energized by a 120V circuit. A pressure switch is installed on the inlet side of the water softener to indicate inadequate softened water system pressure. Inadequate softened water system pressure will activate an alarm at the LCP-ORHW and the “HEADWORKS ODOR REDUCTION STATION FAILURE” alarm at the PCC annunciator modules. There is a varea-meter on the discharge of the water softening system to indicate flowrate.

The water softener has local automatic controls which facilitate backwash/ regeneration/ rinse cycles based on the volume of water treated. A calcium ion analyzer senses an overall failure in the softening system and activates an alarm at the LCP-ORHW and the “HEADWORKS ODOR REDUCTION STATION FAILURE” alarm at the PCC annunciator modules.

Storage Bin/Grit Dewatering Areas Air Supply and Exhaust Fans

The air supply fan, SF1, is furnished with a locally-mounted ROT switch and an HOA switch at LCP-ORHWB. The “Remote” position of the ROT switch enables controls located at LCP-ORHWB. The LCP-ORHWB control panel is located outside the storage bin area. The “Off” position is lockable and prevents the air supply fan from operating. The “Test” position is spring loaded and is used to test the operation of the air supply fan with the HOA switch in the “Off” position. Run/Stopped/Trip lights for the air supply fan are located at the MCC cabinet. A flow switch is installed on the discharge side of the air supply fan to indicate motor failure or blocked discharge. Failure of the air supply fan de-energizes the motor and activates alarms at the LCP-ORHWB and “HEADWORKS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. During normal operations, SF1 is

continuously supplying air to the building and will continue to operate even if a scrubber exhaust fan failure is detected.

Exhaust Fan Nos. 1 and 2 are each furnished with a locally-mounted ROT switch and an HOA switch at LCP-ORHWP. The “Remote” position of the ROT switch enables controls located at LCP-ORHWP. The “Off” position is lockable and prevents the exhaust fan from operating. The “Test” position is spring loaded and is used to test the operation of the exhaust fan with the HOA switch in the “Off” position. Run/Stopped/Trip lights for the exhaust fans are located at the MCC cabinet. Both exhaust fans are interlocked such that both fans are either “On” or “Off,” and operate at the same time. Failure of one exhaust fan does not prevent the other exhaust fan from operating. During normal operating conditions, EF1 and EF2 are not running so that the ventilation is provided by the scrubber exhaust fans. Failure of both scrubber exhaust fans automatically shutdown recirculation pumps, start Exhaust Fan Nos. 1 and 2 in the storage bin/grit dewatering areas, start Exhaust Fan No. 3 and close FRP damper (ORV1) in the screenings discharge area. This automatic sequence provides local backup ventilation.

Smoke detectors are installed in the storage bin and grit dewatering areas. The activation of smoke alarms shuts down scrubber exhaust fans, shuts down air supply and exhaust fans in storage bin and grit dewatering areas, and shuts down the exhaust fan in screening discharge area.

Screening and Wetwell Areas Exhaust Fan

The Exhaust Fan No. 3 is furnished with a locally-mounted ROT switch and an HOA switch in LCP-ORHWP. The “Remote” position of the ROT switch enables controls located at LCP-ORHWP. The “Off” position is lockable and prevents the exhaust fan from operating. The “Test” position is spring loaded, and is used to test the operation of the exhaust fan with the HOA switch in the “Off” position. Run/Stopped/Trip lights are provided at the MCC cabinet. A flow switch is installed on the discharge side of the exhaust fan to indicate motor failure or blocked discharge. Failure of the exhaust fan de-energizes the motor and activates alarms at the LCP-ORHWP and “HEADWORKS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. During normal

operations, EF3 is not running so that the ventilation is provided by the scrubber exhaust fans. Failure of both scrubber exhaust fans automatically shutdown recirculation pumps, start Exhaust Fan Nos. 1 and 2 in the storage bin/grit dewatering areas, start Exhaust Fan No. 3 and close FRP damper (ORV1) in the screenings discharge area. This automatic sequence provides local backup ventilation.

4.1.2 Step by Step Start-Up Procedures

4.1.2.1 General System Start-Up Procedures

The Headworks Facilities should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Ensure that the inlet and junction structures, bar screen channels and grit chamber are free of accumulated grease, rags and other debris.
3. Visually inspect all equipment for any signs of damage or improper installation.
4. Verify the grit/screenings storage bin is positioned properly.
5. Inspect the entire length of the screenings conveyor belt for debris and clean surface of debris.
6. Ensure that the screenings conveyor emergency taglines are set and have not been pulled. If they have been pulled, reset the tagline switches.
7. Select the bar screen(s), grit chamber blower, and the grit pump(s) that will be in service.
8. Ensure the Control Panels LCP-HWE located at the HWE-LCC-EAST and LCP-ORHW at the Headworks Odor Reduction Station, and Distribution Panels DPP4, DPC4, DPL4, DPM4, located at the HWE-LCC-EAST are energized.
9. Ensure that the circuit breakers at Motor Control Centers MCC-HWE in HWE-LCC-EAST and at MCC-PSTE “A” BUS and MCC-PSTE “B” BUS in the PST-LCC-EAST are energized for all equipment to be operated.
10. Energize the SG-HWE in the HWE-LCC-EAST.

11. Start Headworks Odor Reduction Station according to the procedures described in Sections 4.1.2.2.4. and in the following order:
 - a. Screening and Wetwell Areas Exhaust Fan and Automatic Damper
 - b. Storage Bin/Grit Dewatering Areas Air Supply and Exhaust Fans
 - c. Scrubber Exhaust Fan
 - d. Water Softening System
 - e. Scrubber
 - f. Recirculation Pumps
 - g. pH and ORP Controllers
 - h. NaOC1 Storage Tank
 - i. NaOC1 Metering Pump
 - j. NaOH Storage Tank
 - k. NaOH Metering Pump
12. After normal operation of the Odor Reduction Station is established, start to feed the influent flow to the Screening Area by opening Junction Box No. 1 sluice gate.
13. pH and ORP of the odor control scrubber should be continuously monitored. The optimum setpoints (pH, ORP) should be in accordance with the Odor Reduction Station Air Permit and your Operations Supervisor's direction based on operating experience.
14. Start the screenings conveyor(s) that will be in service according to the procedures described in Section 4.1.2.2.1.
15. Open the isolation slide gates to the appropriate screening channels as required by your Operations Supervisor.
16. Start-up the respective bar screen(s) that will be in service according to the procedures described in Section 4.1.2.2.1.
17. Start the grit handling equipment according to the procedures described in Section 4.1.2.2.3.
18. Start the influent pump station according to the procedures described in Section 4.1.2.2.2.

4.1.2.2 Individual Equipment Start-Up Procedures

4.1.2.2.1 Screening Facilities

Slide Gates

Open the selected slide gate and the selected slide gate for scum removal according to the procedures listed below:

1. Select the gate that will be opened.
2. Open the gate as follows:

Automatically - Portable Hydraulic Operator

- a. Since the portable hydraulic operator is not used continuously, the operator must be inspected before each use. Perform a brief examination of the unit, checking the following items:
 - Proper hydraulic oil level. If low, fill as directed in manufacturer's O&M Manual.
 - Unusual wear or damage to components.
 - Fluid leakage.
 - Clean out covers, filler caps and breather caps on reservoir are properly fastened.
 - All filtration devices are in place.
 - The unit should be clean and free from material buildups that may result in over heating and/or damage.
- b. Energize the operator by inserting plug in receptacle and starting motor.
- c. Position remote drive unit (RDU) over the gate operator drive shaft.
- d. Verify the gate position and direction of the necessary gate movement.
- e. Activate the directional control valve. Observe carefully the gate head movement and operator to detect irregular movement. Should this occur, release directional control valve to avoid damage.
- f. Deactivate RDU when gate is within 2-inches of its desired position.
- g. Use manual operator to move gate into its final position.

Manually - Square Nut Operator

- a. Position the t-handle over the operator nut, make certain the nut is fully-recessed into the socket.
 - b. Rotate the operator clockwise to open the gate.
3. Visually inspect the gate head to verify proper position.

Screening Equipment

Start up the influent mechanical bar screening equipment according to the procedures listed below:

1. Select the screenings conveyor(s) that will be in service.
2. Place the respective ROT switch for conveyor in the “Remote” position.
3. Place the screenings conveyor(s) into operation as follows:

Automatic Mode of Operation

- a. Place the respective HOA switch at the LCP-HWE for conveyor in the “Auto” position.
 - b. In the “Auto” mode, the mechanical bar screen operates as called for by signals from PLC-HWE described in detail in Section 4.1.1.2.

Manual Mode of Operation

- a. Place the respective HOA switch of the LCP-HWE for conveyor in the “Hand” position.
4. Visually verify the conveyor system is operating.
5. Select the mechanical screen(s) that will be in service.
6. Place the FOR switch for the selected mechanical screens in the “Forward” position.
7. Ensure the LOS switch for the screen(s) is in the “On” position.
8. Place the mechanical bar screen(s) into operation as follows:

Automatic Mode of Operation

- a. Place the HOA switch at the LCP-HWE for the selected mechanical bar screen(s) in the “Auto” position.
- b. In the “Auto” mode, the conveyor operates as called for by signals from PLC-HWE described in detail in Section 4.1.1.2.

Manual Mode of Operation

- a. Place the respective HOA switch at the LCP-HWE for the selected mechanical bar screen(s) in the “Hand” position.
9. Open the isolation slide gates to the appropriate screening channels as required by your Operations Supervisor. NOTE: If the channel for the screen to be started has been dewatered, the isolation slide gates should be opened to fill the channel before starting the screen.
 10. Monitor the water level differential of the upstream and downstream channel of the screens at the headworks bubbler level system. The water level should be established by your Operations Supervisor.
 11. Visually monitor the operation of the mechanical screens to ensure that debris is being removed from the bar rack by the steel rake assembly.
 12. Test rake wiper assembly.
 13. Check limit switches for proper alignment when in contact with rake.
 14. Run rake until it engages in bar section at bottom.
 15. Run rake into bar section and check engagement of teeth into bars as it travels to top of bar section. Adjust if required.
 16. Check contact of rake wiper with rake and adjust if required.
 17. Run rake to home position (up position switch) to make sure it functions properly.
 18. Run rake in local for an entire cycle.
 19. Initiate start and stop of rake from timer.

20. The manually cleaned bar screens are used during periods of maintenance or repair of the mechanical bar screens. Cleaning the manually cleaned bar screen is accomplished with a rake with tines (prongs) which fit between the bars.

4.1.2.2.2 Influent Pump Station

Start up the influent pump station facilities according to the procedures listed below:

1. Select the influent pump(s) that will be in service.
2. Verify the influent pump(s) pipe valving is in the proper orientation and selected pump discharge and suction valves are open.
3. Ensure that seal water is being supplied to the pump(s).
4. Place the respective ROT switch in the “Remote” position.
5. Place the influent pump(s) into operation as follows:

Automatic Mode of Operation

- a. Place the respective HOA switch at the LCP-IPS in the “Auto” position.
- b. In the “Auto” mode, the pump operates as called for by signals from PLC-IPS which is described in detail in Section 4.1.1.3. Under normal conditions the selected pump will start after a 0 to 180 second delay and operate continuously.

Manual Mode of Operation

- a. Place the respective HOA switch at the LCP-IPS in the “Hand” position.
- b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
6. Visually verify the pump is operating.
7. Check driver lubrication levels and flow.

4.1.2.2.3 Grit Handling Equipment

Grit Chamber Blowers

Start up the grit chamber blowers according to the following procedures listed below:

1. Select the blower that will be in service. One blower should be normally in service and one in standby mode.
2. Verify that the blower pipe valving is in the proper orientation and the selected blower pressure relief valve is operating.
3. Place the respective ROT switch in the “Remote” position.
4. Place the grit chamber blower into operation as follows:

Automatic Mode of Operation

- a. Place the respective HOA switch at the LCP-GB in the “Auto” position.
- b. In the “Auto” position the grit blower will operate as called for by signals from PLC-HWE which is described in detail in Section 4.1.1.4.

Manual Mode of Operation

- a. Place the respective HOA switch at the LCP-GB in the “Hand” position.
5. Visually verify blower is operating and that the discharge pressure does not continue to rise above the design point.

Grit Pumps

Start up the grit pumps according to the procedures listed below:

1. Select the grit pump(s) that will be in service.
2. Verify the grit pump pipe valving is in the proper orientation and selected pump discharge and suction valves are open.
3. Ensure that seal water is being supplied to the pump(s).
4. Place the respective ROT switch in the “Remote” position.
5. Place grit pump(s) into operation as follows:

Automatic Mode of Operation

- a. Place the respective HOA switch at the LCP-GP in the “Auto” position.
- b. In the “Auto” mode, the grit pump will operate as called for by signals from PLC-HWE which is described in detail in Section 4.1.1.4.

Manual Mode of Operation

- a. Place the respective HOA switch at the LCP-GP in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
6. Visually verify the pump is operating.

Grit Classifier/Separators

Start up the grit classifier/seperator according to the procedures listed below:

1. Select the grit classifier/seperator(s) that will be in service. The degritting unit starts when the grit pumps are called to start and will run for an adjustable off-delay period after the grit pumps have stopped.
2. Verify the grit classifier/seperator pipe valving is in the proper location.
3. Ensure that the classifier is bedded with clean sand. If not, fill the tank with water and then with the unit running, load the tank with sand in the pool area until sand is discharged by the conveyor at the upper end of the classifier.
4. Place the respective ROT switch in the “Remote” position.
5. Place the appropriate On/Off switch at the LCP-GC in the “On” position to start the selected grit classifier/seperator.
6. Visually verify the grit classifier/seperator is operating.

Grit/Screenings Storage Bin Winches

Start the grit/screenings bin winches according to the procedures listed below:

1. Inspect the winch and other equipment. Make sure to check lubrication before use.

2. Make sure the load is free to move and will not tip or in any way move uncontrollably.
3. Turn electric power on by using the local disconnect switch.
4. Operate the winches as required by your Operation Supervisor by using the respective Forward/Off/Reverse switches located at the north wall of the Grit/Screenings Storage Area.

4.1.2.2.4 Odor Reduction Station

Odor Reduction Station Exhaust Fans

Start up the odor reduction station exhaust fans according to the procedures listed below:

1. Select the odor reduction station exhaust fan that will be in service at the LCP-ORHW.
2. Verify that the odor reduction duct and duct drain is in the proper orientation and that the selected fan inlet and discharge dampers are open.
3. Place the respective ROT switch in the “Remote” position.
4. Place the fan into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORHW in the “Auto” position.
- b. In the automatic mode, the fan operates as called for by signals from PLC-ORHW. Under normal conditions the selected fan will start after a 0 to 180 second delay and operate continuously.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORHW in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and the fan will operate continuously.
5. Visually verify the fan is operating.

Odor Reduction Station Scrubber

Start-up the scrubber according to procedures listed below:

1. Ensure that the drain and sample valves are closed.
2. Open the appropriate isolation valves including the sodium hypochlorite feed line, sodium hydroxide feed line, and sump make up water line.
3. Ensure the sump is full of liquid and that overflow rate (blowdown) has been established.

Odor Reduction Station pH and ORP Controllers

Start-up the pH and ORP controllers according to the procedures listed below:

1. Ensure that the ORP analyzer is energized and displaying a millivolt reading.
2. Ensure that the pH analyzer is energized and displaying reading.
3. Calibrate ORP and pH probes per manufacturer's recommendations.
4. Open the upstream and downstream ball valves which isolate the pH and ORP inlet header (by-pass line) from the recirculation pump discharge and suction piping.
5. Open the respective downstream ball valves which isolate the pH and ORP probes from the common outlet headers.
6. Adjust flow rates into the pH and ORP probes with the respective upstream throttling valves so that 11 gpm flows through each analyzer.
7. Verify and adjust as necessary the pH setpoint to the desired value (between 9.0 and 11.0 per air permit requirements).

Odor Reduction Station Recirculation Pumps

Start-up the recirculation pumps according to the procedures below:

1. Select the recirculation pump that will be in service at the LCP-ORHW.
2. Verify that the recirculation pump pipe valving is in the proper orientation and the selected pump discharge and suction valves are open.

3. Ensure that the upstream throttling valves and downstream ball valves which isolate the pH and ORP controllers from the recirculation pump suction and discharge piping are closed. Excessive pressures can damage the probes.
4. Ensure that seal water is being supplied to the pump.
5. Place the respective ROT switch in the “Remote” position.
6. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORHW in the “Auto” Position.
- b. In the Automatic mode the pump operates as called for by signals from PLC-ORHW. Under normal conditions the selected pump will start after a 0 to 180 second delay and operate continuously.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORHW in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
7. Visually verify the pump is operating.
 8. Verify that the isolation valves on both sides (inlet and outlet) of the orifice plate associated with the flowmeter (rotameter) are open and that the valve in the meter bypass line is closed.
 9. Observe the flowmeter reading (flow rate should be 240 gpm or greater).

Odor Reduction Station NaOH Metering Pumps

Start-up the sodium hydroxide metering pump according to the procedures listed below:

1. Select the NaOH metering pump that will be in service at the LCP-ORHW.
2. Verify the NaOH metering pump pipe valving is in the proper orientation and the selected pump discharge and suction valves are open.
3. Place the respective ROT switch in the “Remote” position.

4. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORHW in the “Auto” position.
- b. In the Automatic mode, the pump operates as called for by PLC-ORHW. Under normal conditions the selected pump will start after a 0 to 180 second delay and operate continuously with the pump stroke being automatically adjusted based on the pH analyzer signal.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORHW in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
5. Visually verify the pump is operating.
 6. Observe the discharge pressure of the pump (discharge pressure should be approximately 40 psi).
 7. Verify that flow is occurring through the pump using the calibration column.

Odor Reduction Station NaOCl Metering Pumps

Start-up the sodium hypochlorite metering pumps according to the procedures listed below:

1. Select the NaOCl metering pump that will be in service at the LCP-ORHW.
2. Verify the NaOCl metering pump pipe valving is in the proper orientation and selected pump discharge and suction valves are open.
3. Place the respective ROT switch in the “Remote” position.
4. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORHW in the “Auto” Position.
- b. In the Automatic mode, the pump operates as called for by PLC-ORHW. Under normal conditions the selected pump will start after a 0 to 180 second delay and operate continuously.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORHW in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
5. Visually verify the pump is operating.
 6. Observe the discharge pressure of the pump (discharge pressure should be approximately 40 psi).
 7. Verify that flow is occurring using the calibration column.
 8. Manually adjust the electronic stroke control on the metering pump to achieve the desired ORP millivolt reading at the ORP transmitter (between 575 and 725 mV per air permit requirements).

Odor Reduction Station NaOH Storage Tank

1. Fill bulk storage tank according to the following procedures:
 - a. Energize the fill station panel.
 - b. Attach chemical supply truck hose to the quickconnect of the fill pipe for the tank to be filled.
 - c. Open the isolation valve.
 - d. Pump the ordered amount of chemical into the chemical storage tank carefully watching the sight glass on the side of the tank so as not to over fill the tank.
 - e. When pumping is completed purge the feed pipe with air. Close the isolation valve. Disconnect the supply hose and cap the fill pipe.

WARNING: In case the high level alarm horn sounds, stop chemical pumping immediately. (A high level alarm is designed to activate before the tank overflows.) Silence the alarm by pressing the Acknowledge pushbutton. Alarm light will stay illuminated until the chemical level in the tank is below the high level.

2. Start-up the sodium hydroxide storage tanks according to the procedures listed below:
 - a. Ensure that there is sufficient caustic in the tank (minimum 30% full).
 - b. Open the appropriate isolation valves on the outlet lines.
 - c. Turn on power for the field-mounted control panel for heat tracing system.

Odor Reduction Station NaOCl Storage Tank

1. Fill bulk storage tank according to the following procedures:
 - a. Energize the fill station panel.
 - b. Attach chemical supply truck hose to the quickconnect of the fill pipe for the tank to be filled.
 - c. Open the isolation valve.
 - d. Pump the ordered amount of chemical into the chemical storage tank carefully watching the sight glass on the side of the tank so as not to over fill the tank.
 - e. When pumping is completed purge the feed pipe with air. Close the isolation valve. Disconnect the supply hose and cap the fill pipe.

WARNING: In case the high level alarm horn sounds, stop chemical pumping immediately. (A high level alarm is designed to activate before the tank overflows.) Silence the alarm by pressing the Acknowledge pushbutton. Alarm light will stay illuminated until the chemical level in the tank is below the high level.

2. Start-up the sodium hypochlorite storage tank according to the procedures listed below:
 - a. Ensure that there is sufficient sodium hypochlorite in the tank (minimum 30% full).

- b. Open the appropriate isolation valves on the outlet lines.

NaOH and NaOCl Containment Sump Pumps

Start the respective sump pump according to the procedures below:

1. Assess what liquid is in the sump (water or chemical).

If the liquid is water:

- a. Open the isolation valve to the tank drain.

If the liquid is chemical:

- a. Arrange for a hazardous waste truck to be called onto the site.
 - b. Connect the quickconnect from the sump pump discharge line to the hazardous waste truck.
 - c. Open the isolation valve to the quickconnect line. Ensure the isolation valve to the tank drain is closed.
2. Place the appropriate pump disconnect On/Off switch in the “On” position.
 3. Place the Control On/Off switch in the “On” position. The control power light will illuminate.
 4. Release the depressed stop button with the appropriate key.
 5. Press the Pump Start pushbutton.
 6. After a 0 to 180 second delay the pump motor starts and pump operates until a low level is signaled by a float switch.
 7. Visually verify pump is running.

Odor Reduction Station Water Softening System

Start-up the water softener according to the procedures below:

1. Ensure that the local electrical disconnect is positioned to energize the water softening systems controls.
2. Open appropriate isolation valves on the inlet and outlet side of the water softening system.
3. Close the by-pass valve.

4. Adjust the flow of softened water to the scrubber tower to meet the desired flow rate.
5. Observe the calcium analyzer indicator (reading should be below 8 ppm).

Storage Bin/Grit Dewatering Area Air Supply and Exhaust Fans

Start up the dewatering area air supply (SF1) and exhaust fans (EF1 and EF2) according to the procedures listed below:

1. Place the respective ROT switch in the “Remote” position.
2. Place the fans into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORHWB in the “Auto” Position.
- b. In the “Automatic” mode, the fan operates as called for by PLC-ORHW.
- c. The supply fan under normal conditions will start after a 0 to 180 second delay and operate continuously.
- d. The exhaust fan under normal conditions (scrubber fans in operation) will not start.
- e. Visually observe operation of the respective fans.

Manual Mode of Operation

- a. Place the respective Hand/Off/Auto switch at the LCP-ORHWB in the “Hand” position.
- b. After a 0 to 180 second delay the fan motor starts and pump will operate continuously.
- c. Visually observe that the respective fan is operating.

Screening and Wetwell Areas Exhaust Fan and Automatic Control Damper

Start up the screening and wetwell areas exhaust fan (EF3) and the automatic control damper (ORV1) as follows:

1. Place the respective ROT switch in the “Remote” position.
2. Place the fan into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORHWB in the “Auto” position.
- b. In the “Automatic” mode, the pump operates as called for by PLC-ORHW. Under normal conditions (scrubber fans in operation) the exhaust will not start or operate.
- c. Visually observe the operation of the fan.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORHWB in the “Hand” position.
 - b. After a 0 to 180 second delay the fan motor starts and fan will operate continuously.
 - c. Visually verify that the fan is operating.
3. Place the control damper into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORHWB in the “Auto” position.
- b. In the “Automatic” mode, the damper operates as called for by PLC-ORHW. Under normal conditions (scrubber fans in operation) the damper will move to the “Open” position.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORHWP in the “Hand” position.
- b. The valve may be manually opened or closed by using the locally-mounted controls.
- c. Visually verify that the valve is in the proper position.

4.1.3 Step by Step Shutdown Procedures

4.1.3.1 General System Shutdown Procedures

The Headworks Facilities should be shut down according to the following procedures:

1. Refer to the General Shutdown Procedures presented in Section 4.0.3
2. Shut down the Influent Pump Station according to procedures presented in Section 4.1.3.2.2.
3. Shut down the Screening Facilities according to the procedures presented in Section 4.1.3.2.1
4. Shut down the Aerated Grit Chamber Facilities according to the procedures presented in Section 4.1.3.2.3.
5. Shut down the headworks odor reduction station according to the procedures described in Section 4.1.3.2.4. If the odor reduction station is to be shut down in its entirety, the shut down order for the various pieces of odor reduction equipment shall be as follows:
 - a. NaOH Metering Pump
 - b. NaOH Storage Tank
 - c. NaOC1 Metering Pump
 - d. NaOC1 Storage Tank
 - e. pH and ORP Controllers
 - f. Recirculation Pump
 - g. Scrubber
 - h. Water Softening System
 - i. Scrubber Exhaust Fans
 - j. Storage Bin/Grit Dewatering Areas Air Supply and Exhaust Fans
 - k. Screening and Wetwell Areas Exhaust Fan

4.1.3.2 Individual Equipment Shutdown Procedures

4.1.3.2.1 Screening Facilities

Slide Gates

Close the selected slide gate and the selected slide gate for scum removal according to the procedures listed below:

1. Select the gate that will be closed.
2. Close the gate as follows:

Automatically - Portable Hydraulic Operator

- a. Since the portable hydraulic operator is not used continuously, the operator must be inspected before each use. Perform a brief examination of the unit, checking the following items:
 - Proper hydraulic oil level. If low, fill as directed in manufacturer's O&M Manual.
 - Unusual wear or damage to components.
 - Fluid leakage.
 - Clean out covers, filler caps and breather caps on reservoir are properly fastened.
 - All filtration devices are in place.
 - The unit should be clean and free from material buildups that may result in over heating and/or damage.
- b. Energize the operator by inserting plug in receptacle and starting motor.
- c. Position remote drive unit (RDU) over the gate operator drive shaft.
- d. Verify the gate position and direction of the necessary gate movement.
- e. Activate the directional control valve. Observe carefully the gate head movement and operator to detect irregular movement. Should this occur, release directional control valve to avoid damage.
- f. Deactivate RDU when gate is within 2-inches of its desired position.
- g. Use manual operator to move gate into its final position.

Manually - Square Nut Operator

- a. Position the t-handle over the operator nut, make certain the nut is fully-recessed into the socket.
 - b. Rotate the operator counter-clockwise to close the gate.
3. Visually inspect the gate head to verify proper position.

Screening Equipment

Shut down the mechanical screening equipment according to the procedures listed below:

1. Close isolation slide gates upstream of the screening equipment.
2. Turn the respective FOR switch to the “Off” position when the screen has reached the “End of Travel” position.
3. Continue to operate the screenings conveyor(s) to transfer debris to the storage bin area.
4. When debris transfer to the storage bin area is complete, turn the ROT switch for the respective conveyor to the “Off” position.
5. After water level in screenings channel has reached the low level setting, close the respective isolation slide gate downstream of the screening equipment.
6. Use a non-potable water eductor to dewater screenings channel which has been isolated at either end.

Note: The screens also automatically shut down on high torque, motor overload, and drive temperature high conditions or as called for by signals from PLC-HWE which is as described in Section 4.1.1.2.

4.1.3.2.2 Influent Pump Station

Shut down the influent pump station according to the procedures listed below:

1. Turn the respective HOA switch at the LCP-IPS for the pumps to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.

4. If the pump is to be out of service for an extended period of time, disconnect power source.
5. If either half of the pump station is to be out of service for an extended period of time, close the appropriate isolation stop plates and slide gates in the pump station wetwell and IPS influent channel.

Note: The influent pumps will also shut down on pump failure, seal water failure, and IPS wetwell low level conditions or as called for by PLC-HWE as described in Section 4.1.1.3.

4.1.3.2.3 Grit Handling Equipment

Grit Chamber Blowers

Shut down the grit chamber blowers according to the procedures listed below:

1. Turn the respective HOA switch at the LCP-GB at the PST-LCC-EAST for the blower to be shut down to the “Off” position.
2. Verify the blower is stopped.
3. Lock the appropriate ROT switch.
4. If the blower is to be out of service for an extended period of time, disconnect power source.

Note: The grit chamber blowers will also shut down on low discharge pressure or as called for by PLC-HWE as described in Section 4.1.1.4.

Grit Pumps

Shut down the grit pumps according to the procedures listed below:

1. Turn the respective HOA switch at LCP-GP at the PST-LCC-EAST pumps to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, close the isolation valves on pump suction and discharge sides.

Note: The grit pumps will also shut down on pump failure and grit classifier failure conditions or as called for by PLC-HWE as described in Section 4.1.1.4.

Grit Classifiers/Separators

Shut down the grit classifiers/separators according to the procedures listed below:

1. Turn the respective On/Off switch at LCP-GP at the HW-LCC-EAST for the grit classifier/separator to be shut down to the “Off” position.
2. Verify the grit classifier/separator is stopped.
3. Lock the appropriate ROT switch.
4. If the grit classifier/separator is to be out of service for an extended period of time, disconnect power source.

Note: The grit classifier/separator will also shut down on a grit classifier/separator failure condition or as called for by PLC-HWE as described in Section 4.1.1.4.

Grit/Screenings Storage Bin Winches

Shut down the grit/screenings storage bin winches as follows:

1. Release the respective Forward/Off/Reverse switch. The switch should spring return to the “Off” position to stop the associated winch.
2. Turn electric power off by using the local disconnect switch.
3. Make sure the clutch is engaged, this will help keep the wire rope from unspooling.

4.1.3.2.4 Odor Reduction Station

Odor Reduction Station Exhaust Fans

Shut down the odor reduction station exhaust fan according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORHW for the odor reduction fan to be shut down to the “Off” position.
2. Verify the fan is stopped.
3. Lock the appropriate ROT switch.
4. If the fan is to be out of service for an extended period of time, disconnect power source.

5. If the odor reduction system (or one of the fans) is to be out of service for an extended period of time, close the isolation damper on the inlet and discharge of the fan.

Note: The fan will also be automatically shut down on a low discharge flow signal from the downstream flow sensor.

Odor Reduction Station Scrubber

Shut down the odor reduction station scrubber according to the procedures listed below:

1. Close the outlet isolation valves.
2. If the scrubber is to be out of service for an extended period of time, disconnect the power to the level transmitter.

Odor Reduction Station pH and ORP Controllers

Shut down the pH and ORP controllers according to the procedures listed below:

1. Close the inlet throttling valves and the downstream ball valves to isolate the pH and ORP probes.
2. If the controllers are to be out of service for an extended period of time, disconnect the power to the controller.

Odor Reduction Station Recirculation Pump

Shut down the recirculation pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORHW for the odor reduction station recirculation pump to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source.
5. If the entire odor reduction system (or one of the recirculation pumps) is to be out of service for an extended period of time, close the isolation valves on the pump suction and discharge.

Note: The pump will also be automatically shut down by PLC-ORHW upon one of the following:

- a. High or low pressure signal from the downstream pressure switch.
- b. Low flow signal from the seal water flow switch.
- c. Low low liquid level signal from the scrubber liquid level sensor.

Odor Reduction Station NaOH Metering Pumps

Shut down the sodium hydroxide metering pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORHW for the sodium hydroxide metering pump to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source.
5. If the entire odor reduction system (or one of the NaOH metering pumps) is to be out of service for an extended period of time, close the isolation valves on the pump suction and discharge and close the upstream seal water ball valve to curtail seal water flow.

Note: The pump will also be automatically shut down by PLC-ORHW upon one of the following:

- a. Low low level signal from the tank liquid level sensor.
- b. Ruptured diaphragm signal from the pump-mounted conductivity sensor.

Odor Reduction Station NaOCl Metering Pump

Shut down the sodium hypochlorite metering pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORHW for the sodium hypochlorite metering pump to be shut down to the “Off” position.
2. Verify the pump is stopped.

3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source.
5. If the entire odor reduction system (or one of the NaOCl metering pumps) is to be out of service for an extended period of time, close the isolation valves on pump suction and discharge.

Note: The pump will also be automatically shut down by PLC-ORHW upon one of the following:

- a. Low low level signal from the tank liquid level sensor.
- b. Ruptured diaphragm signal from the pump-mounted conductivity sensor.

Odor Reduction Station NaOH Storage Tank

Shut down the sodium hydroxide storage tank according to the procedures listed below:

1. Shut down the outlet isolation valves.
2. If the tank is to be out of service for an extended period of time, disconnect the power to the level transmitter and to the field-mounted control panel for heat tracing system and drain the tank according to the procedures similar to those shown in Section 4.5.3.2.2.

Odor Reduction Station NaOCl Storage Tank

Shut down the sodium hypochlorite storage tank according to the procedures listed below:

1. Shut down the outlet isolation valves.
2. If the tank is to be out of service for an extended period of time, disconnect the power to the level transmitter and drain the tank according to the procedures similar to those shown in Section 4.5.3.1.2.

NaOH and NaOCl Containment Sump Pumps

Shut down the respective sump pump according to the following procedures:

1. Press the Pump Stop pushbutton.

Note: A key is required to unlock the stop pushbutton when the sump pump needs to be started again.

2. Verify the pump has stopped.
3. Lock the appropriate lock switch.
4. If pump is to be out of service for an extended period of time, disconnect power source and close isolation valves.

Note: The sump pump will also automatically shut down on low liquid level or motor overload.

Odor Reduction Station Water Softening System

Shut down the water softening system according to the procedures listed below:

1. Ensure that each of the vessels of the water softening system is in either the “Operation” or “Stand-by” mode. (If the softening system is in some other mode, wait until the regeneration cycle is complete before proceeding.)
2. Close the isolation valves on the inlet and outlet sides of the water softening system.
3. If the water softening system is to be out of service for an extended period of time, disconnect power source.

Storage Bin/Grit Dewatering Areas Air Supply and Exhaust Fans

Shut down the storage bin/grit dewatering areas air supply (SF1) and exhaust fans (EF1 and EF2) according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at the LCP-ORHWB in the “Off” position.
2. Verify that the respective fan has stopped.
3. Lock the appropriate ROT switch.
4. If the fan(s) are to be out of service for an extended period of time, disconnect the power source.

Note: The Supply Fan will also automatically shut down on a low discharge flow signal from the downstream sensor. The exhaust fan will automatically shut down whenever either of the scrubber fans are in operation.

Screening and Wetwell Areas Exhaust Fan and Automatic Control Damper

Shut down the screening and wetwell areas exhaust fan (EF3) and automatic control damper (ORV1) according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORHWP in the “Off” position.
2. Verify that the fan has stopped or the damper is closed.
3. Lock the appropriated ROT switch.
4. If the fan or damper is to be out of service for an extended period of time, disconnect the power source.

Note: The fan automatically shuts down and the damper opens whenever either of the scrubber fans are in operation.

4.1.4 Alarm and Status Annunciation

4.1.4.1 Screenings Facilities

The following alarms and status annunciations are associated with the Screenings Facilities:

<u>Alarm/Status</u>	<u>Display Location</u>
PLC-HWE Primary Failure Annunciator	LCP-HWE
PLC-HWE Backup Failure Annunciator	LCP-HWE
PLC-HWE Failure Annunciator	PCC
Influent Channel Low pH Alarm	LCP-HWE
Influent Channel High pH Alarm	LCP-HWE
Influent Channel pH High/Low Alarm	PCC
Headworks Influent Channel High High Level Alarm	PCC
Headworks Influent Channel Combustible Gas High Level Alarm	LCP-HWE

Headworks Influent Channel H2S Gas High Level Alarm	LCP-HWE
Screenings Area Combustible Gas Detection Alarm	PCC
Screenings Area Hydrogen Sulfide Detection Alarm	PCC
Storage Bin Area Combustible Gas High Level Alarm	LCP-HWE
Storage Bin Area Combustible Gas Detection	PCC
Storage Bin Area H2S Gas High Level Alarm	LCP-HWE
Storage Bin Area Hydrogen Sulfide Detection	PCC
BCP-HW Common Alarm	LCP-HWE
BCP-HW Common Alarm	PCC
Headworks Mechanical Screen Failure Alarm	PCC
Mechanical Screen SCN1 Run/Stopped/Trip Lights	MCC-HWE
Mechanical Screen SCN2 Run/Stopped/Trip Lights	MCC-HWE
Mechanical Screen SCN3 Run/Stopped/Trip Lights	MCC-HWE
Mechanical Screen No. 1 Failure Alarm	LCP-HWE
Mechanical Screen 1 Run Light	LCP-HWE
Mechanical Screen 1 Torque Overload Light	LCP-HWE
Mechanical Screen 1 Motor Overload Light	LCP-HWE
Mechanical Screen 1 Drive Temperature High Light	LCP-HWE
Mechanical Screen No. 2 Failure Alarm	LCP-HWE
Mechanical Screen 2 Run Light	LCP-HWE
Mechanical Screen 2 Torque Overload Light	LCP-HWE
Mechanical Screen 2 Motor Overload Light	LCP-HWE
Mechanical Screen 2 Drive Temperature High Light	LCP-HWE
Mechanical Screen No. 3 Failure Alarm	LCP-HWE
Mechanical Screen 3 Run Light	LCP-HWE
Mechanical Screen 3 Torque Overload Light	LCP-HWE

Mechanical Screen 3 Motor Overload Light	LCP-HWE
Mechanical Screen 3 Drive Temperature High Light	LCP-HWE
Headworks Screenings Conveyor Failure Alarm	PCC
Headworks Conveyor Tagline Alarm	PCC
Screenings Conveyor CNV1 Run/Stopped/Trip Lights	MCC-HWE
Screenings Conveyor CNV2 Run/Stopped/Trip Lights	MCC-HWE
Screening Conveyor No. 1 Failure Alarm	LCP-HWE
Screening Conveyor No. 1 Tag Line Alarm	LCP-HWE
Screening Conveyor 1 Run Light	LCP-HWE
Screening Conveyor 1 Motor Overload Light	LCP-HWE
Screening Conveyor No. 2 Failure Alarm	LCP-HWE
Screening Conveyor No. 2 Tag Line Alarm	LCP-HWE
Screening Conveyor 2 Run Light	LCP-HWE
Screening Conveyor 2 Motor Overload Light	LCP-HWE

4.1.4.2 Influent Pump Station

The following alarms and status annunciations are associated with the Influent Pump Station:

<u>Alarm/Status</u>	<u>Display Location</u>
Influent Pump Station Failure	PCC
Influent Pump Station Combustible Gas High Level Alarm	LCP-HWE
Influent Pump Station H2S Gas High Level Alarm	LCP-HWE
Influent Pump Station Combustible Gas Detection	PCC
Influent Pump Station Hydrogen Sulfide Detection	PCC
Influent Pump Station Well No. 1 Low Level	LCP-IPS
Influent Pump Station Well No. 1 High Level	LCP-IPS

Influent Pump Station Well No. 2 Low Level	LCP-IPS
Influent Pump Station Well No. 2 High Level	LCP-IPS
Influent Pump Station Bubbler Failure	PCC
Influent Pump Station BCP1-IPS Common Alarm	LCP-IPS
Influent Pump Station BCP2-IPS Common Alarm	LCP-IPS
Influent Pump Station Seal Water Failure Alarm	LCP-IPS
Influent Pump Station Seal Water Failure Alarm	PCC
Influent Pump No. 1 Failure Alarm	LCP-IPS
IPS1 Variable Speed Pump Run Light	LCP-IPS
Influent Pump No. 2 Failure Alarm	LCP-IPS
IPS2 Constant Speed Pump Run Light	LCP-IPS
Influent Pump No. 3 Failure Alarm	LCP-IPS
IPS3 Variable Speed Pump Run Light	LCP-IPS
Influent Pump No. 4 Failure Alarm	LCP-IPS
IPS4 Constant Speed Pump Run Light	LCP-IPS
Influent Pump No. 5 Failure Alarm	LCP-IPS
IPS5 Variable Speed Pump Run Light	LCP-IPS
IP2 Constant Speed Pump Run/Stopped/Trip Light	SS2-HWE
IP4 Constant Speed Pump Run/Stopped/Trip Light	SS4-HWE
IP1 Variable Speed Pump Run/Fault Light	VFD1-IPS
IP3 Variable Speed Pump Run/Fault Light	VFD3-IPS
IP5 Variable Speed Pump Run/Fault Light	VFD5-IPS

4.1.4.3 Aerated Grit Chamber

The following alarms and status annunciations are associated with the Aerated Grit Chamber:

<u>Alarm/Status</u>	<u>Display Location</u>
PLC-PSTE Primary Failure Annunciator	LCP-PSTE
PLC-PSTE Secondary Failure Annunciator	LCP-PSTE
PLC-PST Failure Annunciator	PCC
Grit Blower GB1 Run/Stopped/Trip Lights	MCC-PSTE "A" BUS
Grit Blower GB2 Run/Stopped/Trip Lights	MCC-PSTE "B" BUS
Grit Blower Failure	PCC
Grit Blower No. 1 Failure Alarm	LCP-GB
Grit Blower 1 Run Light	LCP-GB
Grit Blower 1 Low Pressure Light	LCP-GB
Grit Blower 1 High Pressure Light	LCP-GB
Grit Blower No. 2 Failure Alarm	LCP-GB
Grit Blower 2 Run Light	LCP-GB
Grit Blower 2 Low Pressure Light	LCP-GB
Grit Blower 2 High Pressure Light	LCP-GB
Grit Pumps Seal Water Failure Alarm	LCP-GB
Grit Pumps Seal Water Failure Alarm	PCC
Grit Pump Gallery Wet Floor Alarm	LCP-GB
Grit Pump GP1 Run/Stopped/Trip Lights	MCC-PSTE "A" BUS

Grit Pump GP2 Run/Stopped/Trip Lights	MCC-PSTE “B” BUS
Grit Pump GP3 Run/Stopped/Trip Lights	MCC-PSTE “A” BUS
Grit Pump GP4 Run/Stopped/Trip Lights	MCC-PSTE “B” BUS
Grit Pump GP5 Run/Stopped/Trip Lights	MCC-PSTE “A” BUS
Grit Pump GP6 Run/Stopped/Trip Lights	MCC-PSTE “B” BUS
Grit Pump Failure Alarm	PCC
Grit Pump No. 1 Failure	LCP-GB
Grit Pump 1 Run Light	LCP-GB
Grit Pump No. 2 Failure	LCP-GB
Grit Pump 2 Run Light	LCP-GB
Grit Pump No. 3 Failure	LCP-GB
Grit Pump 3 Run Light	LCP-GB
Grit Pump No. 4 Failure	LCP-GB
Grit Pump 4 Run Light	LCP-GB
Grit Pump No. 5 Failure	LCP-GB
Grit Pump 5 Run Light	LCP-GB
Grit Pump No. 6 Failure	LCP-PSTE
Grit Pump 6 Run Light	LCP-PSTE
Grit Classifier/Separator Not In Operation Alarm	LCP-PSTE
Grit Classifier/Separator Failure Alarm	PCC
Grit Classifier GC1 Run/Stopped/Trip Lights	MCC-HWE

Grit Classifier GC2 Run/Stopped/Trip Lights	MCC-HWE
Grit Classifier GC3 Run/Stopped/Trip Lights	MCC-HWE
Grit Classifier/Separator No. 1 Failure	LCP-GC
Grit Classifier/Separator 1 Run Light	LCP-GC
Grit Classifier/Separator No. 2 Failure	LCP-GC
Grit Classifier/Separator 2 Run Light	LCP-GC
Grit Classifier/Separator No. 3 Failure	LCP-GC
Grit Classifier/Separator 3 Run Light	LCP-GC
Grit Dewatering Area Combustible Gas High Level Alarm	LCP-HWE
Grit Dewatering Area Combustible Gas Detection	PCC
Grit Dewatering Area H ₂ S Gas High Level Alarm	LCP-HWE
Grit Dewatering Area Hydrogen Sulfide Detection	PCC

4.1.4.4 Odor Reduction Station

The following alarms are associated with odor reduction station.

Odor Reduction Station Exhaust Fan

<u>Alarm/Status</u>	<u>Display Location</u>
Exhaust Fan OREF1 Run/Stopped/Trip Lights	MCC-HWE
Exhaust Fan OREF2 Run/Stopped/Trip Lights	MCC-HWE
Exhaust Fan OREF1 Run Light	LCP-ORHW
Exhaust Fan OREF1 Motor Fan Failure Light	LCP-ORHW

Exhaust Fan OREF1 Failure Annunciator	LCP-ORHW
Exhaust Fan OREF2 Run Light	LCP-ORHW
Exhaust Fan OREF2 Motor Fan Failure Light	LCP-ORHW
Exhaust Fan OREF2 Failure Annunciator	LCP-ORHW
Headworks Odor Reduction Station Failure	PCC

Odor Reduction Station Scrubber

<u>Alarm/Status</u>	<u>Display Location</u>
ORHW Scrubber ORSC1 Low Level Annunciator	LCP-ORHW

Odor Reduction Station pH and ORP Controllers

<u>Alarm/Status</u>	<u>Display Location</u>
ORHW Scrubber ORSC1 High pH Alarm Annunciator	LCP-ORHW
ORHW Scrubber ORSC1 Low pH Alarm Annunciator	LCP-ORHW
ORHW Scrubber ORSC1 Low ORP Alarm Annunciator	LCP-ORHW
ORHW Scrubber ORSC1 High ORP Alarm Annunciator	LCP-ORHW

Odor Reduction Station Recirculation Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
Odor Reduction Recirculation Pump ORRP1 Run/Stopped/Trip Lights	MCC-HWE
Odor Reduction Recirculation Pump ORRP2 Run/Stopped/Trip Lights	MCC-HWE
Odor Reduction Recirculation Pump ORRP1 Running Light	LCP-ORHW
Odor Reduction Recirculation Pump ORRP1 Motor Failure Light	LCP-ORHW
ORHW Recirculation Pump ORRP1 Failure Annunciator	LCP-ORHW
Odor Reduction Recirculation Pump ORRP2 Running Light	LCP-ORHW
Odor Reduction Recirculation Pump ORRP2 Motor Failure Light	LCP-ORHW
ORHW Recirculation Pump ORRP2 Failure Annunciator	LCP-ORHW
ORHW Recirculation Pump Seal Water Failure Annunciator	LCP-ORHW
Recirculation Pumps Area Shower Alarm Annunciator	LCP-ORHW
Headworks Odor Reduction Station Failure Annunciator	PCC

Odor Reduction Station NaOH Metering Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
ORHW Caustic (NaOH) Metering Pump ORMP1 Run/Stopped/Trip Lights	MCC-HWE
ORHW Caustic (NaOH) Metering Pump ORMP2 Run/Stopped/Trip Lights	MCC-HWE
ORHW Caustic Metering Pump ORMP1 Running Light	LCP-ORHW
ORHW Caustic Metering Pump ORMP1 Motor Failure Light	LCP-ORHW
ORHW Caustic Metering Pump ORMP1 Failure Annunciator	LCP-ORHW
ORHW Caustic Metering Pump ORMP2 Running Light	LCP-ORHW
ORHW Caustic Metering Pump ORMP2 Motor Failure Light	LCP-ORHW
ORHW Caustic Metering Pump ORMP2 Failure Annunciator	LCP-ORHW
Headworks Odor Reduction Station Failure Annunciator	PCC

Odor Reduction Station NaOCl Metering Pump

<u>Alarm/Status</u>	<u>Display Location</u>
ORHW Sodium Hypochlorite Metering Pump ORMP3 Run/Stopped/Trip Lights	MCC-HWE
ORHW Sodium Hypochlorite Metering Pump ORMP4 Run/Stopped/Trip Lights	MCC-HWE
ORHW Sodium Hypochlorite Metering Pump ORMP3 Running Light	LCP-ORHW
ORHW Sodium Hypochlorite Metering Pump ORMP3 Motor Failure Light	LCP-ORHW
ORHW Sodium Hypochlorite Metering Pump ORMP3 Failure Annunciator	LCP-ORHW
ORHW Sodium Hypochlorite Metering Pump	LCP-ORHW

ORMP4 Running Light	
ORHW Sodium Hypochlorite Metering Pump ORMP4 Motor Failure Light	LCP-ORHW
ORHW Sodium Hypochlorite Metering Pump ORMP4 Failure Annunciator	LCP-ORHW
Headworks Odor Reduction Station Failure Annunciator	PCC

Odor Reduction Station NaOH Storage Tank and Containment Area

<u>Alarm/Status</u>	<u>Display Location</u>
ORHW Caustic Storage Tank ORSOHT1 Low Level Alarm Annunciator	LCP-ORHW
ORHW Caustic Storage Tank ORSOHT1 Low Low Level Alarm Annunciator	LCP-ORHW
ORHW Caustic Storage Tank ORSOHT1 High Level Alarm Annunciator	LCP-ORHW
ORHW Caustic Storage Tank ORSOHT1 High Level Alarm, Horn and Indicator Light	NaOH Fill Station
ORHW Caustic Containment Sump High Level Alarm Annunciator	LCP-ORHW
Fill Panel Area Shower Alarm Annunciator	LCP-ORHW
Caustic Storage Area Shower Alarm Annunciator	LCP-ORHW
ORHW Caustic Containment Sump High Level Annunciator	PCC
Fill Panel Area Shower Annunciator	PCC
Caustic Storage Area Shower Annunciator	PCC

Odor Reduction Station NaOCl Storage Tank and Containment Area

<u>Alarm/Status</u>	<u>Display Location</u>
ORHW Sodium Hypochlorite Storage Tank ORSHT1 Low Level Alarm Annunciator	LCP-ORHW
ORHW Sodium Hypochlorite Storage Tank ORSHT1 Low Low Level Alarm Annunciator	LCP-ORHW
ORHW Sodium Hypochlorite Storage Tank ORSHT1 High Level Alarm Annunciator	LCP-ORHW
ORHW Sodium Hypochlorite Storage Tank High Level Alarm Horn and Indicator Light	NaOCl Fill Station
ORHW Sodium Hypochlorite Containment Sump High Level Alarm Annunciator	LCP-ORHW
Sodium Hypochlorite Storage Area Shower Alarm Annunciator	LCP-ORHW
ORHW Sodium Hypochlorite Containment Sump High Level Annunciator	PCC
Sodium Hypochlorite Storage Area Shower Annunciator	PCC

Odor Reduction Station Water Softening System

<u>Alarm/Status</u>	<u>Display Location</u>
ORHW Water Softening System ORSFT1 Alarm Annunciator	LCP-ORHW
Headworks Odor Reduction Station Failure Annunciator	PCC

Storage Bin/Grit Dewatering Areas Air Supply and Exhaust Fans

<u>Alarm/Status</u>	<u>Display Location</u>
Air Supply Fan SF1 Run/Stopped/Trip Lights	MCC-HWE
Air Exhaust Fan EF1 Run/Stopped/Trip Lights	MCC-HWE
Air Exhaust Fan EF2 Run/Stopped/Trip Lights	MCC-HWE
Air Supply SF1 Failure Annunciator	LCP-ORHWP
Air Supply SF1 Running Light	LCP-ORHWP
Air Supply SF1 Failure Light	LCP-ORHWP
Exhaust Fan EF1 Failure Annunciator	LCP-ORHWP
Exhaust Fan EF1 Running Light	LCP-ORHWP
Exhaust Fan EF1 Failure Light	LCP-ORHWP
Exhaust Fan EF2 Failure Annunciator	LCP-ORHWP
Exhaust Fan EF2 Running Light	LCP-ORHWP
Exhaust Fan EF2 Failure Light	LCP-ORHWP
Headworks Odor Reduction Station Failure Annunciator	PCC

Screening and Wetwell Area Exhaust Fan and Automatic Damper

<u>Alarm/Status</u>	<u>Display Location</u>
Exhaust Fan EF3 Run/Stopped/Trip Lights	MCC-HWE
Exhaust Fan EF3 Failure Annunciator	LCP-ORHWP
Exhaust Fan EF3 Running Light	LCP-ORHWP
Exhaust Fan EF3 Failure Light	LCP-ORHWP
Damper Valve ORV1 Failure Annunciator	LCP-ORHWP
Damper Valve ORV1 Running Light	LCP-ORHWP
Damper Valve ORV1 Failure Light	LCP-ORHWP
Headworks Odor Reduction Station Failure Annunciator	PCC

4.1.5 Daily Operational Checks

4.1.5.1 General

1. Refer to the general daily operation checks requirements described in Section 4.0.5.
2. Consult Section 4.1.5.2 - 4.1.5.5 and the appropriate manufacturer's operation and maintenance manuals for specific monitoring requirements.

4.1.5.2 Screening Equipment

1. Visually observe each element of the facilities and all piping and connections for any signs of damage, liquid leaks, or any other unusual problems.
2. Check the positions of the slide gates and isolation stop plates for each screenings channel to confirm the requirements of your Operations Supervisor.
3. Check control settings of each element of the facilities to confirm the requirements of your Operations Supervisor.

4. Check operation of each element of the facilities to see that it is operating smoothly and quietly. Check all drives for leaks, unusual noise, and excessive temperature (hand touch).
5. Check for proper operation of each bar screen through a full cycle of operation. Note any jam or overload conditions.
6. Check the overall condition of the screenings conveyor belt. Ensure that the belt is tracking properly during operation and that screenings are landing on the belt. Note any wear on the plows, or side skirting.
7. Check position of the storage bin, level and uniformity of screenings and/or grit in the truck.
8. Check the screenings carryover through the plow area and note the need for mechanical adjustment.
9. Inspect taglines to ensure they are not tangled, hung up, or obstructed in any fashion that may prevent the taglines engaging the switch.
10. Check the conveyor drive roller chains and sprockets for wear and elongation of the chain.
11. Check and record combustible gas concentrations and hydrogen sulfide gas concentrations from the Influent Channel and the Storage Bin Area sensors locally to satisfy the requirements established by your Operations Supervisor.
12. Calibrate the combustible gas sensors and the hydrogen sulfide gas sensors for the Influent Channel and the Storage Bin Area on a weekly basis.
13. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the Screening Equipment:

Operation and Maintenance Manual for South Bay International Wastewater Treatment Plant (CC-2), Influent Screenings Equipment (Section 11001). Prepared by Fairfield Service Company. 1997.

Operations and Maintenance Data for South Bay International Wastewater Treatment Plant Advanced Primary Treatment Plant, Screenings Conveyance Equipment (Section 11002). Prepared by G.M.I. Industries. 1997.

14. Check and record run times for the Influent Screens and conveyors at the MCC-HWE.

4.1.5.3 Influent Pump Station

1. Check the positions of the IPS Influent Channel slide gates and pump discharge and interconnect valves to confirm the requirements of your Operations Supervisor.
2. Check the influent pumps operation to see that they are operating smoothly and quietly.
3. Check the influent pumps for leaks, excessive noise, and temperature (hand touch).
4. Check seal water flow to each influent pump. Adjust as necessary.
5. Check that the swing check valves on all operating pumps are open. This condition is alarmed at LCP-IPS, but a visual check provides added redundancy. If an operating pump has a check valve that is closed, then check and open the discharge isolation valve. If the discharge isolation valve is open, and the associated check valve is in the closed position, then the respective pump should be taken out of service by locking the ROT switch in the “Off” position.
6. Check the discharge pressures using the influent pump pressure gauges.
7. Check control settings of the influent pumps locally and at the LCP-IPS to confirm the requirements of your Operations Supervisor.
8. Check and record combustible gas concentration and hydrogen sulfide gas concentration from the Influent Pump Station sensors locally to satisfy the requirements established by your Operations Supervisor.
9. Calibrate the combustible gas sensor and the hydrogen sulfide gas sensor for the Influent Pump Station on a weekly basis.
10. Consult the manufacturer’s O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the Influent Pump Station:

Installation, Operation and Maintenance Manual for South Bay International Wastewater Plant Advanced Primary Treatment Plant, Variable Speed Influent Pumps (Section 11003). Prepared by Fairbanks Morse Pump Corporation. 1997.

11. Check and record run times for the constant speed pumps at SS2-HWE and SS4-HWE and for the variable speed pumps at the respective VFDs.

4.1.5.4 Grit Handling Equipment

Aerated Grit Chamber

1. Check the position of the influent and bypass channel stop plates to confirm the requirements of your Operations Supervisor.
2. Check the motion (“roll”) of wastewater in the grit chamber initiated by the diffused air. Wastewater should move through the grit chamber in a circular (helical) path and should make two or three passes across the bottom of the chamber at peak flows (there should be more passes across the bottom at lower flows). If the velocity of roll is too great, grit will be carried out of the chamber. If the velocity of roll is too low, organic material will be removed with the grit. Adjust the air flow as required.
3. Ensure that the grit removal from the grit chamber is accomplished at regular intervals as established by your Operations Supervisor and as controlled by the programmed timer at the panel LCP-HW.
4. Check surface of water in the grit chamber for scum and floating debris accumulation. If scum and floating debris accumulate on the surface in dead area, remove this material twice a day, or more if needed.

Grit Chamber Blowers

1. Check the grit chamber blower that is in operation to see that it is operating smoothly and quietly.
2. Check the grit chamber blower for leaks, excessive noise, and temperature.
3. Check the suction and discharge pressures of the grit chamber blower located at the local gauges.
4. Check control settings of the grit chamber blower locally at the LCP-GB to confirm the requirements of your Operations Supervisor.
5. Verify that the stand-by equipment is ready for operation.

6. Consult the manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manuals should be consulted for the grit chamber blowers:

Operation and Maintenance Manual for South Bay International Wastewater Treatment Plant, Rotary Positive Displacement Blowers (Section 11004). Prepared by Colorado Compressors, Inc., 1997.

Grit Pumps

1. Check the positions of the manually operated valves on grit pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the grit pumps operation to see that they are operating smoothly and quietly.
3. Check the grit pumps for leaks, excessive noise, and temperature (hand touch).
4. Check seal water flow to each grit pump. Adjust as necessary.
5. Check that the swing check valves on all operating pumps are open. This condition is alarmed at LCP-GP, but a visual check provides added redundancy. If an operating pump has a check valve that is closed, then check and open the discharge and suction isolation valves. If both discharge and suction isolation valves are open, and the associated check valve is in the closed position, then the respective pump should be taken out of service by locking the ROT switch in the "Off" position.
6. Check the discharge pressures using the grit pump pressure gauges.
7. Check control settings of the grit pumps locally and at the LCP-GP to confirm the requirements of your Operations Supervisor.
8. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the grit pumps:

Operation & Maintenance Instructions South Bay International Wastewater Treatment Plant, Recessed Impeller Centrifugal Pumping Equipment (Section 11005). Prepared by Wemco Pump. 1997

9. Check and record run times for the grit pumps at MCC-PSTE.

Grit Classifier/Separators

1. Visually observe each element of the facilities and all piping and connections for any signs of damage, liquid leaks, or any other unusual problems.
2. Check control settings of each element of the facilities to confirm the requirements of your Operations Supervisor.
3. Check operation of each element of the facilities to see that it is operating smoothly and quietly. Check all drives for leaks, unusual noise, and excessive temperature.
4. Check and record combustible gas concentration and hydrogen sulfide gas concentration from the Grit Dewatering Area sensors locally to satisfy the requirements established by your Operations Supervisor.
5. Calibrate the combustible gas sensor and the hydrogen sulfide gas sensor for the Grit Dewatering Area on a weekly basis.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the grit classifier/separators:

Operation & Maintenance Instructions South Bay International Wastewater Treatment Plant, Grit Dewatering Equipment (Section 11006). Prepared by Wemco Pump. 1997.

7. Check and record run times for the grit classifier/separators at MCC-HWE.

Grit/Screenings Storage Bin Winches

1. Observe the wire rope as it winds onto the drum. If it becomes loose, uneven, or overlapped, stop the operation and rewind the wire rope before continuing.
Continued operation with overlapped or uneven wire rope can damage the wire rope.
2. Make sure at least 4 wraps of wire rope are wound on the drum at all times, to serve as anchor wraps. With less than 4 wraps on the drum the wire rope could come loose, and release the load.
3. Check operation of the winches to see that they are operating smoothly and quietly. Check the drives for leaks, unusual noise, and excessive temperature.

4. Observe the reducer for signs of smoke, the smell of burnt lubricant, and other signs of overheating. Stop the operation if the reducer overheats, and allow the winch to cool. **Continued operation may cause damage.**
5. Make sure all people, including operators and yourself, stand away from the winch. As much as possible, stand out of the path of the load, and out of the path of a broken wire rope that might snap back and cause injury.
6. Consult the Manufacturer's O&M Manuals for Troubleshooting and test procedures. The following O&M Manuals should be consulted for the storage bin winches:

Operation and Maintenance Instructions, South Bay International Wastewater Treatment Plant, Electric Hoist Equipment (Section 14320). Prepared by Thern, Inc. 1997.

4.1.5.5 Odor Reduction Station

The daily check of the odor reduction station should be according to the following procedures:

Odor Reduction Station Exhaust Fans

1. Check the positions of the manually operated suction and discharge dampers and interconnection ducts to confirm the requirements of your Operations Supervisor.
2. Check the exhaust fan operation to see that it is operating smoothly.
3. Check the exhaust fan for leaks, excessive noise, and temperature (hand touch).
4. Check that the lever weighted back draft on the operating fan is open. If an operating fan has a back draft damper that is closed, then check that the inlet and discharge isolation damper are open. If the isolation dampers are open, and the associated backdraft damper is in the closed position, then the respective fan should be taken out of service by locking the ROT switch in the "Off" position.
5. Check control settings of the fan locally and at the LCP-ORHW to confirm the requirements of your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station system:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Odor Reduction Scrubber Systems (Section 11050), Prepared by R. J. Environmental, Inc. 1997.

Odor Reduction Station Scrubber

1. Visually observe scrubber sump and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the tower and all pipes, ducts, valves, sampling valves, and manholes for any signs of damage or improper installation. All sampling valves and manholes should be properly closed as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves, and dampers to confirm the requirements of your Operations Supervisor.
4. Check and record sump liquid level locally and at the LCP-ORHW, the mist elimination differential pressure, and the packed bed differential pressure, to satisfy the requirements established by your Operations Supervisor.
5. Check the scrubber liquid overflow (blowdown) for clarity. A milky solution indicates insufficient overflow rate.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station system:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Odor Reduction Scrubber Systems (Section 11050), Prepared by R. J. Environmental, Inc. 1997.

Odor Reduction Station pH and ORP Controllers

1. Visually observe each controller and all piping and connections for cracking, any signs of liquid leaks, and any other unusual problems.
2. Check the positions of the manually-operated valves, to confirm the requirements of your Operations Supervisor.
3. Check and record pH and ORP readings locally and at LCP-ORHW to satisfy the requirements established by your Operations Supervisor.

4. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction pH and ORP Controllers:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Odor Reduction Scrubber Systems (Section 11050).
Prepared by R.J. Environmental, Inc. 1997.

Odor Reduction Station Recirculation Pumps

1. Check the positions of the manually operated valves on recirculation lines and pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the recirculation pump operation to see that they are operating smoothly and quietly.
3. Check the recirculation pumps for leaks, excessive noise, and temperature (hand touch).
4. Check seal water flow to each recirculation pump. Adjust as necessary to confirm the requirements of your Operations Supervisor.
5. Check and record the discharge pressure using the local recirculation pump pressure gauge.
6. Check control status of the recirculation pumps at the LCP-ORHW to confirm the requirements of your Operations Supervisor.
7. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction recirculation pumps System:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Odor Reduction Scrubber Systems (Section 11050).
Prepared by R.J. Environmental, Inc. 1997.

Odor Reduction Station NaOH Metering Pump

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check and record the discharge pressure using the local pressure gauge.
5. Check control settings of the caustic metering pump locally and at the LCP-ORHW to confirm the requirements of your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the NaOH metering pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Diaphragm Chemical Metering Pumps (Section 11018). Prepared by PulsaFeeder, Inc. 1997.

Odor Reduction Station NaOCl Metering Pump

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check and record the discharge pressure using the local pressure gauge.
5. Check control settings of the sodium hypochlorite pump locally and at the LCP-ORHW to confirm the requirements of your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the NaOCl metering pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Diaphragm Chemical Metering Pumps (Section 11018). Prepared by PulsaFeeder, Inc. 1997.

Odor Reduction Station NaOH Storage Tank

1. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation. All manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Visually inspect air vent and overflow pipe for any restrictions.
4. Check the positions of the manually-operated valves of the tanks to confirm the requirements of your Operations Supervisor.
5. Check control settings of each element of the tank to confirm the requirements of your Operations Supervisor.
6. Check and record sodium hydroxide level in the tank locally and at LCP-ORHW to satisfy the requirements established by your Operations Supervisor.
7. Consult the manufacturer's O&M Manual for troubleshooting and repair procedures. The following O&M Manual should be consulted for the NaOH storage tank:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Fiberglass Reinforced Plastic Tanks (Section 11030). Prepared by Belco Manufacturing. 1997.

Odor Reduction Station Sodium Hypochlorite Storage Tank

1. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation. All manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Visually inspect air vent and overflow pipe for any restrictions.
4. Check the positions of the manually-operated valves of the tanks to confirm the requirements of your Operations Supervisor.

5. Check control settings of each element of the tank to confirm the requirements of your Operations Supervisor.
6. Check and record sodium hypochlorite level in the tank locally and at LCP-ORHW to satisfy the requirements established by your Operations Supervisor.
7. Consult the manufacturer's O&M Manual for troubleshooting and repair procedures. The following O&M Manual should be consulted for the NaOCl storage tank:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Fiberglass Reinforced Plastic Tanks (Section 11030). Prepared by Belco Manufacturing. 1997.

NaOH and NaOCl Containment Sump Pumps

1. Check level in the sumps in the NaOH and NaOCl storage areas.
2. Record run times of the sump pumps.
3. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the sump pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sump Pumps (Section 11016). Prepared by Multi W Systems, Inc. 1997.

Odor Reduction Station Water Softener System

1. Check water softener vessels for leaks.
2. Check and record water flow rate, calcium ion reading, and pressure.
3. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station water softener system:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant - Water Softening Equipment (Section 11233). Prepared by Culligan Technologies, 1997.

Storage Bin/Grit Dewatering Areas Air Supply and Exhaust Fans

1. Check the supply fan (SF1) operation to see that it is operating smoothly.
2. Check the supply fan for excessive noise and temperature (hand touch)
3. Verify that the exhaust fans (EF1 and EF2) are not operating at the same time as the odor reduction station scrubber exhaust fans.
4. If the odor reduction station is out-of-service, check the two exhaust fans (EF1 and EF2) for operation and excessive noise or temperature (hand touch).
5. Check control settings of the fans locally and at the LCP-ORHWB to confirm the requirements of your Operations Supervisor.
6. Consult the manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the Storage Bin/Grit Dewatering Areas air supply and exhaust fans:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Fiberglass Reinforced Plastic Fans (Section 15833). Prepared by Hartzell, 1997.

Screening and Wetwell Areas Exhaust Fan and Automatic Damper

1. Verify that the exhaust fan is not operating and that the automatic damper is opened under normal conditions with the odor reduction station scrubber exhaust fans (either OREF1 or OREF2) in operation.
2. If the odor reduction station is out-of-service, check the exhaust fan (EF-3) for operation and excessive noise or temperature (hand touch). Check that the automatic damper (ORV1) is closed.
3. Check control settings of the fan locally and at the LCP-ORHW to confirm the requirements of your Operations Supervisor.
4. Consult the manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the Screening and Wetwell Area exhaust fan:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Fiberglass Reinforced Plastic Fans (Section 15833). Prepared by Hartzell, 1997.

4.1.6 Training Record

The following record should be used by the Operator to ensure a complete understanding of the Headworks Facilities.

4.1.6.1 Reading Assignment

1. Chapters 8, 9, 13, 15, Operation of Wastewater Treatment Plants - MOP 11. Water Environment Federation, 1990.
2. Chapter 4, Operation of Wastewater Treatment Plants - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1993.
3. Chapter 1, Advanced Waste Treatment - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1991.

4.1.6.2 Field Instruction

The operator should review and know the location and purpose of each of the following items:

Screening Equipment

Automatic Sampler	_____
High High Level Float Switch	_____
Bubbler Differential Level Sensing System	_____
Screening Area Isolation Slide Gates	_____
Horizontal Belt Conveyors	_____
Screening Area Feed Valves	_____
High Torque Switch	_____
pH Transmitter	_____
Local Controls	_____
LCP-HWE Alarms	_____
PCC Alarms	_____

Influent Pumps

Isolation Valves	_____
Seal Water Assembly	_____
Local Controls	_____
LCP-IPS Controls and Alarms	_____
PCC Alarms	_____

Grit Chamber

Isolation Valves	_____
Local Controls	_____
LCP-GP Controls and Alarms	_____
PCC Alarms	_____

Grit Chamber Blowers

Isolation Valves	_____
Grit Blower Inlet/Outlet Silencer	_____
Spring Weight Pressure Relief Valve	_____
Local Controls	_____
LCP-GP Controls and Alarms	_____
PCC Alarms	_____

Grit Pumps

Isolation Valves	_____
Seal Water Assembly	_____
Local Controls	_____
LCP-GP Controls and Alarms	_____
PCC Alarms	_____

Grit Classifier/Separators

Isolation Valves	_____
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Local Controls	_____
LCP-GP Controls and Alarms	_____
PCC Alarms	_____
Grit/Screenings Storage Bin Winches	
Local Controls	_____
Odor Reduction Station Exhaust Fan	
Isolation Damper	_____
Backdraft Damper	_____
Low Flow Switch	_____
Local Controls	_____
LCP-ORHW Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station Scrubber	
Isolation Valves	_____
Level Control	_____
Mist Eliminator D/P	_____
Packed Bed D/P	_____
PCC Alarms	_____
Odor Reduction Station pH and ORP Controllers	
By-Pass Line Operation	_____
pH Controls	_____
ORP Controls	_____
LCP-ORHW Alarms	_____
PCC Alarms	_____
Odor Reduction Station Recirculation Pumps	
Flow Testing	_____

Isolation Valves	_____
Seal Water Assembly	_____
Local Controls	_____
LCP-ORHW Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station NaOH Metering Pumps	
Isolation Valves	_____
Local Controls	_____
LCP-ORHW Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station NaOC1 Metering Pumps	
Isolation Valves	_____
Local Controls	_____
LCP-ORHW Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station NaOH Storage Tank	
Isolation Valves	_____
Level Sensor	_____
LCP-ORHW Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station NaOC1 Storage Tank	
Isolation Valves	_____
Level Sensor	_____
LCP-ORHW Controls and Alarms	_____
PCC Alarms	_____

NaOH and NaOC1 Containment Sump
Pumps

Local Controls _____

LCP-SP Alarms _____

PCC Alarms _____

Odor Reduction Station Water Softening
System

Isolation/By-Pass Valves _____

Low Pressure Switch _____

Calcium Ion Controller _____

Duplex Controller _____

LCP-ORHW Alarms _____

PCC Alarms _____

Storage Bin/Grit Dewatering Areas Air
Supply (SF1) and Exhaust Fans (EF1 and
EF2)

Supply Fan Low Flow Switch _____

LCP-ORHWB Alarms _____

PCC Alarms _____

Screening and Wetwell Exhaust Fan (EF3)
and Automatic Damper (ORV1)

Damper _____

LCP-ORHWB Alarms _____

PCC Alarms _____

4.2 PRIMARY SEDIMENTATION FACILITIES

4.2.1 Description of Controls and Operation

4.2.1.1 General

Refer to the general control and operational philosophy description presented in Section 4.0.1.

The Primary Sedimentation Area Process schematic is presented in Figure 3.2-1.

The control, status, and annunciators for the Primary Sedimentation facilities consist of field controls and local control panels (LCP) located in the field or in the Primary Sedimentation Tank Local Control Center (PST-LCC-EAST). The main local control panel (LCP-PSTE) contains most of the LCPs for the PST Systems and is located in the PST-LCC-EAST. The PST-LCC-EAST also houses switchboards, motor control centers (i.e., MCC-PSTE “A” and “B” BUS, MCC-PSTE1 and MCC-PSTE2) and variable frequency drives.

4.2.1.2 Channel Aeration System

Two (2) primary channel air blowers (PCAB) are installed in the lower level of PST-LCC-EAST. Each blower is provided with an On/Off selector switch at LCP-PCAB located at PST-LCC-EAST. In the “On” position, the blowers run continuously. In the “Off” position, the blowers only operate in the “Test” position of the Remote/Off/Test (ROT) switch.

Each blower is provided with a ROT switch located at the blower. The “Remote” position of the ROT switch enables the controls located at LCP-PCAB. The “Off” position is lockable and prevents the blower from operating, overriding all other controls. The “Test” position is spring loaded and is used to test the blower with the On/Off switch in the “Off” position. The blowers are interlocked to prevent both blowers from operating at the same time.

An elapsed time meter and Run/Off lights for each blower is provided at the MCC. An additional run light is provided at LCP-PCAB for each blower. The blowers can shut down and set off alarm “CHANNEL AIR BLOWER DISCHARGE HIGH PRESSURE “ or “CHANNEL AIR BLOWER DISCHARGE LOW PRESSURE”. Failure of any blower is

initiated as a “CHANNEL AIR BLOWER FAILURE” alarm at LCP-PCAB and a common alarm is transmitted to the PCC as “CHANNEL AIR SYSTEM FAILURE.”

The two (2) air supply fans are provided with Hand/Off/Auto (HOA) switches located at LCP-PCAB. In the “Hand” position, the fan operates continuously. In the “Off” position, the fan operates only in the “Test” position of the ROT switch. In the “Auto” position, the fan starts when either Channel Air Blower No. 1 or Channel Air Blower No. 2 is placed in the “On” position.

Each supply fan is provided with a ROT switch at the fan motor. In the “Remote” position, the fan is operated by controls at the LCP-PCAB. The “Off” position is lockable and prevents the fan from operating, overriding all other controls. In the “Test” position is spring loaded and is used to test the fan operation while the HOA switch is in the “Off” position.

An elapsed time meter and Run/Off lights is provided for each fan at the MCC. An additional run light is provided at LCP-PCAB for each fan. Failure of any fan annunciates a “AIR SUPPLY FAN FAILURE” alarm at LCP-PCAB and a common alarm is transmitted to the PCC as “CHANNEL AIR SYSTEM FAILURE.”

Two (2) PST gallery exhaust fans are provided at the southeast corner of the PST gallery. Each fan is provided with an On/Off switch located at LCP-PCAB. In the “On” position, the fan runs continuously. In the “Off” position, the fan only operates in the “Test” position of the ROT switch.

Each PST gallery exhaust fan is provided with a ROT switch. In the “Remote” position, the fan is operated by controls at the LCP-PCAB. In the “Off” position, the fan does not operate, overriding all other controls. The “Test” position is spring loaded and is used to test the fan with the On/Off switch in the “Off” position.

An elapsed time meter and Run/Off lights are provided for each fan at the MCC. An additional run light is provided at LCP-PCAB for each fan. Failure of either fan annunciates a “PST GALLERY EXHAUST FAN FAILURE” alarm at LCP-PCAB and a common alarm is transmitted to the PCC as “CHANNEL AIR SYSTEM FAILURE.”

A schematic of the Channel Aeration Facilities is provided in Figure 3.2-2.

4.2.1.3 Rapid Mix Facilities

A total of five (5) vertically mounted rapid mixing pumps are provided for the initial facilities (one for each tank). Each pump is provided with an On/Off selector switch located at LCP-RM located at PST-LCC-EAST. In the “On” position, the pumps run continuously. In the “Off” position, the pump only operates in the “Test” mode of the ROT switch.

Each rapid mix pump is provided with a ROT switch located at the pump. The “Remote” position of the ROT switch enables the controls located at the LCP-RM. The “Off” position is lockable and prevents the mixing pump from operating, overriding all other controls. The “Test” position is spring loaded and is used to test the pump with the On/Off switch “Off” position.

An elapsed time meter and run/off lights for each pump are located at the MCC. An additional run light is provided at LCP-RM for each pump. Failure of a pump is detected by limit switches on the pump discharge check valve arm. Failure of any pump is indicated as a “RAPID MIX PUMP FAILURE” alarm at LCP-RM and a common alarm is transmitted to the PCC as “RAPID MIX PUMP STATION FAILURE.”

The PST Gallery duplex sump pumps located in the southwest corner of the PST Gallery are provided with Hand/Off/Auto selector switches. The HOA selector switch is provided with a key which is needed to operate the switch. The switches are mounted in the LCP-PSTGS located at the pump location. Also at the LCP-PSTGS are pump run and fail indicating lights, seal fail indicating light, alarm light beacon, alarm test switch, control power light, control On/Off switch, and lockable On/Off Pump 1 and Pump 2 disconnect switches. The LCP-PSTGS contains two (2) elapsed time meters.

The sump level is monitored with float switches. A pump operates when the level rises to the high level set by float switch and pumps down until the level falls to the low level set by float switch. A low low level float switch shall serve as a backup to shut off the pump.

When both pumps are in the “Auto” position, the pumps alternate automatically as duty and standby pumps on each pump down cycle. If the duty pump fails, the standby pump operates in its place. Pumps are equipped with high temperature switches in the motor windings to stop operation on winding high temperature. Also, pumps are equipped with moisture

sensing element and warning lights for moisture detection and alarming is provided in the control panel.

The alarm “PST GALLERY SUMP PUMP FAIL” is transmitted at panel LCP-PSTE when pump has winding high temperature. The alarm “PST GALLERY SUMP HIGH HIGH LEVEL” is transmitted to LCP-PSTE when level rises to level set by float switch. The high high level alarm transmits a signal to the PCC to initiate alarm “PST GALLERY SUMP HIGH LEVEL”.

4.2.1.4 Sludge Collection and Pumping

Sludge Collectors

Five (5) sludge collector mechanisms are provided for the initial facilities (one for each tank). One drive is provided for each PST collector. A total of five drives are provided. Each collector drive is provided with a locally mounted ROT switch and a Forward/Reverse (F/R) switch. In the “Remote” position, the collectors are controlled by On/Off switches located at LCP-PSC at PST-LCC-EAST. The “Off” position of the ROT is lockable and prevents the collector from operating, overriding all other controls. The “Test” position is spring loaded and operates the collector in the direction indicated by the F/R switch. It is used to test the operation of the collector locally. The “Forward” and “Reverse” positions of the F/R switch select the direction to “Test” the collector. The spring loaded “Reverse” position is also used to remove an obstruction in the collector mechanism.

An elapsed time meter and Run/Off lights are provided for each collector at the MCC. An additional run light is provided for each collector at LCP-PSC.

Each drive sprocket is fitted with a shear pin coupling to prevent damage to the motor in the event of overload. A limit switch is placed at each shear pin to detect failure. On failure, a discrete signal is sent to initiate a collector drive “COLLECTOR FAILURE” alarm at LCP-PSC and a common alarm “PRIMARY SEDIMENTATION TANK COLLECTOR FAILURE” at the PCC. A “Run” indicating light is also provided for each collector actuator at LCP-PSC.

Primary Sludge Pumping Facilities

A positive displacement sludge pump is provided for each two sedimentation tanks. Each pump is driven by a constant-speed TEFC motor. Each pump is provided with a Hand/Off/Auto (HOA) selector switch at LCP-PSP located at PST-LCC-EAST. In the “Hand” mode, the pump runs continuously. In the “Off” mode, the pump only operates in the “Test” mode of the ROT switch. In the “Auto” mode, the pump is controlled by the PLC-PSTE located in PST-LCC-EAST. The automatic mode of operation is described below.

Each sludge pump is provided with a ROT switch located at the pump. The “Remote” position of the ROT switch enables the controls located at the LCP-PSP. The “Off” position is lockable and prevents the sludge pump from operating, overriding all other controls. The “Test” position is spring loaded and is used to test the operation of the pump with the HOA switch in the “Off” position.

A high discharge pressure switch is located downstream of each sludge pump. The switch shuts down any pump at a preset pressure point. A discrete signal is transmitted to a “PRIMARY SLUDGE PUMP HIGH DISCHARGE PRESSURE” alarm located at LCP-PSP.

An elapsed time meter and run/off lights for each pump are located at the MCC. An additional Run light is provided for each pump at LCP-PSP. Failure of any pump is indicated as a “PRIMARY SLUDGE PUMP FAILURE” alarm at LCP-PSP and a common alarm is transmitted to the PCC as “PRIMARY SLUDGE PUMP STATION FAILURE.”

Each sedimentation tank is provided with two GLDI sludge withdrawal lines. Each withdrawal line is provided with a TEFC quarter turn, non-modulating motor-operated plug valve. Four lines (two tanks) discharge to a common primary sludge pump suction header.

Each of the ten TEFC motor operated valves is provided with a Remote/Off/Local (ROL) switch located at the valve. In the “Local” position, the valve is controlled by three pushbuttons (Open/Stop/Close) located at the valve. The “Stop” pushbutton is lockable and overrides all other controls. In the “Remote” position, the valve is operated by the PLC-PSTE at PST-LCC-EAST. Additionally, each valve has a lockable On/Off disconnect box located at each valve.

Each valve is provided with an “Auto” light at LCP-PSP to indicate the mode of operation. If a valve fails to open or close when called for in the automatic mode of

operation, a position switch sends a “PRIMARY SLUDGE VALVE FAILURE” alarm signal to LCP-PSP and a common “PRIMARY SLUDGE PUMP STATION FAILURE” alarm to the PCC.

Each primary sludge pump is supplied with a discharge magnetic flow meter with local instantaneous flow indication. The flow meters are capable of reading and indicating a range of 0 to 115 gpm (maximum capacity of primary sludge pump is 115 gpm).

A common magnetic flow meter is located on the primary sludge discharge line of the pump station. The meter has a local indicator for instantaneous and totalized flow. The meter transmits an analog signal to the LCP-PSP. The PLC-PSTE outputs total instantaneous flow and totalized flow signals, which is indicated on the face of LCP-PSP.

A sludge grinder with a manual bypass and a NEMA-4X local control panel LCP-PSPG are located in the PST Access Gallery.

The grinder is provided with a ROT switch located at LCP-PSPG. In the “Remote” position, the grinder is controlled by the PLC-PSTE located at PST-LCC-EAST. The “Off” position is lockable and prevents the grinder from operating, overriding all other controls. The “Test” position is not spring loaded and enables Start/Stop pushbuttons located at LCP-PSPG.

The grinder is provided with four indicating lights “RUNNING,” “GRINDER TRIP,” “GRINDER STOP” and “MOTOR O/L (OVERLOAD)” all located at LCP-PSPG. The elapse time meter is located at the LCP-PSPG.

The grinder is also provided with two indicating lights “RUN” and “OFF” and an elapsed time meter located at its respective MCC. Additionally, the grinder is provided with two indicating lights “RUN” and “AUTO” at the LCP-PSP located in PST-LCC-EAST.

Alarms send a discrete signal to initiate a common alarm “PRIMARY SLUDGE PUMP STATION FAILURE” to the PCC.

In the automatic mode of operation, all in-service sludge pumps must be placed in the “Auto” position, and in-service sludge withdrawal valves must be placed in the “Auto” position. The sludge grinder must be in the “Remote” or bypass position. The automatic mode uses a high flow/low flow time period for the PLC-PSTE to determine the length of operation for the equipment when in automatic mode. These periods are entered at the

Headworks panelview, LCP-HWE. These periods (maximum 2 high periods and 2 low periods per day) affect all the PLCs at the plant.

The cycle of operation for the primary sludge pump system typically consists of the three primary sludge pumps running sequentially. Each pump has its interval of operation. The interval of operation for a pump consists of drawing sludge from one tank, then drawing from the other.

For example, at a resettable interval as programmed into the PLC-PSTE at PST-LCC-EAST, the two motor operated valves on the sludge withdrawal lines for Sedimentation Tank 1 open simultaneously, the Primary Sludge Grinder starts and then Primary Sludge Pump 1 starts. After an adjustable duration programmed into the PLC-PSTE, the valves on the sludge withdrawal lines of Sedimentation Tank 2 open, and then the valves on the lines for Tank 1 close. Primary Sludge Pumps continue to run for a preset adjustable time. Closure of valves for one tank occurs after the valves for Tank 2 are confirmed open. The cycle is repeated at the resettable interval programmed into the PLC-PSTE.

The PLC-PSTE provides the ability to the operator to pump primary sludge as described above, each pump in sequence, or to pump sludge from each pump simultaneously at a preset interval. The operator has the capability to operate the tank withdrawal valves independently such as Primary Sludge Valve 1A.

The operator is given the ability to set the interval of operation equal to the cycle of operation. In that case, the valves for Tank 1 open, then the valves for Tank 2 close, and the cycle continues, with the Primary Sludge Pump 1 continuing to operate.

Should a valve selector switch be in the “Local” position, that valve is skipped over in the sequence.

4.2.1.5 Primary Skimmings Processing Facilities

Surface Skimmers

An automatic surface rotary skimmer is located at the effluent end of each primary sedimentation tank. A single drive is provided for each skimmer. A total of five drives is provided. Each skimmer drive is provided with a locally mounted ROL switch, a forward pushbutton, and a backward pushbutton. In the “Remote” position, the skimmers are

controlled by the PLC-PSTE located at PST-LCC-EAST. The “Off” position is lockable and prevents the skimmers from operating, overriding all other controls. The “Local” position enables the forward or backward pushbutton to be depressed which is used to test the operation of the skimmer locally. The forward and backward pushbuttons are spring loaded and test the skimmers in the respective directions and allow for removal operation of the skimmers in both directions.

A schematic of the primary skimmings facilities is provided in Figure 3.2-3.

In the “Remote” position of the ROL switch, interval and duration times programmed into the PLC-PSTE send signals to one skimmer for a preset duration at a preset interval set on a real-time basis. The skimmer tilts forward and then reverses in sequence, from Skimmer No. 1 to Skimmer No. 5. If the ROL switch for any skimmer drive is in the “Off” or “Local” position, that skimmer is skipped in sequence.

The PLC-operated skimming operation (PLC-PSTE) can be interrupted by depressing an abort pushbutton located at LCC-PST-EAST. Following abort of a cycle, a reset button located at LCP-PSK must be pushed. Once the system has been reset, the skimmers operate when the next timed cycle is called for.

A signal is transmitted from the skimmings pump station to inhibit skimmer operation when a skimmings pump is running, when the skimmings wet well is full, and when the skimmings system is in the separation cycle. Once the inhibit signal has been released, the skimmers operate when the next timed cycle is called for. An “Auto” light is provided for each skimmer at LCP-PSK. This light confirms PLC-PSTE control. The skimmers operate in a sequential mode. They cannot be operated simultaneously.

Each skimmer drive is provided with limit switches to detect skimmer position. Should the skimmer fail to tilt or to upright as called for, a discrete signal is transmitted to LCP-PSK to initiate a “SKIMMER FAILURE” alarm and a common alarm is transmitted to the PCC as “PRIMARY SEDIMENTATION TANK SKIMMER FAILURE.”

Skimmings Pump Station

Skimmings from each primary sedimentation tank discharge by gravity to the Skimmings Wet Well. Subnatant is pumped back to the primary sedimentation basin

influent channel. Concentrated skimmings from the wet well is discharged to the USST.

Two skimmings pumps are provided. One is an operating pump. The second is a standby pump. A Pump 1/Alternate/Pump 2 selector switch is provided for duty/standby pump combination selection. Each is a two-speed pump, and is provided with a Hand-Off-Auto (HOA) selector switch at the LCP-PSKPS located at the Skimmings Dry Well for pump operation. In the “Hand” mode, the pump runs continuously at the speed set by a high speed/low speed selector switch at LCP-PSKPS. In the “Off” mode, the pump only operates in the “Test” mode of the ROT switch. In the “Auto” mode, the pump operates as called for by signals from a PLC-PSTE located at PST-LCC-EAST. The automatic mode of operation is described below.

Each pump is provided with a ROT switch at the motor location. The “Remote” position of the ROT switch enables the controls located at the LCP-PSKPS. The “Off” position is lockable and prevents the skimmings pump from operating, overriding all other controls. The “Test” position is spring loaded and operates the pump as long as the switch is held in the “Test” position.

An elapsed time meter and run/off lights for each pump are located at the MCC. An additional Run light is provided at LCP-PSKPS for each pump. Failure of the motor is indicated as a “PRIMARY SKIMMINGS PUMP MOTOR FAILURE” alarm at LCP-PSTE. Failure of a pump is detected by limit switches on the pump discharge check valve arm. Failure of any pump is indicated as a “PRIMARY SKIMMINGS PUMP FAILURE” alarm at LCP-PSKPS and a common alarm is transmitted to the PCC as “PRIMARY SKIMMINGS PUMP STATION FAILURE.”

A common seal water supply manifold to the pumps is equipped with a flow switch, pressure gauge, and a pressure regulator. The seal water flow switch activates a common “PRIMARY SKIMMINGS PUMPS SEAL WATER FAILURE” alarm (one for two pumps) at LCP-PSKPS on “no” seal water flow conditions and shuts down the pumps. The pressure gauge on the seal water manifold is provided to indicate the pressure in the seal water.

The level in the Skimmings Wet Well is monitored by a bubbler level detector. An analog signal proportional to wetwell level is transmitted to the PLC-PSTE for indication, system control, and high/low level annunciation. The bubbler level detector is housed in a

NEMA 4X bubbler control panel (LCP-PSKBE) and is located outside on top of the Skimmings Wet Well. A digital level read-out is provided on the face of the panel. The bubbler panel contains built-in duplex compressors with automatic switchover to the standby compressor, should the operating compressor fail. A rotameter (airflow) and wetwell level indicator are located at the LCP-PSKBE.

Each compressor is provided with an On/Off switch at the LCP-PSKBE located on top of the Skimmings Wet Well. In the “Off” position, the compressor operates only in the “Test” position of the ROT switch. In the “On” position, the compressor operates continuously or as called for by signals from the PLC-PSTE located at PST-LCC-EAST. Also, a Duty selector switch (Compressor1/Auto/Compressor 2) is provided locally at LCP-PSKBE. The automatic mode of operation is described below.

The compressors operate as follows: With the compressor On/Off selector switch in the “On” position and the duty compressor switch in the “Compressor 1” or “Compressor 2” position, the respective compressor runs continuously. A compressor does not operate when the On/Off selector switch is in the “On” position and the other compressor has been selected as duty compressor. With the compressor On/Off selector switch in the “On” position and the duty compressor switch in the “Auto” position, the compressors alternate operation after each air fill cycle. With the compressor On/Off selector switch in the “Off” position, the respective compressor does not operate.

Each is provided with Run light; “COMPRESSOR FAILURE,” and “LOW AIR” annunciators located at LCP-PSKBE. A set of normally closed contacts which close on Compressor No. 1 Failure, Compressor No. 2 Failure, or low air shall be provided. The bubbler compressor failure alarm is also transmitted as a “LCP-PSKBE FAILURE” alarm at the LCP-PSKPS and at the LCP-PSTE and as a common “PRIMARY SKIMMINGS PUMP STATION FAILURE” at the PCC.

“PRIMARY SKIMMINGS WET WELL HIGH LEVEL” and “PRIMARY SKIMMINGS WET WELL LOW LEVEL” alarms are annunciated at LCP-PSKPS as a common “PRIMARY SKIMMINGS PUMP STATION FAILURE” alarm at the PCC, based on interpolation of points from the analog level signal input to the PLC-PSTE from the bubbler level detector. The “PRIMARY SKIMMINGS WET WELL LOW LEVEL” alarm

sends a signal to disable both pumps. The “PRIMARY SKIMMINGS WET WELL HIGH LEVEL” alarm sends a signal to interrupt the skimmings operation.

Three motor operated plug valves are located at the skimmings pump station. The first valve (PSKPS-V1) allows subnatant to be pumped back to the grit chamber effluent channel. The second valve (PSKPS-V2) allows pumped skimmings to be recycled to the skimmings wetwell to homogenize the mixture. The third valve (PSKPS-V3) allows homogenized skimmings to be pumped to the USST.

Each of the three TEFC motor operated valves are provided with a Remote/Off/Local switch located at the valve. In the “Local” position, the valve is controlled by three pushbuttons (Open/Stop/Close) located at the valve. The “Stop” pushbutton is lockable and overrides all other controls. In the “Remote” position, the valve is operated by the PLC-PSTE at PST-LCC-EAST. Additionally, each valve has a lockable On/Off disconnect box located at each valve.

An “Auto” indicating light is provided at LCP-PSKPS. If a valve fails to open or close when called for in the automatic mode of operation, a position switch sends a “PRIMARY SKIMMINGS RECYCLE VALVE FAILURE”, “PRIMARY SKIMMINGS DISCHARGE VALVE FAILURE”, or “PRIMARY SKIMMINGS SUBNATANT VALVE FAILURE” alarm signal to LCP-PSKPS and a common “PRIMARY SKIMMINGS PUMP STATION FAILURE” at the PCC.

A skimmings grinder with a manual bypass is located on the skimmings line leading to the USST, downstream of Valve PSKPS-V3. The grinder is provided with a NEMA 4X local control panel LCP-PSKG which is field-mounted in the Skimmings Dry Well.

At Skimmings Dry Well, each grinder is provided with an ROT switch located at LCP-PSKG. In the “Remote” position, the grinder is controlled by the PLC-PSTE located at PST-LCC-EAST. The “Off” position is lockable and prevents the grinder from operating overriding all other controls. The “Test” position shall not be spring loaded and shall enable Start/Stop pushbuttons located at LCP-PSKG.

The grinder shall be provided with four indicating lights “RUN,” “TRIP,” “STOP”, and “MOTOR OVERLOAD” all located at LCP-PSKG.

The grinder shall also be provided with two indicating lights “RUN” and “OFF” and an elapsed time meter to be located at its respective MCC. Additionally, the grinder is provided with two indicating lights “RUN” and “AUTO” at the LCP-PSK located in PST-LCC-EAST.

Alarms send a discrete signal to initiate a common alarm “PRIMARY SKIMMINGS PUMP STATION FAILURE” to the PCC.

In the automatic mode of operation, both skimmings pumps must be placed in the “Auto” position, and all three motor-operated valves must be placed in the “Auto” position and the Lead Select switch (Pump 1/Alternate/Pump 2) must be in the desired position. The skimmings grinder must be in the “Auto” position or bypassed.

When the skimmings wetwell level rises to a preset point, a signal is sent to inhibit skimmer operations. The skimmings are allowed to separate in the wetwell for an adjustable preset time period as programmed into the PLC-PSTE at PST-LCC-EAST. When the appropriate amount of time has elapsed, the PLC-PSTE sends a signal to open motor-operated valve PSKPS-V1, and to start the operating pump at low speed. The operating pump returns the subnatant to the grit chamber effluent channel. When the wetwell level drops to a second adjustable preset point, valve PSKPS-V1 closes automatically, the pump shuts down, and skimmer operation resumes. This cycle is repeated for an adjustable set number of cycles (0 to 100) as called for by a cycle counter programmed into the PLC-PSTE.

After the appropriate number of cycles, signals from the PLC-PSTE disable the skimmers, open motor-operated valve PSKPS-V2 on the homogenize line, and close motor-operated valve PSKPS-V1 on a subnatant line. The pump remains on at low speed. The pump recycles skimmings in the wetwell to homogenize the mixture.

After an adjustable preset time (0 to 30 minutes), as programmed into the PLC-PSTE, signals from the PLC-PSTE close PSKPS-V2, start the grinder, and open motor-operated valve PSKPS-V3 on a line leading to the USST. The signal also shifts the pump into high speed. The pump then pumps the wetwell down to a lower set level. When this level is reached, signals are sent to shut down the pump and grinder and to close motor-operated valve PSKPS-V3.

At this point, the counter and homogenize times programmed into the PLC-PSTE are reset, and the operating pump designation is shifted to the second pump. The skimmers are enabled to resume operation

The PLC-PSTE setpoints for each level are determined by subtracting the wetwell invert elevation (36.00 ft) and the distance from the bottom of the bubbler to the wetwell invert (1 ft) from the desired elevation. Relative wetwell levels are as follows:

Level Description	Elevation (ft)	PLC-PSTE Setpoints (ft)
Ground surface:	56.00	--
High wetwell level:	50.00	13.0
Subnatant pumping start:	48.00	11.0
Invert of influent pipe:	48.00	--
Skimmings pumping start/subnatant pumping stop:	43.00	6.0
Skimmings pumping stop:	39.00	2.0
Low wetwell level:	38.75	1.75
Centerline of pump suction:	37.50	--
Wetwell invert:	36.00	--

Failure of the grinder sends signals to stop the operating pump, close valve PSKPS-3, and inhibit skimming operations.

A common failure alarm for all failure conditions at the Primary Skimmings Pump Facilities is transmitted to the PCC for annunciation as “PRIMARY SKIMMING PUMP STATION FAILURE.”

The Skimming Dry Well duplex sump pumps are provided with Hand/Off/Auto selector switches. The HOA selector switch is provided with a key which is needed to operate the switch. The switches are mounted in the LCP-PSKS located at the pump location. Also at the LCP-PSKS are pump run and fail indicating lights, seal fail indicating light, alarm light beacon, alarm test switch, control power light, control On/Off switch, and

lockable On/Off Pump 1 and Pump 2 disconnect switches. The LCP-PSKS contains two (2) elapsed time meters.

The sump level is monitored with float switches. A pump operates when the level rises to the high level set by float switch and pumps down until the level falls to the low level set by float switch. A low low level float switch shall serve as a backup to shut off the pump. When both pumps are in the “Auto” position, the pumps alternate automatically as duty and standby pumps on each pump down cycle. If the duty pump fails, the standby pump operates in its place. Pumps are equipped with high temperature switches in the motor windings to stop operation on winding high temperature. Also, pumps are equipped with moisture sensing elements and warning lights for moisture detection and alarming is provided in the control panel.

The alarm “SKIMMINGS DRY WELL SUMP PUMP FAIL” is transmitted at panel LCP-PSTE when pump has winding high temperature. The alarm “SKIMMINGS DRY WELL SUMP HIGH HIGH LEVEL” is transmitted to LCP-PSTE when level rises to level set by float switch. The high high level alarm transmits a signal to the PCC to initiate alarm “PRIMARY SKIMMINGS DRY WELL SUMP HIGH HIGH LEVEL”.

4.2.1.6 PST Chemical Addition Facilities

The polymer containment area, ferric chloride containment, and the polymer mixing area (serves entire mixing area) are provided with a sump and float switch which sends an alarm such as “PSTE POLYMER CONTAINMENT SUMP HIGH LEVEL” to the LCP-PSTE and a “POLYMER CONTAINMENT SUMP HIGH LEVEL” to the PCC. Each area sends a respective alarm to the LCP-PSTE and PCC.

Each containment area is provided with a permanently installed sump pump with no automatic control. To drain the area, the operator manually opens and closes the appropriate discharge isolation valves, then manually starts the pump.

The lockable On/Off pump disconnect switch, control On/Off switch, control power light, Pump Start and Pump Stop pushbuttons, and pump run lights are provided at the sump pump control panel located at the pump. The control On/Off switch, when in the “On” position, energizes the sump pump control panel and the control power light will illuminate.

The Pump Start pushbutton, when pressed, starts the sump pump which operates until a low level is signaled by the float switch. A Pump Stop pushbutton is provided to manually stop the pump. The Stop pushbutton is provided with a key release lock so that a key is required to unlock the stop pushbutton after it has been pressed. The stop button must be released before the pump can be started.

4.2.1.6.1 PST Polymer Addition Facilities

The PST polymer addition facilities are a semi-automatic system and require routine and daily operator attention to transfer, mix and deliver polymer to the rapid mix chamber.

A schematic of the polymer addition facilities is presented as Figure 3.2-4.

Bulk Polymer Storage Tanks

No mechanical equipment is incorporated into bulk storage of polymer. However, three (3) sensors are provided to indicate a low bulk polymer supply, high level alarm and to protect the transfer pump from running dry, respectively.

The low level sensor is set to indicate when only five days of polymer is remaining, and a signal is transmitted to a single annunciator at LCP-PSTPOL located in PST-LCC-EAST to indicate “BULK POLYMER SUPPLY TANK LOW LEVEL.” The low low level sensor is set to indicate when the bulk polymer level is four inches above the transfer pump suction outlet centerline, shutdown polymer transfer pumps, and transmit a signal as “BULK POLYMER SUPPLY TANK LOW LOW LEVEL” alarm to LCP-PSTPOL. The high level sensor is set to indicate when the bulk polymer level is a preset level (a minimum of 6 inches) below the overflow, sound horn and transmit a signal as “BULK POLYMER SUPPLY TANK HIGH LEVEL” alarm to LCP-PSTPOL. The setpoints of these levels may be adjusted by the Operations Supervisor to optimize plant operation. All three alarms are annunciated as a common “PST POLYMER ADDITION SYSTEM FAILURE” at the PCC.

The bulk polymer storage tank elevations and PLC-PSTE setpoints are as follows:

Level Description	Elevation (ft)	PLC-PSTE Setpoints (ft)
Top of tank (straight shell)	66.50	--
Invert of overflow pipe	65.50	--
High switch which indicates a “BULK POLYMER SUPPLY TANK HIGH LEVEL” alarm at the LCP-PSTPOL	64.00	6.5
Low switch which indicates a “BULK POLYMER SUPPLY TANK LOW LEVEL” alarm at the LCP-PSTPOL. Reminder to order chemical.	60.10	2.6
Low low switch which indicates a “BULK POLYMER SUPPLY TANK LOW LOW LEVEL” at the LCP-PSTPOL; disables the polymer transfer pump regardless of HOA position and transmits failure alarm.	58.50	1.0
Pump suction outlet centerline	58.17	--
Bottom of tank	57.50	--

At the fill station panel, a high level alarm indicator light and an alarm horn receive a signal from the PLC to indicate high level in the respective bulk storage tank. An acknowledge pushbutton is provided at the fill station panel to silence the alarm horn. The alarm indicator light will be illuminated until the tank level is lowered.

Bulk Polymer Transfer Pumps

Two (2) bulk polymer transfer pumps are provided. One is dedicated to each bulk tank. Both bulk transfer pumps are provided with a HOA switches located at the LCP-PSTPOL in PST-LCC-EAST. In the “Hand” position, the pump operates continuously. In the “Off” position, the pump operates only in the “Test” mode of the ROT switch. In the “Auto” position, the pump is controlled by the PLC located in PST-LCC-EAST. The automatic mode of operation is described below.

Each pump is provided with a Remote-Off-Test (ROT) switch at the SCR controller location near the pump. The “Remote” position of the ROT switch enables the controls

located at the LCP-PSTPOL. The “Off” position is lockable and prevents the pump from operating, overriding all other controls. The “Test” position is spring loaded and is used to test the operation of the pump with the HOA switch in the “Off” position. Located at each transfer pump is a SCR controller providing localized manual adjustment of the bulk polymer feed rate. Each SCR controller is equipped with a ten-turn potentiometer for speed control and a running light. Each pump is integrated into the polymer mixing tank make-up process. Additionally, there is a lockable On/Off switch box located adjacent to the SCR controller.

In the “Auto” mode, the selected pump operates when the level of the in-service mix tank reaches a preset adjustable “Transfer Pumps On” level. Instantaneously, the make-up water solenoid valve also opens. When the level in the polymer mix tank reaches high “Transfer Pump Off” level, the pump stops and the make-up water solenoid valve closes.

If the makeup water solenoid valve fails to open when called for, a “POLYMER MIX TANK MAKE-UP WATER FAILURE” alarm annunciates at LCP-PSTPOL. An adjustable rotameter is installed for control and measurement of NPW flow. The make-up water solenoid valve automatically closes if the polymer flow is stopped.

A Run light for each pump is provided at each SCR controller. An additional Run light is provided for each pump at LCP-PSTPOL.

A high/low pressure switch is installed on the discharge side of each pump to indicate low flow, pump failure, loss of suction and blocked discharge. Under a high or low pressure condition a signal is transmitted to annunciate a “POLYMER TRANSFER PUMP FAILURE” alarm. Failure (motor overload) is annunciated individually for both bulk transfer pumps at LCP-PSTPOL and as a common “PST POLYMER ADDITION SYSTEM FAILURE” at the PCC.

Polymer Mixing Tanks

One tank is in service at one time. A “Tank 1/Tank 2” switch is provided at the LCP-PSTPOL to select the desired in-service tank. All pumps in the “Auto” mode are controlled by level settings in the tank in operation.

Both mixer tank motors are provided with On-Off switches located at LCP-PSTPOL. In the “On” position, the mixer runs continuously. In the “Off” position, the mixer operates only in the “Test” mode of the ROT switch.

Each mixer is provided with a Remote-Off-Test switch at the motor location. The “Remote” position of the ROT switch enables the controls located at the LCP-PSTPOL. The “Off” position is lockable and prevents the mixer from operating, overriding all other controls. The “Test” position is spring loaded and is used to test the operation of the mixer with the On/Off switch in the “Off” position.

Run/Off lights and an elapsed time meter for each mixer are provided at the MCC. An additional Run light is provided for each mixer at LCP-PSTPOL.

Failure of either of the mixer motors is transmitted to a single annunciator as discrete signal at LCP-PSTPOL and as a common “PST POLYMER ADDITION SYSTEM FAILURE” at the PCC. Each mix tank is equipped with level sensors to indicate the various level setpoints. The low low level setpoint is located ten inches above the suction piping, and transmits an alarm to a discrete annunciator at the LCP-PSTPOL to indicate “POLYMER MIX TANK LOW LOW LEVEL” for each mixing tank. High high level alarm is located eight inches below the top of the tank and two inches below overflow pipe and also transmits a “POLYMER MIX TANK HIGH HIGH LEVEL” alarm to individual annunciators at the LCP-PSTPOL. Both polymer transfer pumps are disabled upon a high high level. All polymer addition pumps are disabled upon a low low alarm. The setpoints of these levels may be adjusted by the Operations Supervisor to optimize plant operation.

The low level setting which signals the transfer pumps to start when the pump is in “Auto” was determined to protect the mixers. The low level is set so that the liquid level is one propeller diameter above the mixer propeller. This protects the mixer from damage due to vibration and vortexing.

The polymer mixing tank elevations and PLC-PSTE setpoints are as follows:

Level Description	Elevation (ft)	PLC-PSTE Setpoints (ft)
Top of tank	63.50	--
High high switch which indicates a “POLYMER SOLUTION LEVEL HIGH” alarm to LCP-PSTPOL, disables both polymer transfer pump regardless of HOA position and transmits failure alarm	62.20	4.7
Transfer pump “Off” switch, also closes NPW solenoid valve	62.00	4.5
Transfer pump “On” switch, also opens NPW solenoid valve. Level in tank protects mixer from creating vortex.	60.80	3.3
Low low switch which indicates a “LOW POLYMER SOLUTION SUPPLY” alarm at LCP-PSTPOL, disables all polymer addition pump regardless of HOA position and transmits failure alarm	59.50	2.0
Pump suction outlet centerline	58.17	--
Tank bottom	57.50	--

Polymer Addition Pumps

All five (5) polymer addition pumps are provided with On/Off switches located at LCP-PSTPOL. In the “On” position, the pumps operate continuously. In the “Off” position, the pumps do not operate except in the “Test” position of the ROT switch.

Each pump is provided with a Remote-Off-Test switch at the motor location. The “Remote” position of the ROT switch enables the controls located at the LCP-PSTPOL. The “Off” position is lockable and prevents the pump from operating, overriding all other controls. The “Test” position is spring loaded and is used to test the operation of the pump with the HOA switch in the “Off” position.

A Hand/Auto speed selection switch is provided with each pump located at the LCP-PSTPOL. In the “Hand” position, the pump motor speed signal is adjusted manually by a

locally mounted potentiometer. In the “Auto” position, the pump motor speed is controlled by a 4-20 mA signal from the plant influent flow meter. The variable speed SCR D.C. drives for the polymer feed pumps are located at each pump. Each control is equipped with a ten-turn potentiometer located at the pumps to manually adjust the speed of the polymer feed pump.

Flow switches are installed on the discharge pipe of each pump to indicate motor failure, pump failure, loss of suction, and blocked discharge. Under a “low flow” condition, a signal is transmitted to annunciate a “POLYMER ADDITION PUMP FAILURE” alarm. Failure (motor overload) of the pumps is annunciated individually for each pump at the respective LCP-PSTPOL and a common “PST POLYMER ADDITION SYSTEM FAILURE” is annunciated at the PCC

A Run light is provided at the SCR controller for each pump. An additional Run light is provided for each pump at LCP-PSTPOL.

4.2.1.6.2 PST Ferric Chloride Addition Facilities

Ferric chloride addition facilities are a semi-automatic system and require routine and daily operator attention to transfer, mix and deliver ferric chloride solution to the RMC pump discharge. Also, two (2) additional pumps are provided to deliver ferric chloride to the USST.

A schematic of the ferric chloride facilities is presented in Figure 3.2-5.

Bulk Ferric Chloride Storage Tanks

No mechanical equipment is incorporated into bulk storage of ferric chloride. However, three sensors are provided to indicate a low bulk ferric chloride supply, high ferric chloride level and to protect the transfer pump from running dry, respectively.

The low level sensor is set to indicate when only five days of ferric chloride is remaining, and a signal is transmitted to a single annunciator at the LCP-PSTFER to indicate “BULK FERRIC CHLORIDE SUPPLY TANK LOW LEVEL.” The low low level sensor is set to indicate when the bulk ferric chloride level is four inches above the transfer pump suction outlet centerline, shutdown ferric chloride transfer pumps, and transmit a signal as “BULK FERRIC CHLORIDE SUPPLY TANK LOW LOW LEVEL” alarm to LCP-

PSTFER. The high level sensor is set to indicate when the bulk ferric chloride level is a preset level (a minimum of 6 inches) below the tank overflow, sound horn, and transmit a signal as “FERRIC CHLORIDE SUPPLY TANK HIGH LEVEL” alarm to LCP-PSTFER. The setpoints of the levels may be adjusted by the Operation Supervisor to optimize plant operation. All three alarm conditions annunciate as a common "PST FERRIC CHLORIDE ADDITION SYSTEM FAILURE” at the PCC.

The bulk ferric chloride storage tank elevations and PLC-PSTE setpoints are as follows:

Level Description	Elevation (ft)	PLC-PSTE Setpoints (ft)
Top of tank (straight shell)	77.50	--
Invert of overflow pipe	76.50	--
High switch which indicates a “BULK FERRIC CHLORIDE SUPPLY TANK HIGH LEVEL” alarm at the LCP-PSTFER	74.70	17.2
Low switch which indicates a “BULK FERRIC CHLORIDE SUPPLY TANK LOW LEVEL” alarm at the LCP-PSTFER. Reminder to order chemical.	60.20	2.7
Low low switch which indicates a “BULK FERRIC CHLORIDE SUPPLY TANK LOW LOW LEVEL” at the LCP-PSTFER; disables the ferric chloride transfer pump regardless of HOA position and transmits failure alarm.	58.60	1.1
Pump suction outlet centerline	58.17	--
Bottom of tank	57.50	--

At the fill station panel, a high level alarm indicator light and an alarm horn receive a signal from the PLC to indicate high level in the respective bulk storage tank. An acknowledge pushbutton is provided at the fill station panel to silence the alarm horn. The alarm indicator light will be illuminated until the tank level is lowered.

Bulk Ferric Chloride Transfer Pump

Two (2) Bulk Transfer Pumps are provided. One is dedicated to each bulk tank. The other is a manual standby pump. Both Bulk Transfer Pump motors are provided with a HOA switch located at LCP-PSTFER. In the “Hand” position, the pump operates continuously. In the “Off” position, the pump operates only in the “Test” mode of the ROT switch. In the “Auto” position, the pump is controlled by the PLC located in PST-LCC-EAST. The automatic mode of operation is described below.

Each pump is provided with a ROT switch at the motor location. The “Remote” position of the ROT switch enables the controls located at the LCP-PSTFER. The “Off” position is lockable and prevents the pump from operating, overriding all other controls. The “Test” position is spring loaded and is used to test the operation of the pump with the HOA switch in the “Off” position. Each pump has localized adjustment of the stroke rate of the pump. A potentiometer is provided for each pump for stroke rate control. Each pump is integrated into the ferric chloride mixing tank make-up process.

In the “Auto” mode, the selected pump operates when the level of the in-service mix tank reaches a preset adjustable “Transfer Pump On” level. Instantaneously, the make-up water solenoid valve also opens. When the level in the ferric chloride mix tank reaches a “Transfer Pump On” level, the pump stops and the make-up water solenoid valve closes.

If the makeup water solenoid valve fails to open when called for, a “FERRIC CHLORIDE MIX TANK MAKE-UP WATER FAIL” alarm annunciates at LCP-PSTFER. An adjustable rotameter is installed for control and measurement of NPW flow. The make-up water solenoid valve automatically closes if the ferric chloride flow is stopped.

Run/Off lights and an elapsed time meter for each pump are provided at the MCC. An additional Run light is provided for each pump at LCP-PSTFER.

A flow limit switch is provided on the discharge side and sends a “FERRIC CHLORIDE TRANSFER PUMP NO FLOW” alarm to the LCP-PSTE when no flow is detected after pump is turned on.

A conductivity sensor is installed between a double diaphragm in the transfer pump. Under a diaphragm rupture condition, a signal is transmitted to annunciate “FERRIC CHLORIDE TRANSFER PUMP DIAPHRAGM RUPTURE” alarm. Failure (motor

overload) is annunciated individually for both bulk transfer pumps at LCP-PSTFER and as a common “PST FERRIC CHLORIDE ADDITION STATION FAILURE” at the PCC.

Ferric Chloride Mixing Tanks

One tank is in service at one time. A “Tank 1/Tank 2” switch is provided at the LCP-PSTFER to select the desired in-service tank. All pumps in the “Auto” mode are controlled by level settings in the tank in operation.

Both mixer tank motors are provided with On-Off switches located at LCP-PSTFER. In the “On” position, the mixer runs continuously. In the “Off” position, the mixer operates only in the “Test” mode of the ROT switch.

Each mixer is provided with a Remote-Off-Test switch at the motor location. The “Remote” position of the ROT switch enables the controls located at the LCP-PSTFER. The “Off” position is lockable and prevents the mixer from operating, overriding all other controls. The “Test” position is spring loaded and is used to test the operation of the mixer with the On/Off switch in the “Off” position.

Run/Off lights and an elapsed time meter for each mixer are provided at the MCC. An additional Run light is provided for each mixer at LCP-PSTFER.

Failure of either of the mixer motors is transmitted to a single annunciator at LCP-PSTFER and as a common “PST FERRIC CHLORIDE ADDITION SYSTEM FAILURE” at the PCC. Each mix tank is equipped with level sensors to indicate the various level setpoints. The low low level setpoint is located ten inches above the suction piping, and transmits an alarm to a discrete annunciator at the LCP-PSTFER to indicate “FERRIC CHLORIDE MIX TANK LOW LOW LEVEL” for each mixing tank. High high level alarm is located eight inches below the top of the tank and two inches below overflow and also transmits a “FERRIC CHLORIDE MIX TANK HIGH HIGH LEVEL” alarm to individual annunciators at the LCP-PSTFER. Both ferric chloride transfer pumps are disabled upon a high high level. All ferric chloride addition pumps are disabled upon a low low alarm. The setpoints of these levels may be adjusted by the Operations Supervisor to optimize plant operation.

The low level setting which signals the transfer pumps to start when the pump is in “Auto” was determined to protect the mixers. The low level is set so that the liquid level is

one propeller diameter above the mixer propeller. This protects the mixer from damage due to vibration and vortexing. The ferric chloride mixing tank elevations and PLC-PSTE setpoints are as follows:

Level Description	Elevation (ft)	PLC-PSTE Setpoints (ft)
Top of tank	63.50	--
High high switch which indicates a “FERRIC CHLORIDE SOLUTION LEVEL HIGH” alarm to LCP-PSTFER, disables both ferric chloride transfer pump regardless of HOA position and transmits failure alarm	62.20	4.7
Transfer pump “Off” switch, also closes NPW solenoid valve. Level in tank protects mixer from creating vortex.	62.00	4.5
Transfer pump “On” switch, also opens NPW solenoid valve	60.80	3.3
Low low switch which indicates a “LOW FERRIC CHLORIDE SOLUTION SUPPLY” alarm at LCP-PSTFER, disables all ferric chloride transfer pump regardless of HOA position and transmits failure alarm	59.50	2.0
Pump suction outlet centerline	58.17	--
Tank bottom	57.50	--

Ferric Chloride Addition Pumps

All five (5) PST ferric chloride addition pumps are provided with On/Off switches located at LCP-PSTFER. In the “On” position, the pumps operate continuously. In the “Off” position, the pumps do not operate except in the “Test” position of the ROT switch.

A Hand/Auto stroke control switch is provided with each pump. In the “Hand” position, the pump stroke length is adjusted manually by a locally mounted potentiometer. In the “Auto” position, the pump stroke length is controlled by a 4-20 mA signal from the plant influent flow meter.

The USST ferric chloride addition pumps, located adjacent to the ferric chloride mixing tanks, are provided with On-Off switches located at LCP-PSTFER. In the “On” position, the pumps operate continuously with the rate of addition controlled by a locally mounted potentiometer.

Each pump is provided with a Remote-Off-Test switch at the motor location. The “Remote” position of the ROT switch enables the controls located at the LCP-PSTFER. The “Off” position is lockable and prevents the pump from operating, overriding all other controls. The “Test” position is spring loaded and is used to test the operation of the pump with the HOA switch in the “Off” position.

The variable speed SCR drives for the ferric chloride addition pumps are located at each pump. Each control is equipped with a ten-turn potentiometer located at the pumps to manually adjust the speed and stroke of the ferric chloride addition pump.

A flow limit switch is provided on the discharge side and sends a “FERRIC CHLORIDE TRANSFER PUMP NO FLOW” alarm to the LCP-PSTE when no flow is detected after pump is turned on. A conductivity sensor is installed between a double diaphragm in the addition pump. Under a diaphragm rupture condition, a signal is transmitted to annunciate “FERRIC CHLORIDE PUMP DIAPHRAGM RUPTURE” alarm. Failure (motor overload) of the pumps is annunciated individually for each pump at the respective LCP-PSTFER, and as a common “PST” or “USST FERRIC CHLORIDE ADDITION SYSTEM FAILURE” at the PCC.

Run/Off lights and an elapsed time meter for each pump are provided at the MCC. An additional Run light is provided for each pump at LCP-PSTFER.

4.2.1.7 Odor Reduction Station

The PST Odor Reduction Station is provided with a Local Control Panel LCP-ORPST, with a NEMA 4X enclosure for control of the odor reduction system. Process and air flow schematics for the PST Odor Reduction Station are presented in Figures 3.2-6 and 3.2-7, respectively.

Odor Reduction Station Scrubber Exhaust Fans

The exhaust fans are furnished with a locally-mounted ROT switch and an HOA switch in LCP-ORPST located at the odor reduction station. The “Remote” position of the ROT switch enables controls located at LCP-ORPST. The “Off” position is lockable to prevent the exhaust fan from operating. The “Test” position is spring loaded and is used to test the operation of the exhaust fan with the HOA switch in the “Off” position. A duty/standby selector switch is provided at the LCP-ORPST for the operator to select the in-service exhaust fan. Run/Stopped/Trip lights for each exhaust fan are provided at the MCC cabinet. A flow switch is installed on the discharge side of the exhaust fan to indicate motor failure or blocked discharge. Failure of the exhaust fan de-energizes the motor and activates alarms at the LCP-ORPST and “PST ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. Failure of both scrubber exhaust fans automatically shuts down the recirculation pumps.

Odor Reduction Station Scrubber

Differential pressure indicators are installed across both the mist eliminator and packed bed to provide indication of pressure loss across the scrubber for local identification only. Indicators are mounted on the scrubber, approximately 5 ft above the finished floor.

A pressure transducer is installed on the scrubber sump. The low level set point is set to indicate six inches above the recirculation pump suction line and when tripped activates alarms at the LCP-ORPST and a common “PST ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. If the sump level continues to drop to three inches above the recirculation pump suction, the recirculation pumps shut down.

Odor Reduction Station pH Controller

The pH analyzer is installed in the odor reduction station recirculation pump bypass loop. The pH reading is displayed at the analyzer and at the pH controller mounted in LCP-ORPST. The pH operating range shall be set between 9 and 11 with a target set point of 10.5 pH. The pH controller can be operated in either manual or automatic mode. In manual mode the controller displays the setpoint dialed in by the operator on front of the panel mounted controller. In automatic mode the controller tracks the actual pH. The pH setpoint is maintained through electric control of the stroke controller of the selected NaOH metering pump. Low and high pH annunciate at the LCP-ORPST.

Odor Reduction Station ORP Controller

An ORP analyzer is installed in the odor reduction station recirculation pump bypass loop. The ORP operating range is set between 575 mv to 725 mv. The desired operating ORP is maintained by manually adjusting the stroke control potentiometer on the NaOCl metering pumps. Low and high ORP are annunciated at the LCP-ORPST.

Odor Reduction Station Recirculation Pumps

Each recirculation pump is furnished with a locally-mounted ROT switch and an HOA switch in LCP-ORPST. The “Remote” position of the ROT switch enables the controls at LCP-ORPST. The “Off” position which is lockable prevents the recirculation pump from operating. The “Test” position is spring loaded and is used to test the operation of the exhaust fan with the HOA switch in the “Off” position. A duty/standby selector switch is provided at the LCP-ORPST for the operator to select the in-service recirculation pump. Run/Stopped/Trip lights for each recirculation pump are provided at the MCC cabinet. A pressure switch is installed on the discharge side of each recirculation pump to indicate motor failure or blocked discharge. Failure of either recirculation pump results in de-energizing the corresponding motor and activates alarms at the LCP-ORPST and “PST ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. In the “Auto” position, failure of the in-service pump starts the standby unit.

Seal water is provided to each recirculation pump. Failure of seal water supply activates alarms at LCP-ORPST, and “PST ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules, and shuts down both recirculation pumps.

Odor Reduction Station NaOH Metering Pumps

Each NaOH metering pump has a locally-mounted ROT switch and an HOA switch in LCP-ORPST. The “Remote” position of the ROT switch enables the controls located at the LCP-ORPST. The “Off” position which is lockable prevents the NaOH metering pump from operating. The “Test” position is spring loaded and is used to test the operation of the NaOH metering pump with the HOA switch in the “Off” position. A duty/standby selector switch is provided at LCP-ORPST for the operator to select the in-service NaOH pump. Run/Stopped/Trip lights for each NaOH pump are provided at the MCC cabinet. A pressure relief valve is provided on the discharge side of each NaOH pump to bypass flow back to the storage tank. A conductivity sensor is installed in each NaOH metering pump to indicate diaphragm rupture. Failure of either NaOH pump de-energizes the motor and activates alarms at the LCP-ORPST and “PST ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. In the “Auto” position, failure of the in-service pump automatically starts the standby unit.

Each NaOH metering pump is of variable stroke length and has an integral non-reversing electric stroke control motor for purposes of varying the pump stroke. Stroke control is the direct-acting type and mounted directly to the pump in a NEMA 4 enclosure. Each NaOH metering pump stroke controller is capable of capacity adjustment for 0-100% by changing piston stroke length based on a 4-20mA signal input from panel mounted pH controller.

Odor Reduction Station NaOCl Metering Pumps

Each NaOCl metering pump has a locally-mounted ROT switch and an HOA switch in LCP-ORPST. The “Remote” position of the ROT switch enables the controls located at the LCP-ORPST. The “Off” position which is lockable prevents the NaOCl feed pump from operating. The “Test” position is spring loaded and is used to test the operation of the NaOCl metering pump with the HOA switch in the “Off” position. A duty/standby selector switch is provided at LCP-ORPST for the operator to select the in-service NaOCl pump. Run/Stopped/Trip lights for each NaOCl pump are provided at the MCC cabinet. A pressure relief valve is provided on the discharge side of each NaOCl pump to bypass flow back to the storage tank. A conductivity sensor is provided at each NaOCl pump to detect a diaphragm

rupture. Failure of either NaOCl pump results in de-energizing the corresponding motor and activates alarms at the LCP-ORPST and “PST ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. In the “Auto” position, failure of the in-service pump automatically starts the standby unit.

Each NaOCl metering pump is of variable stroke length and equipped with an integral non-reversing electric stroke control motor for purposes of varying the pump stroke. The stroke control is the direct-acting type and mounted directly to the pump in a NEMA 4 enclosure. Each NaOCl metering pump stroke controller is capable of capacity adjustment for 0-100% by changing piston stroke length based upon the setting of the locally mounted potentiometer.

Odor Reduction Station NaOH Storage Tank

There is no mechanical equipment within the NaOH bulk storage tank. A pressure transducer is installed on the side of the NaOH storage tank. The low level setpoint is set to indicate when only five days of NaOH is remaining and activates alarms at the LCP-ORPST and “PST ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The low low level setpoint is set to indicate when NaOH is only three (3) inches above the NaOH metering pump suction line and activates alarms at the LCP-ORPST and “PST ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The high level setpoint is set to indicate a liquid level 6 inches below tank overflow and activates an alarm at the LCP-ORPST and the “PST ODOR REDUCTION STATION FAILURE” alarm at the PCC annunciator modules.

At the fill station panel, a high level alarm indicator light and an alarm horn receive a signal from the PLC to indicate high level in the respective bulk storage tank. An acknowledge pushbutton is provided at the fill station panel to silence the alarm horn. The alarm indicator light will be illuminated until the tank level is lowered.

Odor Reduction Station NaOCl Storage Tank

A pressure transducer is installed on the side of the NaOCl storage tank. The low level setpoint is set to indicate when only five days of NaOCl is remaining and activates alarms at the LCP-ORPST and “PST ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The low low level setpoint is set to indicate when NaOCl is only three (3) inches above the NaOCl metering pump suction line and activates alarms at the LCP-ORPST and “PST ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The high level setpoint is set to indicate a liquid level 6 inches below tank overflow and activates an alarm at the LCP-ORPST and the “PST ODOR REDUCTION STATION FAILURE” alarm at the PCC annunciator modules.

At the fill station panel, a high level alarm indicator light and an alarm horn receive a signal from the PLC to indicate high level in the respective bulk storage tank. An acknowledge pushbutton is provided at the fill station panel to silence the alarm horn. The alarm indicator light will be illuminated until the tank level is lowered.

NaOH and NaOCl Containment Sump Pumps

Each containment area is provided with a permanently installed sump pump with no automatic control. To drain the area, the operator manually opens and closes the appropriate discharge isolation valves, then manually starts the pump.

The lockable On/Off pump disconnect switch, control On/Off switch, control power light, Pump Start and Pump Stop pushbuttons, and pump run lights are provided at the sump pump control panel located at the pump. The control On/Off switch, when in the “On” position, energizes the sump pump control panel and the control power light will illuminate. The Pump Start pushbutton, when pressed, starts the sump pump which operates until a low level is signaled by the float switch. A Pump Stop pushbutton is provided to manually stop the pump. The Stop pushbutton is provided with a key release lock so that a key is required to unlock the stop pushbutton after it has been pressed. The stop button must be released before the pump can be started.

Odor Reduction Station Water Softening System

The water softener duplex systems are energized by a 120V circuit. A pressure switch is installed on the inlet side of the water softener to indicate failure of softened water supply. Failure of softened water supply activates an alarm at the LCP-ORPST and the “PST ODOR REDUCTION STATION FAILURE” alarm at the PCC annunciator modules. There is a varea-meter on the discharge of the water softening system to indicate flowrate.

The water softener has local automatic controls which facilitate backwash/regeneration/rinse cycles based on the volume of water treated. A calcium ion analyzer senses an overall failure in the softening system and activates an alarm at the LCP-ORPST and the “PST ODOR REDUCTION STATION FAILURE” alarm at the PCC annunciator modules.

4.2.2 Step by Step Start-Up Procedures

4.2.2.1 General System Start-Up Procedures

Routine Mode of Operation

The Primary Sedimentation Facilities should be started according to the following procedures for routine mode of operation:

1. Refer to the General Start-Up Procedures in Section 4.0.2.
2. Visually inspect tanks, covers, PST Gallery, PST Access Gallery and the Skimmings Dry Well for any signs of damage or improper installation. The areas should be cleaned of all installation or maintenance equipment and other articles which are not part of the system.
3. Ensure all ROT switches are in the “Off” position.
4. Determine which of the primary sedimentation tanks will be in service. Check the tank to be sure that there are no tools, ladders or other items in the tank to be in service.
5. Ensure that Local Control Panels LCP-PSTE located at the PST-LCC-EAST; LCP-PSPG and LCP-PSPS located at the PST Access Gallery; LCP-PSKG, LCP-PSKPS, and LCP-PSKBE located at the PSK Pump Station Dry Well; and LCP-ORPST located at the Odor Reduction Station are energized.

6. Ensure that Distribution Panels DPC1, DPP1, DPP3 and DPL1 located at the PST-LCC-EAST; DPM1, DPM3, DPV1, and DPV3 located in the Blower Room; and DPC2, DPL2, DPM2, and DPP2 located at the NaOL1-LCC are energized.
7. Ensure that the circuit breakers at Motor Control Centers MCC-PSTE “A” BUS, MCC-PSTE “B” BUS, MCC-PSTE1 and MCC-PSTE2, all located in PST-LCC-EAST are energized for all equipment to be operated. Also, ensure local On/Off disconnect boxes are energized.
8. Ensure that the tank drain valves are closed in each tank that is to come on line and fill-and-draw valves on effluent end of the PSTs are closed for all tanks.
9. Ensure that the USST facilities are on-line and operational.
10. Start up the PST Odor Reduction Station as specified in Section 4.2.2.2.6 in the following order:
 - a. Exhaust Fan
 - b. Water Softening System
 - c. Scrubber
 - d. Recirculation Pumps
 - e. pH and ORP Controllers
 - f. NaOCl Storage Tank
 - g. NaOCl Metering Pump
 - h. NaOH Storage Tank
 - i. NaOH Metering Pump
11. Begin mixing the diluted chemical solutions for the 30 minute mix time at the Chemical Addition Facilities:
 - a. Polymer (See Section 4.2.2.2.5.1)
 - b. Ferric Chloride (See Section 4.2.2.2.5.2)
12. Open the Pressure Slide Gates between the RMCs and the PSTs to be in service.
13. If not already open, open the SS Stop Plates to allow influent from influent channel into RMC.
14. After RMC is full (visually verify) start Chemical Addition Pumps (See Section 4.2.2.2.5.1 and 4.2.2.2.5.2) and the Rapid Mix Pumps for the tanks to be in service.

15. Start the Sludge Collector System (plastic flight and chain) when the tank is mostly full. (See Section 4.2.2.2.3).
16. When the Odor Reduction Station is operating and the influent and effluent channels are full, start the Channel Aeration Facilities (See Section 4.2.2.2.1) by starting up the Air Supply Fans and then the Channel Air Blowers.
17. To determine if sufficient sludge has built up in the hopper, extract a sample of sludge from the sludge sample ports or use a “sludge judge” to perform a visual check. Take a sample of the sludge after the tank has been in operation for 30 minutes. Continue checking sludge level every 30 minutes until the level is 6 inches thick above the top of the hoppers. Sludge should not exceed 2 feet above the top of the hoppers. See Section 4.2.2.2.3 for sample procedures.

Once sufficient sludge has built up in the hoppers, start the Primary Sludge Pumps according to Section 4.2.2.2.3.

18. Once skimmings have built up (visually check under the Tank covers), start the Rotary Skimmers and skimming program (See Section 4.2.2.2.4).

Fill and Draw Mode of Operation

For the FAD mode of operation, the Primary Sedimentation Facilities should be started according to the following procedures:

1. Verify that the influent wastewater flow is greater than 13 MGD and confirm the use of the Fill and Draw (FAD) mode of operation with your Operation Supervisor.
2. Ensure automatic mode of operation of the PEEC valve according to procedures in Section 4.10.2.1.
3. Follow Steps 1 to 10 from the procedures for routine mode of operation which are located above in this Section 4.2.2.1.
4. Select the four (4) PSTs which will be in service for the FAD mode of operation.
5. Open the influent slide gates and remove the stainless steel stop plates on the four (4) respective rapid mix chambers.

6. Position the sludge collectors in each PST so that a flight is not located in front of a FAD valve. **Force of water through the valves may damage flights.**
7. Open the 10-inch canal gate valves on the FAD drain connection on the effluent end of each of the four (4) PSTs. **CAUTION: DO NOT OPEN THE FAD VALVES IF THE WATER LEVEL IN THE PSTs IS BELOW THE ELEVATION OF THE FAD VALVES. THE SLUDGE COLLECTOR FLIGHTS MAY BREAK.**
8. Start up the channel aeration system for the PST influent, PST effluent, and grit influent channels after the channels are full with water in accordance with Section 4.2.2.2.1.
9. Operate the grit removal system, sludge collectors, primary sludge pumps, and primary skimmers as needed to control the buildup of solids and skimmings (see Sections 4.1.2.2.3 and 4.2.2.2.3 and 4.2.2.2.4).
10. In this mode of operation, flow in excess of 13 MGD (not discharged through the PEEC) will be detained in the four (4) in-service PSTs to a maximum water surface elevation of 60.5 ft. This water elevation is one foot greater than the elevation of the effluent weirs. Since the effluent channel and PSTs will have the same water surface elevation, the effluent weirs are not used during the FAD mode of operation.
11. Once the storage capacity of the available PSTs is exhausted, close the 96" sluice gate at Junction Box No. 1. Verify that sewage flow is entering the treatment plant.
12. If appropriate, the EC valve may be opened to assist Mexico in controlling the sewage flow while the PSTs are draining through the PEEC. However, the total combined flow rate in the EC should never exceed 13 mgd. The minimum flow rate that could be accurately measured by the PEEC flow meter is 4 mgd.
13. The four (4) in-service PSTs will continue to drain via the 10" FAD valve and will discharge to the EC via the PEEC system. Drain the tanks until the elevation in the PSTs is at the FAD valves or 50.5 ft elevation.
14. Repeat steps 1 through 13, until the sewage flow is consistently less than 13 mgd at the influent flow meter.
15. The FAD mode of operation allows for one tank to be out of service for cleaning to control the odors. If the FAD mode of operation is to be used on

a frequent basis, rotate the 4 in-service tanks, so that one tank may be cleaned between each cycle.

4.2.2.2 Individual Equipment Start-Up Procedures

4.2.2.2.1 Channel Aeration System

Air Supply Fans

Start up the air supply fans according to the procedures listed below:

1. Select the supply fan that will be in service.
2. Verify the fan duct valving is in the proper orientation.
3. Place the respective ROT switch in the “Remote” position.
4. Place the supply fan into operation as follows:

Automatic Mode of Operation

- a. Place the appropriate HOA switch at LCP-PCAB in the “Auto” position to start the selected fan.
- b. The supply fan will automatically start and operate when a channel aeration blower is operating.
- c. Visually verify the fan is operating.

Manual Mode of Operation

- a. Place the appropriate HOA switch at LCP-PCAB in the “Hand” position to start the selected fan.
- b. After a 0 to 180 second delay, the fan motor starts and fan will operate continuously.
- c. Visually verify the fan is operating.

Channel Air Blowers

Start up the channel air blowers according to the procedures listed below:

1. Verify water is in the influent and effluent channels.
2. Select the blower that will be in service.
3. Verify the blower duct valving is in the proper orientation.
4. Place the ROT switch in the “Remote” position.

5. Place the appropriate On/Off Switch at the LCP-PCAB in the “On” position to start the blower.
6. After a 0 to 180 second delay, the blower motor starts and the blower will operate continuously.
7. Visually verify the blower is operating.

PST Gallery Exhaust Fans

Start up the PST Gallery exhaust fans according to the procedures listed below:

1. Select the exhaust fan that will be in service.
2. Verify the fan duct valving is in the proper orientation.
3. Place the respective ROT switch in the “Remote” position.
4. Place the appropriate On/Off switch at LCP-PCAB in the “On” position to start the selected fan.
5. After a 0 to 180 second delay, the fan motor starts and fan will operate continuously.
6. Visually verify the fan is operating.

4.2.2.2.2 Rapid Mix Facilities

Slide Gates

Open the selected slide gate and the selected slide gate for scum removal according to the procedures listed below:

1. Select the gate that will be opened.
2. Open the gate as follows:

Automatically - Portable Hydraulic Operator

- a. Since the portable hydraulic operator is not used continuously, the operator must be inspected before each use. Perform a brief examination of the unit, checking the following items:
 - Proper hydraulic oil level. If low, fill as directed in manufacturer’s O&M Manual.
 - Unusual wear or damage to components.

- Fluid leakage.
 - Clean out covers, filler caps and breather caps on reservoir are properly fastened.
 - All filtration devices are in place.
 - The unit should be clean and free from material buildups that may result in over heating and/or damage.
- b. Energize the operator by inserting plug in receptacle and starting motor.
 - c. Position remote drive unit (RDU) over the gate operator drive shaft.
 - d. Verify the gate position and direction of the necessary gate movement.
 - e. Activate the directional control valve. Observe carefully the gate head movement and operator to detect irregular movement. Should this occur, release directional control valve to avoid damage.
 - f. Deactivate RDU when gate is within 2-inches of its desired position.
 - g. Use manual operator to move gate into its final position.

Manually - Square Nut Operator

- a. Position the t-handle over the operator nut, make certain the nut is fully-recessed into the socket.
 - b. Rotate the operator clockwise to open the gate.
3. Visually inspect the gate head to verify proper position.

Rapid Mix Pumps

Start up the rapid mix pumps according to the procedures listed below:

1. Select the rapid mix pump(s) that will be in service.
2. Ensure there is water in the RMC to be in service.
3. Verify the rapid mix pipe valving is in the proper orientation and selected pump discharge and suction valves are open.
4. Place the respective ROT switch in the “Remote” position.
5. Place the appropriate On/Off switch at LCP-RM in the “On” position to start the selected pump.

6. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
7. Visually verify the pump is operating.

PST Gallery Sump Pumps

Start up the sump pump, according to the procedures listed below:

1. At the LCP-PSTGS located at the sump, turn pump disconnect switch to “On” for the pump(s) to be in operation.
2. Turn control switch to “On”. Control power light should illuminate.
3. Place the sump pump into operation as follows:

Automatic Mode of Operation

- a. Place the HOA switch at the LCP-PSTGS located near the sump in the “Auto” position. A key is needed to operate the HOA selector switch.
- b. If both pumps are to be operational, then both pumps HOA switches must be in the “Auto” position. Pumps will alternate cycles.
- c. Pump(s) will operate when it receives a signal provided by the sump level indicators that the sump is at a high level and will run until the sump reaches the low level.

Manual Mode of Operation

- a. Place the HOA switch for the pump to be in service in the “Hand” position. A key is needed to operate the HOA selector switch.
 - b. After a 0 to 180 second delay, the pump motor starts and the pump will operate until the sump reaches the low low level.
4. Visually verify pump is operating.

4.2.2.2.3 Sludge Collection and Pumping

Sludge Collectors

Start up the sludge and skimming collectors according to the procedures listed below:

1. Select the collector that will be in service.
2. Ensure the tank to be placed in service is mostly filled with water.
3. Check the tank to be sure that there are no tools, loose parts, covers, etc. in the tank.
4. Place the respective ROT switch in the "Remote" position.
5. Set On/Off switch in "On" position located at the LCP-PSC. The collector will start and operate continuously.
6. Check operation of drive for noise, vibration, or excessive load on the drive chain.
7. When starting the mechanism up after a period of non-operation, carefully check the shear pin hubs on the drive sprockets to ensure that they function properly. To verify proper operation, remove the shear pin and check to see that the drive sprocket can rotate independently from the shear pin hub.

If the drive sprocket is frozen to the shear pin hub:

- a. Disassemble the shear pin hub mechanism.
 - b. Clean the surfaces in contact with each other with an emery cloth.
 - c. Apply a liberal coating of lithium based grease to the contact surfaces.
 - d. Reassemble the mechanism and again check it for proper operation.
8. If the tanks have been allowed to remain full for an extended period of mechanism inactivity, ensure that there is not an excessive "sludge blanket" covering the bottom of the tank. If this cannot be accomplished visually, a "sludge judge" should be used.
 9. When starting up a large group of mechanisms which have been inoperative for a significant time period, **DO NOT START ALL OF THE MECHANISMS AT ONE TIME**. Instead, start one mechanism, insure that it is functioning properly, and proceed mechanism by mechanism. This procedure mitigates the damages resulting from unforeseen problems with the whole group of collectors.

Primary Sludge Sampling

1. Follow safety procedures for sampling collection as outlined in Section 7.2.12 and as required by your Operations Supervisor.
2. Ensure **no** tank drain procedures are ongoing, or flooding of the Gallery will occur.
3. Ensure tank drain line is empty by opening the 6-inch plug valve in the tank drain line to the PST gallery sump. If line is full, allow to empty into sump.
4. Open the discharge isolation valve of the sampling chamber.
5. Open the plug valve of one of the three sampling sludge lines for the selected depth of the sludge hopper.
6. Open the inlet isolation valve of the sample chamber and allow the sludge to flow for 30 seconds or as long as required by your Operations Supervisor to clear the line to obtain a representative sample.
7. Take sample of sludge.
8. Close the inlet isolation valve of the sample chamber.
9. Close the plug valve of the sampling sludge line.
10. Rinse sample chamber with non-potable water.
11. Close the discharge isolation valve of the sampling chamber
12. Flush the tank drain line with non-potable water (which is hard piped to the tank drain). Allow the flushing to go into the sump.
13. After flushing is complete and tank drain line is empty, close 6-inch plug valve to sump.

Primary Sludge Pumps

Start up the Primary Sludge Pumps according to the procedures listed below:

1. Select the primary sludge pumps(s) that will be in service.

2. Verify that the primary sludge grinder ROT switch at the LCP-PSPG is positioned in the “Remote” position or the grinder is bypassed. (See Grinder Start-Up procedures below).
3. Ensure that automatic oiler is turned on to supply the pump(s).
4. Check oil level at reducer.
5. Ensure oil level in plunger is above the wrist pin.
6. Inspect packing, lubricate if required.
7. Check rotation with arrows on connecting rod.
8. Energize flow meter for pump.
9. Ensure air chambers are empty.
10. Place the respective ROT switch in the “Remote” position.
11. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Verify the primary sludge pipe valving is in the proper orientation and place the ROL switch at the valve(s) to “Remote” position.
- b. Place the appropriate primary sludge pump HOA switch at LCP-PSP in the “Auto” position.
The pump(s) will operate as called for by PLC-PSTE as described in detail in Section 4.2.1.4. The pumps operate based on signals from a timer set by the operator. When a primary pump sludge starts operating, the sludge grinder will also operate. When no primary sludge pumps are in operation, the grinder does not operate. The motor-controlled valves operate by signals from the PLC-PSTE to allow the respective pump(s) to operate and cycle.
- c. Visually verify the pump(s) is operating.

Manual Mode of Operation

- a. Verify the primary sludge pipe valving is in the proper orientation and selected pump discharge and suction valves are open.
NOTE: Be certain both the suction and discharge valves are open before starting pump. Severe pipe damage occurs.

- b. Place the appropriate primary sludge pump HOA switch at LCP-PSP in the “Hand” position to start the selected pump.
- c. After a 0 to 180 second delay the pump motor starts and pump operates continuously.
- d. Visually verify the pump is operating.

Primary Sludge Grinder

Start up the Primary Sludge Grinder according to the procedures listed below:

Note: The Grinder must be in the “Remote” position or the grinder must be bypassed when the primary sludge pumps and valves are in the automatic mode (PLC). The Grinder cannot be operated in the manual mode if the primary sludge pumps and valves are in the automatic mode.

1. Open the isolation valves on each side of the grinder. Keep the bypass valves open.
2. Place the grinder into operation as follows:

Automatic Mode of Operation

- a. Place the respective ROT switch in the “Remote” position (located at the LCP-PSPG in the PST Access Gallery).
- b. The grinder now operates as called for by PLC-PSTE. The grinder will operate only when a Primary Sludge Pump is in operation.

Manual Mode of Operation

- a. Place the respective ROT switch in the “Test” position (located at the LCP-PSPG in the PST Access Gallery). The “Test” mode is not spring loaded.
 - b. Push the appropriate Start/Stop pushbutton located at the LCP-PSPG to “Start” the grinder.
3. Visually verify the grinder is operating and close the bypass valves.

4.2.2.2.4 Primary Skimmings Processing Facilities

Surface Skimmers

Start up the Primary Sedimentation Tank Surface Rotary Skimmers according to the procedures listed below:

1. Select the skimmer(s) that will be in service.
2. Verify that no debris or obstacles are around the skimmers and motors.
3. Place the respective ROL switch in the “Remote” position.
4. The skimmer operates as called for by signals from the PLC-PSTE as described in Section 4.2.1.5. The rotary skimmers operate in a sequential cycle and not simultaneous operation.

Primary Skimmings Pumps

Start up the Skimmings Pumps according to the procedures listed below:

1. Select the skimmings pumps(s) that will be in service.
2. Verify that the skimmings grinder is positioned in the “Remote” or that the grinder is being bypassed. (See Grinder Start-Up procedures below).
3. Start up the wetwell bubbler level detector.
 - a. Select the compressor to put in service or if both compressors are to alternate in service.
 - b. Place the Compressor 1/Auto/Compressor 2 switch to the “Auto” or to the appropriate “Compressor” position.
 - c. Place the On/Off switch at the LCP-PSKBE in the “On” position. The detector operates continuously or as called for by signals from the PLC-PSTE located at the PST-LCC-EAST.
4. Ensure that seal water is being supplied to the pump(s).
5. Place the respective ROT switch for the pump(s) in the “Remote” position.
6. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Verify the skimmings pipe valving is in the proper orientation and place the Remote/Off/Local switch at the valve(s) to “Remote”.
- b. Place the appropriate HOA switch at LCP-PSKPS in the “Auto” position.
The skimmings pump will operate as called for by PLC-PSTE as described in Section 4.2.1.5. The pump(s) will operate in the low speed based on signals from the wetwell bubbler level detector. The pump(s) will operate in high speed after the pump has operated for a set number of low speed cycles. The skimmings grinder will operate when the skimmings pump is pumping the skimmings at the high speed to the USST.
- c. Visually verify the pump is operating.

Manual Mode of Operation

- a. Verify the skimming pipe valving is in the proper orientation, position the low speed/high speed selector switch in the appropriate position, and verify the selected pump discharge and suction valves are open.
- b. Place the appropriate HOA switch at LCP-PSKPS in the “Hand” position to start the selected pump.
- c. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
- d. Visually verify the pump is operating.

Skimmings Grinder

Start up the Skimming Sludge Grinder according to the procedures listed below:

NOTE: The Grinder must be in the “Remote” or the grinder must be bypassed when the skimming pumps and valves are in the automatic mode (PLC). The Grinder cannot be operated in the manual mode in the skimming pumps and valves are in the automatic mode.

1. Open the isolation valves on each side of the grinder. Keep the bypass valves open.
2. Place the grinder into operation as follows:

Automatic Mode of Operation

- a. Place the respective ROT switch in the “Remote” position (located at the LCP-PSKG in the Skimmings Dry Well).

- b. The grinder now operates based on signals from the PLC-PSTE. The grinder will operate when the skimmings pump is operating at high speed to pump skimmings to the USST.

Manual Mode of Operation

- a. Place the respective ROT switch in the “Test” position (located at the LCP-PSKG in the Skimmings Dry Well). The “Test” mode is not spring loaded.
 - b. Push the appropriate Start/Stop pushbutton located at the LCP-PSPG to “Start” the grinder.
3. Visually verify the grinder is operating and close the bypass valves.

Skimmings Dry Well Sump Pumps

Start up the sump pump according to the procedures listed below:

1. At the LCP-PSKS located at the sump, turn pump disconnect switch to “On” for the pump(s) to be in operation.
2. Turn control switch to “On” position. Control power light will illuminate.
3. Place the sump pump into operation as follows:

Automatic Mode of Operation

- a. Place the HOA switch at the LCP-PSKS located near the sump pump in the “Auto” position. A key is needed to operate the HOA selector switch.
- b. If both pumps are to be operational, then both pumps HOA switches must be in the “Auto” position. Pumps will alternate cycles.
- c. Pump will operate when it receives a signal provided by the sump level indicators that the sump is at a high level and will run until the sump reaches low level.

Manual Mode of Operation

- a. Place the HOA switch for the pump to be in service in the “Hand” position. Note: A key is needed to operate the HOA selector switch.
 - b. After a 0 to 180 second delay, the pump motor starts and the pump will operate until the sump reaches the low low level.
4. Visually verify pump is operating.

4.2.2.2.5 Chemical Addition Facilities

Chemical Addition Area Sump Pumps

Start up the polymer containment area, the polymer mixing area, or the ferric chloride containment area sump pumps according to the procedures below:

1. Assess what liquid is in the sump (water or chemical).

If the liquid is water:

- a. Open the isolation valve to the tank drain.

If the liquid is chemical:

- a. Arrange for a hazardous waste truck to be called onto the site.
 - b. Connect the quickconnect from the sump pump discharge line to the hazardous waste truck.
 - c. Open the isolation valve to the quickconnect line. Ensure the isolation valve to the tank drain is closed.
2. Place the appropriate pump disconnect On/Off switch in the “On” position.
 3. Place the Control On/Off switch in the “On” position. The control power light will illuminate.
 4. Release the depressed stop button with the appropriate key.
 5. Press the Pump Start pushbutton.
 6. After a 0 to 180 second delay the pump motor starts and pump operates until a low level is signaled by a float switch.
 7. Visually verify pump is running.

4.2.2.2.5.1 PST Polymer Addition Facilities

Start up the Polymer Addition Facilities by starting up the specific equipment in the order as listed below.

Polymer Storage Tanks

1. Fill bulk storage tank according to the following procedures:

- a. Energize the fill station panel.
- b. Attach chemical supply truck hose to the quickconnect of the fill pipe for the tank to be filled.
- c. Open the isolation valve.
- d. Pump the ordered amount of chemical into the chemical storage tank carefully watching the sight glass on the side of the tank so as not to over fill the tank.
- e. When pumping is completed purge the feed pipe with air. Close the isolation valve. Disconnect the supply hose and cap the fill pipe.

WARNING: In case the high level alarm horn sounds, stop chemical pumping immediately. (A high level alarm is designed to activate before the tank overflows.) Silence the alarm by pressing the Acknowledge pushbutton. Alarm light will stay illuminated until the chemical level in the tank is below the high level.

Polymer Transfer Pumps

Start up the polymer transfer pumps according to the procedures listed below:

1. Select the bulk polymer tank and transfer pump that will be in service.
2. Select the mixing tank to be in service. Place the Tank 1/Tank 2 switch located at the LCP-PSTPOL to the selected tank.
3. Verify all appropriate valves are in proper orientation between the selected bulk storage tank and the selected mixing tank. Keep the valve at the outlet of the mixing tank closed until the minimum mixing time has passed.
4. Place the ROT switch in the “Remote” position.
5. Place the transfer pump into operation as follows:

Automatic Mode of Operation

- a. Place the appropriate HOA switch at the LCP-PSTPOL in the “Auto” position.
- b. The pump operates from signals from the PLC-PSTE located at the PST-LCC-EAST as described in Section 4.2.1.6.1. The transfer pump will start up when the level in the mixing tank reaches the “low” level. When the transfer pump operates the non-potable make-up water should automatically be discharging to the mixing tank. When the level in the mixing tank reaches the “high” level, the

- transfer pump stops and the valve controlling the make-up water automatically shuts.
- c. The flow rate of the polymer from the transfer pump and the make-up water are individually controlled by manual settings. The flow rate should be set as required by your Operations Supervisor.
 - d. Visually verify the pump is operating and the make-up water is flowing.

Manual Mode of Operation

- a. Place the appropriate HOA switch at the LCP-PSTPOL in the “Hand” position.
- b. After a 0 to 180 second delay the transfer pump will operate continuously.
- c. Visually verify pump is operating.

Note: The solenoid valve for the non-potable make-up water will not open unless the transfer pump is in the “Auto” position.

Polymer Mixer

Start up mixer in the selected mixing tank according to the procedures listed below:

1. Verify the mixer is free from interferences and properly mounted.
2. Verify the upper propeller of the mixer is below the water surface at least 12 inches.
3. Place the ROT switch in the “Remote” position.
4. Place the On/Off switch at the LCP-PSTPOL in the “On” position. The mixer will operate continuously.
5. Visually verify the mixer is operating.

Polymer Addition Pumps

Start up the polymer addition pumps according to the procedures listed below:

1. Allow the polymer solution in the mixing tank to mix for 30 minutes or as required by Operation Supervisor.
2. Select the PST tank(s) and therefore the polymer addition pump(s) that will be in service.

3. Verify the selected addition pump pipe valving is in the proper orientation and the pump suction lines from the mixing tank and discharge lines are open.
4. Place the respective ROT switch for the addition pump(s) to the “Remote” position.
5. Place the appropriate On/Off switch at the LCP-PSTPOL in the “On” position.
6. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
7. Control the speed of the addition pump as follows:
 - a. For automatic control of the addition pump speed, place the Hand/Auto switch at the LCP-PSTPOL in the “Auto” position. The speed is set by signals from the PLC-PSTE located at the PST-LCC-EAST. The speed of the pump is proportional to the influent flow rate.
 - b. For manual control, place the Hand/Auto switch in the “Hand” position and adjust the potentiometer at the pump as required by your Operations Supervisor.
8. Visually verify the polymer addition pump is operating.
9. Verify that flow is occurring through the pump using the calibration column.

4.2.2.2.5.2 PST Ferric Chloride Addition Facilities

Start up the Ferric Chloride Addition Facilities by starting up the equipment in the order listed below.

Bulk Ferric Chloride Storage Tanks

1. Fill bulk storage tank according to the following procedures:
 - a. Energize the fill station panel.
 - b. Attach chemical supply truck hose to the quickconnect of the fill pipe for the tank to be filled.
 - c. Open the isolation valve.

- d. Pump the ordered amount of chemical into the chemical storage tank carefully watching the sight glass on the side of the tank so as not to over fill the tank.
- e. When pumping is completed purge the feed pipe with air. Close the isolation valve. Disconnect the supply hose and cap the fill pipe.

WARNING: In case the high level alarm horn sounds, stop chemical pumping immediately. (A high level alarm is designed to activate before the tank overflows.) Silence the alarm by pressing the Acknowledge pushbutton. Alarm light will stay illuminated until the chemical level in the tank is below the high level.

Ferric Chloride Transfer Pumps

Start up the ferric chloride transfer pumps according to the procedures listed below:

1. Select the bulk ferric chloride tank and transfer pump that will be in service.
2. Select the mixing tank to be in service. Place the Tank 1/Tank 2 switch at the LCP-PSTFER to the selected tank.
3. Verify all appropriate valves are in proper orientation between the selected bulk storage tank and the selected mixing tank. Keep the valve at the outlet of the mixing tank closed until the minimum mixing time has passed.
4. Place the ROT switch in the “Remote” position.
5. Place the transfer pump into operation as follows:

Automatic Mode of Operation

- a. Place the appropriate HOA switch at the LCP-PSTFER in the “Auto” position.
- b. The pump operated from signals from the PLC-PSTE located at the PST-LCC-EAST as described in Section 4.2.1.6.2. The transfer pump will start up when the level in the mixing tank reaches the “low” level. When the transfer pump operates the non-potable make-up water should automatically be discharging to the mixing tank. When the level in the mixing tank reaches the “high” level, the transfer pump stops and the valve controlling the make-up water automatically shuts.

- c. The flow rate of the ferric chloride from the transfer pump and the make-up water are individually controlled by manual settings. The flow rate should be set as required by your Operations Supervisor.
- d. Visually verify the pump is operating and the make-up water is flowing.

Manual Mode of Operation

- a. Place the appropriate HOA switch at the LCP-PSTFER in the “Hand” position.
- b. After a 0 to 180 second delay the transfer pump will operate continuously.
- c. Visually verify pump is operating.

Note: The solenoid valve for the non-potable make-up water will not open unless the transfer pump is in the “Auto” position.

Ferric Chloride Mixer

Start up mixer in the selected mixing tank according to the procedures listed below:

- 1. Verify the mixer is free from interferences and properly mounted.
- 2. Verify the upper propeller of the mixer is below the water level at least 12 inches.
- 3. Place the ROT switch in the “Remote” position.
- 4. Place the On/Off switch at the LCP-PSTFER in the “On” position. The mixer will operate continuously.
- 5. Visually verify the mixer is operating.

Ferric Chloride Addition Pumps

Start up the PST Ferric Chloride Addition pumps according to the procedures listed below:

- 1. Allow the ferric chloride solution in the mixing tank to mix for 30 minutes or as required by Operations Supervisor.
- 2. Select the tank(s) and therefore the PST ferric chloride addition pump(s) that will be in service.
- 3. Verify the selected addition pump pipe valving is in the proper orientation and the pump suction lines from the mixing tank and discharge lines are open.

4. Place the respective ROT switch for the addition pump(s) to the “Remote” position.
5. Place the appropriate On/Off switch at the LCP-PSTFER in the “On” position.
6. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
7. Control the speed of the addition pump as follows:
 - a. For automatic control of the addition pump speed, place the Hand/Auto switch at the LCP-PSTFER in the “Auto” position. The speed is set by signals from the PLC-PSTE located at the PST-LCC-EAST. The speed of the pump is proportional to the influent flowrate.
 - b. For manual control, place the Hand/Auto switch in the “Hand” position and adjust the potentiometer at the pump as required by your Operations Supervisor.
8. Visually verify the ferric chloride addition pump is operating.
9. Verify that flow is occurring through the pump using the calibration column.

Start up the USST Ferric Chloride Addition pumps according to the procedures listed below:

1. Allow the ferric chloride solution in the mixing tank to mix for 30 minutes or as required by Operations Supervisor.
2. Ensure that the primary sludge pumps are running and the USST Facilities are operational.

CAUTION: DO NOT START UP USST FERRIC CHLORIDE ADDITION PUMPS WHEN PRIMARY SLUDGE PUMPS ARE OFF. FERRIC CHLORIDE WILL CORRODE PRIMARY SLUDGE PIPING AND GRINDER.

3. Verify the selected addition pump pipe valving is in the proper orientation and the pump suction lines from the mixing tank and discharge lines are open.

4. Place the respective ROT switch for the addition pump(s) to the “Remote” position.
5. Place the appropriate On/Off switch at the LCP-PSTFER in the “On” position.
6. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
7. Control the speed of the USST addition pump manually by adjusting the potentiometer at the pump as required by your Operations Supervisor.
8. Visually verify the ferric chloride addition pump is operating.
9. Verify that flow is occurring through the pump using the calibration column.

4.2.2.2.6 Odor Reduction Station

Odor Reduction Station Exhaust Fans

Start up the odor reduction station exhaust fans according to the procedures listed below:

1. Select the odor reduction station exhaust fan that will be in service at the LCP-ORPST.
2. Verify that the odor reduction duct and duct drain is in the proper orientation and that the selected fan inlet and discharge dampers are open.
3. Place the respective ROT switch in the “Remote” position.
4. Place the fan into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORPST in the “Auto” position.
- b. In the automatic mode, the fan operates as called for by signals from PLC-ORPST. Under normal conditions the selected fan will start after a 0 to 180 second delay and operate continuously.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORPST in the “Hand” position.

- b. After a 0 to 180 second delay the pump motor starts and the fan will operate continuously.
5. Visually verify the fan is operating.

Odor Reduction Station Scrubber

Start-up the scrubber according to procedures listed below:

1. Ensure that the drain and sample valves are closed.
2. Open the appropriate isolation valves including the sodium hypochlorite feed line, sodium hydroxide feed line, and sump make up water line.
3. Ensure the sump is full of liquid and that overflow rate (blowdown) has been established.

Odor Reduction Station pH and ORP Controllers

Start-up the pH and ORP controllers according to the procedures listed below:

1. Ensure that the ORP analyzer is energized and displaying a millivolt reading.
2. Ensure that the pH analyzer is energized and displaying a reading.
3. Calibrate ORP and pH probes per Manufacturer's recommendation.
4. Open the upstream and downstream ball valves which isolate the pH and ORP inlet header (by-pass line) from the recirculation pump discharge and suction piping.
5. Open the respective downstream ball valves which isolate the pH and ORP probes from the common outlet headers.
6. Adjust flow rates into the pH and ORP probes with the respective upstream throttling valves so that 11 gpm flows through each analyzer.
7. Verify and adjust as necessary the pH setpoint to the desired value (between 9.0 and 11.0 per air permit requirements).

Odor Reduction Station Recirculation Pumps

Start-up the recirculation pumps according to the procedures below:

1. Select the recirculation pump that will be in service at the LCP-ORPST.
2. Verify that the recirculation pump pipe valving is in the proper orientation and the selected pump discharge and suction valves are open.

3. Ensure that the upstream throttling valves and downstream ball valves which isolate the pH and ORP controllers from the recirculation pump suction and discharge piping are closed. Excessive pressures can damage the probes.
4. Ensure that seal water is being supplied to the pump.
5. Place the respective ROT switch in the “Remote” position.
6. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORPST in the “Auto” Position.
- b. In the Automatic mode the pump operates as called for by signals from PLC-ORPST. Under normal conditions the selected pump will start after a 0 to 180 second delay and operate continuously.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORPST in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
7. Visually verify the pump is operating.
 8. Verify that the isolation valves on both sides (inlet and outlet) of the orifice plate associated with the flowmeter (rotameter) are open and that the valve in the meter bypass line is closed.
 9. Observe the flowmeter reading (flow rate should be 240 gpm or greater).

Odor Reduction Station NaOH Metering Pumps

Start-up the sodium hydroxide metering pump according to the procedures listed below:

1. Select the NaOH metering pump that will be in service at the LCP-ORPST.
2. Verify the NaOH metering pump pipe valving is in the proper orientation and the selected pump discharge and suction valves are open.
3. Place the respective ROT switch in the “Remote” position.

4. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORPST in the “Auto” Position.
- b. In the Automatic mode, the pump operates as called for by PLC-ORPST. Under normal conditions the selected pump will start after a 0 to 180 second delay and operate continuously with the pump stroke being automatically adjusted based on the pH analyzer signal.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORPST in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
5. Visually verify the pump is operating.
 6. Observe the discharge pressure of the pump (discharge pressure should be approximately 40 psi).
 7. Verify that flow is occurring through the pump using the calibration column.

Odor Reduction Station NaOCl Metering Pumps

Start-up the sodium hypochlorite metering pumps according to the procedures listed below:

1. Select the NaOCl metering pump that will be in service at the LCP-ORPST.
2. Verify the NaOCl metering pump pipe valving is in the proper orientation and selected pump discharge and suction valves are open.
3. Place the respective ROT switch in the “Remote” position.
4. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORPST in the “Auto” Position.

- b. In the Automatic mode, the pump operates as called for by PLC-ORPST. Under normal conditions the selected pump will start after a 0 to 180 second delay and operate continuously.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORPST in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
5. Visually verify the pump is operating.
 6. Observe the discharge pressure of the pump (discharge pressure should be approximately 40 psi).
 7. Verify that flow is occurring through pump using the calibration column.
 8. Manually adjust the electronic stroke control on the metering pump to achieve the desired ORP millivolt reading at the ORP transmitter (between 575 and 725 mV per air permit requirements).

Odor Reduction Station NaOH Storage Tank

1. Fill bulk storage tank according to the following procedures:
 - a. Energize the fill station panel.
 - b. Attach chemical supply truck hose to the quickconnect of the fill pipe for the tank to be filled.
 - c. Open the isolation valve.
 - d. Pump the ordered amount of chemical into the chemical storage tank carefully watching the sight glass on the side of the tank so as not to over fill the tank.
 - e. When pumping is completed purge the feed pipe with air. Close the isolation valve. Disconnect the supply hose and cap the fill pipe.

WARNING: In case the high level alarm horn sounds, stop chemical pumping immediately. (A high level alarm is designed to activate before the tank overflows.) Silence the alarm by pressing the Acknowledge pushbutton. Alarm light will stay illuminated until the chemical level in the tank is below the high level.

2. Start-up the sodium hydroxide storage tanks according to the procedures listed below:

- a. Ensure that there is sufficient caustic in the tank (minimum 30% full).
- b. Open the appropriate isolation valves on the outlet lines.
- c. Turn on power for the field-mounted control panel for heat tracing system.

Odor Reduction Station NaOCl Storage Tank

1. Fill bulk storage tank according to the following procedures:
 - a. Energize the fill station panel.
 - b. Attach chemical supply truck hose to the quickconnect of the fill pipe for the tank to be filled.
 - c. Open the isolation valve.
 - d. Pump the ordered amount of chemical into the chemical storage tank carefully watching the sight glass on the side of the tank so as not to over fill the tank.
 - e. When pumping is completed purge the feed pipe with air. Close the isolation valve. Disconnect the supply hose and cap the fill pipe.

WARNING: In case the high level alarm horn sounds, stop chemical pumping immediately. (A high level alarm is designed to activate before the tank overflows.) Silence the alarm by pressing the Acknowledge pushbutton. Alarm light will stay illuminated until the chemical level in the tank is below the high level.

2. Start-up the sodium hypochlorite storage tank according to the procedures listed below:
 - a. Ensure that there is sufficient sodium hypochlorite in the tank (minimum 30% full).
 - b. Open the appropriate isolation valves on the outlet lines.

NaOH and NaOCl Containment Sump Pumps

Start the respective sump pump according to the procedures below:

1. Assess what liquid is in the sump (water or chemical).

If the liquid is water:

- a. Open the isolation valve to the tank drain.

If the liquid is chemical:

- a. Arrange for a hazardous waste truck to be called onto the site.
- b. Connect the quickconnect from the sump pump discharge line to the hazardous waste truck.
- c. Open the isolation valve to the quickconnect line. Ensure the isolation valve to the tank drain is closed.

2. Place the appropriate pump disconnect On/Off switch in the “On” position.
3. Place the Control On/Off switch in the “On” position. The control power light will illuminate.
4. Release the depressed stop button with the appropriate key.
5. Press the Pump Start pushbutton.
6. After a 0 to 180 second delay the pump motor starts and pump operates until a low level is signaled by a float switch.
7. Visually verify pump is running.

Odor Reduction Station Water Softening System

Start-up the water softener according to the procedures below:

1. Ensure that the local electrical disconnect is positioned to energize the water softening systems controls.
2. Open appropriate isolation valves on the inlet and outlet side of the water softening system.
3. Close the by-pass valve.
4. Adjust the flow of softened water to the scrubber tower to meet the desired flow rate.
5. Observe the calcium analyzer indicator (reading should be below 8 ppm).

4.2.3 Step by Step Shutdown Procedures

4.2.3.1 General System Shutdown Procedures

The Primary Sedimentation Facilities should be shut down according to the following procedures:

1. Refer to General Shutdown Procedures in Section 4.0.3.
2. Verify that the stand-by tank is on-line and operational.

3. Close the influent pressure slide gates or the stop plates for the tank(s) to be taken out of service.
4. Manually remove skimmings from the tank(s) to be taken out of service. Turn off the Rotary Skimmers (Section 4.2.3.2.4).
5. Turn off the chemical addition pumps for the tank(s) to be taken out of service (see Section 4.2.3.2.5.1 and 4.2.3.2.5.2). Flush all chemical lines with non-potable water.
6. Turn off the rapid mix pump for the tank(s) to be taken out of service (see Section 4.2.3.2.2).
7. Keep the sludge collection equipment running to collect any remaining sludge.
8. Continue sludge pumping cycle for several hours as determined by your Operations Supervisor to remove residual sludge.
9. Shutdown the primary sludge withdrawal system for the tank(s) to be taken out of service by one of the following methods depending on the configuration of the operation (see Section 4.2.3.2.3):
 - a. If the primary sludge pump is only operating for the tank which is to be taken out of service, then shutdown the primary sludge withdrawal system by turning off the primary sludge valves and primary sludge pump so that it no longer operates.
 - b. If the primary sludge pump is operating for more than one tank (i.e., Pump 1 withdrawals from Tank 1 and Tank 2), then shut down the primary sludge withdrawal system by turning off the primary sludge valves for the tank which is to be taken out of service. Therefore, the pump still removes sludge from the tank that is in service based on signals from the PLC-PSTE control logic.
10. Shutdown the sludge collection equipment (see Section 4.2.3.2.3)
11. Check to be sure sample chamber discharge isolation valves are **closed**.
12. Check to be sure all tank drain valves are closed for **all** PSTs.
13. Open the tank drain (two-8-inch plug valves) to route flow to the plant headworks.
14. Wash down the interior of the tank(s) taken out of service.

15. When the tank is empty (visually inspect), close the tank drain (8-inch plug valve).
16. Flush the tank drain according to the following procedures:
 - a. Ensure tank drain valves from tanks are closed.
 - b. Open NPW flushing valve located on the east end of the PST Gallery near Tank 1 to flush line.
 - c. Close NPW line after a few minutes.
 - d. Open 6-inch plug valve from tank drain to PST Gallery Sump to empty tank drain line.

Tank drain line should be flushed and emptied after each use and sludge sampling procedure. Only minimal amounts of sludge should be allowed to the PST Gallery Sump because sump pumps are for pumping water, not sludge.

17. If **all** PST tanks are to be taken out of service, shutdown the channel aeration system (see Section 4.2.3.2.1). After the channel aeration system is off, then shut down the PST odor reduction facilities (see Section 4.2.3.2.6). Also, shut down the entire chemical addition facility (see Section 4.2.3.2.5).
18. Shut down the Primary Sedimentation Facilities Odor Reduction Station according to the procedures described in Section 4.2.3.2.6. If the Odor Reduction Station is to be shut down in its entirety, the shut down order for the various pieces of odor reduction equipment shall be as follows:
 - a. NaOH Metering Pump
 - b. NaOH Storage Tank
 - c. NaOCl Metering Pump
 - d. NaOCl Storage Tank
 - e. pH and ORP Controllers
 - f. Recirculation Pump
 - g. Scrubber
 - h. Water Softening System
 - i. Scrubber Exhaust Fans

4.2.3.2 Individual Equipment Shutdown Procedures

4.2.3.2.1 Channel Aeration System

Channel Air Blowers

Shut down the channel aeration system according to the procedures listed below:

1. Turn the respective HOA switch at LCP-PCAB for the blowers to be shut down to the “Off” position.
2. Verify the blower has stopped.
3. Lock the appropriate ROT switch and close the discharge valve.
4. If the blower is to be out of service for an extended period of time, disconnect power source.

Note: The blowers will also automatically shut down on high discharge pressure, low discharge pressure, or on motor failure.

Air Supply Fans

Shut down the air supply fans according to the procedures listed below:

1. Turn the respective HOA switch at LCP-PCAB for the fans to be shut down to the “Off” position.
2. Verify the fan has stopped.
3. Lock the appropriate ROT switch and close the discharge valve.
4. If the fan is to be out of service for an extended period of time, disconnect power source.

Note: The supply fans will also automatically shut down on motor failure.

PST Gallery Exhaust Fans

Shut down the PST Gallery exhaust fans according to the procedures listed below:

1. Turn the respective On/Off switch at LCP-PCAB for the fans to be shut down to the “Off” position.
2. Verify the fan has stopped.
3. Lock the appropriate ROT switch and close the discharge valve.

4. If the fan is to be out of service for an extended period of time, disconnect power source.

Note: The exhaust fans will also automatically shut down on motor failure.

4.2.3.2.2 Rapid Mix Facilities

Slide Gates

Close the selected slide gate and the selected slide gate for scum removal according to the procedures listed below:

1. Select the gate that will be closed.
2. Close the gate as follows:

Automatically - Portable Hydraulic Operator

- a. Since the portable hydraulic operator is not used continuously, the operator must be inspected before each use. Perform a brief examination of the unit, checking the following items:
 - Proper hydraulic oil level. If low, fill as directed in manufacturer's O&M Manual.
 - Unusual wear or damage to components.
 - Fluid leakage.
 - Clean out covers, filler caps and breather caps on reservoir are properly fastened.
 - All filtration devices are in place.
 - The unit should be clean and free from material buildups that may result in over heating and/or damage.
- b. Energize the operator by inserting plug in receptacle and starting motor.
- c. Position remote drive unit (RDU) over the gate operator drive shaft.
- d. Verify the gate position and direction of the necessary gate movement.
- e. Activate the directional control valve. Observe carefully the gate head movement and operator to detect irregular movement. Should this occur, release directional control valve to avoid damage.
- f. Deactivate RDU when gate is within 2-inches of its desired position.
- g. Use manual operator to move gate into its final position.

Manually - Square Nut Operator

- a. Position the t-handle over the operator nut, make certain the nut is fully-recessed into the socket.
 - b. Rotate the operator counter-clockwise to close the gate.
3. Visually inspect the gate head to verify proper position.

Rapid Mix Pumps

Shut down the rapid mix facilities according to the procedures listed below:

1. Turn the respective On/Off switch at LCP-RM for the pumps to be shut down to the “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. If the pump and PST Tank are to be out of service for an extended period of time:
 - a. Disconnect power source.
 - b. Close the isolation valves on pump suction and discharge sides.

Note: The pumps will also automatically shut down on “no flow” condition as detected by the discharge check valve limit switch or on motor overload.

PST Gallery Sump Pumps

Shut down the sump pump according to the procedures listed below:

1. Place the HOA switch(s) at the LCP-PSTGS located near the sump pump in the “Off” position.

Note: A key is required to unlock the HOA switch when the sump needs to be started again.

2. Verify the pump(s) has stopped.
3. Lock the appropriate lock switch.
4. If pumps are to be out of service for an extended period of time, turn the power control On/Off switch to the “Off” position and disconnect power source and close isolation valves.

Note: The sump pumps will also automatically shut down on low water level

4.2.3.2.3 Sludge Collection and Pumping

Sludge Collectors

Non-metallic chain and flight type collectors are designed for continuous 24 hour operation. When the equipment remains inactive for a significant period of time, special precautions must be taken to avoid excessive accumulation of solids at the bottom of the tank.

Generally, if the equipment is turned off for a period of more than one hour, influent flow should be terminated to avoid excessive accumulation of solids.

Shut down the sludge collection system according to the procedures listed below:

1. If the tank is to be drained for out of service condition, grease sprockets at eight (8) locations while cycling collector prior to shutdown.
2. Turn the respective On/Off switch at LCP-PSC for the collectors to be shut down to the “Off” position.
3. Verify the collector has stopped.
4. Lock the appropriate ROT switch.
5. If the collector is to be out of service for an extended period of time, disconnect power source.

Note: The collectors will also automatically shut down on shear pin breakage or motor overload.

Primary Sludge Pumps

Shut down the primary sludge pumps according to the procedures listed below:

1. Turn the respective HOA switch at LCP-PSP for the pumps to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Turn ROL switches to “Off” for the motor actuated primary sludge valves.
4. Lock the appropriate ROT switches and On/Off disconnect switches.
5. If the pump is to be out of service for an extended period of time, disconnect power source.

6. If the entire tank is to be out of service for an extended period of time, close the isolation valves on pump suction and discharge sides.
7. The valves (and tank) are skipped over in the cycle of operation.

Note: The pumps will also automatically shut down on low suction pressure, high discharge pressure, or motor overload. Additionally, the pumps will automatically shut down as called for by the PLC-PSTE operational logic (see Section 4.2.1.4.2 for detailed description).

4.2.3.2.4 Primary Skimmings Processing Facilities

Surface Skimmers

Shut down the rotary skimmers according to the procedures listed below:

1. Turn the respective ROL switch in the “Off” position.
2. Lock the On/Off disconnect switch.
3. Ensure that the skimmer is in the upward position so that no flow is entering.

Note: The skimmers will also automatically shut down on failure to tilt or return upright, high Skimmings Wet Well level, or motor overload. Additionally, skimmers will automatically shut down as called for by the PLC-PSTE operational logic (see Section 4.2.1.5.1 for detailed description).

Primary Skimmings Pumps

Shut down the primary skimmings pumps according to the procedures listed below:

1. Turn the respective HOA switch at LCP-PSKPS for the pumps to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. Turn off the seal water supplied to the pump.
5. If the pump is to be out of service for an extended period of time, disconnect power source.
6. If the skimmings pump is to be out of service for an extended period of time, close the isolation valves on pump suction and discharge sides and isolation

valves on the associated circulation flow injection lines.

7. If the entire skimming facilities are to be out of service:
 - a. Ensure all the rotary skimmers are in the “Off” position and tilted upward.
 - b. Open the grinder bypass valves, turn the grinder ROT switch to the “Off” position, then close the grinder isolation valves.
 - c. Turn the HOA for the wetwell bubbler detector to the “Off” position.
 - d. Turn the automatic valves to the “Test” position and then close them.

Note: The pumps will also automatically shut down on no flow detection as detected by the discharge check valve limit switch, grinder failure, low Skimmings Wet Well level, or motor overload. Additionally, the pumps will automatically shut down as called by the PLC-PSTE operational logic (see Section 4.2.1.5.2 for detailed description).

Skimmings Dry Well Sump Pumps

Shut down the sump pump according to the procedures listed below:

1. Place the HOA switch(s) at the LCP-PSKS located near the sump pump in the “Off” position.

Note: A key is required to unlock the stop pushbutton when the sump pump needs to be started again.

2. Verify the pump(s) has stopped.
3. Lock the appropriate lock switch.
4. If pumps are to be out of service for an extended period of time, turn the power control On/Off switch to the “Off” position and disconnect power source and close isolation valves.

Note: The sump pumps will also automatically shut down on low water level.

4.2.3.2.5 Chemical Addition Facilities

Chemical Addition Area Sump Pumps

Shut down the polymer containment area, polymer mixing area, or ferric chloride containment area sump pump according to the following procedures:

1. Press the Pump Stop pushbutton.

Note: A key is required to unlock the stop pushbutton when the sump pump needs to be started again.

2. Verify the pump has stopped.
3. Lock the appropriate lock switch.
4. If pump is to be out of service for an extended period of time, disconnect power source and close isolation valves.

Note: The sump pump will also automatically shut down on low liquid level or motor overload.

4.2.3.2.5.1 PST Polymer Addition Facilities

Polymer Bulk Storage Tank

Shut down the PST polymer bulk storage tanks according to the procedures listed below:

1. Continue to operate the respective transfer pump and to transfer polymer to the mixing tank(s).
2. Monitor polymer level in the bulk tank.
3. After polymer level in the tank reaches the low low level setting, shut down the polymer transfer pump according to the procedures described in the next section.
4. Materials that do not drain from the storage tank must be diluted, pumped out using a portable submersible pump, and safely disposed. Follow the procedures similar to those shown in Section 4.5.3.1.2.

Polymer Transfer Pumps

Shut down the polymer transfer pumps according to the procedure listed below:

1. Turn the respective HOA switch at LCP-PSTPOL for the pumps to be shut down to the “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.

4. If the pump is to be out of service for an extended period of time, flush all chemical lines with non-potable water and disconnect power source.
5. If the bulk storage tank is to be out of service for an extended period of time, close the isolation valves on pump suction and discharge sides.

Note: The pumps will also automatically shut down on low or high discharge pressure, on low low storage tank level, or on motor failure. Additionally, the pump will automatically shut down as called by the mixing tank level switch signals (see Section 4.2.1.6.1 for detailed description).

Polymer Mixing Tanks and Mixers

Shut down the polymer mixing tanks according to the procedures listed below:

1. Close the respective isolation valves on the feed lines to the mixing tank.
2. Continue to operate the polymer addition pumps.
3. Monitor the polymer solution level in the mixing tank.
4. When the level in the mixing tank is below the low level, turn off the mixer by turning the ROT switch to the “Off” position and lock it out. Do not operate the mixer when the polymer level is below the low setting to prevent excessive splashing and mixer vibration.
5. After polymer level in the tank reaches the low low level setting, shut down the mixing tank as follows:

If alternate mixing tank is to be operational:

- a. Start-up alternate mixing tank (Refer to start-up procedures in Section 4.2.2.2.5.1 to start up alternate tank).
- b. Place the Tank 1/Tank 2 switch to the mixing tank which is to be operational.

If entire polymer system is to be shut down:

- a. Shut down the polymer addition pumps according to the procedures described in the next section.
6. Materials that do not drain from the mixing tank must be diluted, pumped out using a portable submersible pump, and safely disposed.

Note: The mixer will also automatically shut down on motor overload.

Polymer Addition Pumps

Shut down the polymer addition pumps according to the procedures listed below:

1. Turn the respective On/Off switch at LCP-PSTPOL for the pumps to be shut down to the “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, flush all chemical lines with non-potable water, disconnect power source, and close the isolation valves.

Note: The pump will also automatically shut down on polymer solution low low level in the mixing tank, on no flow condition as detected by the discharge check valve limit switch or motor overload.

4.2.3.2.5.2 PST Ferric Chloride Addition Facilities

Bulk Storage Tank Ferric Chloride

Shut down the PST and USST ferric chloride addition facilities according to the procedures listed below:

1. Continue to operate the respective transfer pump and to transfer ferric chloride to the mixing tank(s).
2. Monitor ferric chloride level in the bulk tank.
3. After ferric chloride level in the tank reaches the low low level setting, shut down the ferric chloride transfer pump according to the procedures described in the next section.
4. Materials that do not drain from the storage tank must be diluted, pumped out using a portable submersible pump, and safely disposed. Follow the procedures similar to those shown in Section 4.5.3.1.2.

Ferric Chloride Transfer Pumps

Shut down the ferric chloride transfer pumps according to the procedures listed below:

1. Turn the respective HOA switch at LCP-PSTFER for the pumps to be shut down to the “Off” position.

2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, flush all chemical lines with non-potable water and disconnect power source.
5. If the bulk storage tank is to be out of service for an extended period of time, close the isolation valves on pump suction and discharge sides.

Note: The pumps will also automatically shut down on low flow detection, diaphragm failure, on low low storage tank level, or on pump failure. Additionally, the pump will automatically shut down as called by the mixing tank level switch signals (see Section 4.2.1.6.2 for detailed description).

Ferric Chloride Mixing Tanks and Mixers

Shut down the ferric chloride mixing tanks according to the procedures listed below:

1. Close the respective isolation valves on the feed lines to the mixing tank.
2. Continue to operate the ferric chloride addition pumps.
3. Monitor the ferric chloride solution level in the mixing tank.
4. When the level in the mixing tank is below the low level, turn off the mixer by turning the ROT switch to the “Off” position and lock it out. Do not operate mixer when the ferric chloride level is below the low level setting to prevent excessive splashing and mixer vibration.
5. After ferric chloride level in the tank reaches the low low level setting, shut down the mixing tank as follows:

If alternate mixing tank is to be operational:

- a. Start-up alternate mixing tank (Refer to start-up procedures in Section 4.2.2.2.5.2 to start up alternate tank).
- b. Place the Tank 1/Tank 2 switch to the mixing tank which is to be operational.

If entire ferric chloride system is to be shut down:

- a. Shut down the ferric chloride addition pumps according to the procedures described in the next section.
6. Materials that do not drain from the mixing tank must be diluted, pumped out using a portable submersible pump, and safely disposed.

Note: The mixers will also automatically shut down on motor overload.

Ferric Chloride Addition Pumps

Shut down the ferric chloride addition pumps according to the procedures listed below:

1. Turn the respective On/Off switch at LCP-PSTFER for the pumps to be shut down to the “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, flush all chemical lines with non-potable water, disconnect power source and close the isolation valves.

Note: The pumps will also automatically shut down on ferric chloride solution low level in the mixing tank, diaphragm rupture, no flow condition as detected by the discharge check valve limit switch, and motor overload.

4.2.3.2.6 Odor Reduction Station

Odor Reduction Station Exhaust Fans

Shut down the odor reduction station exhaust fan according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORPST for the odor reduction fan to be shut down to the “Off” position.
2. Verify the fan is stopped.
3. Lock the appropriate ROT switch.

4. If the fan is to be out of service for an extended period of time, disconnect power source.
5. If the odor reduction system (or one of the fans) is to be out of service for an extended period of time, close the isolation damper on the inlet and discharge of the fan.

Note: The fan will also be automatically shut down on a low discharge flow signal from the downstream flow sensor.

Odor Reduction Station Scrubber

Shut down the odor reduction station scrubber according to the procedures listed below:

1. Shut down the outlet isolation valves.
2. If the tank is to be out of service for an extended period of time, disconnect the power to the level transmitter.

Odor Reduction Station pH and ORP Controllers

Shut down the pH and ORP controllers according to the procedures listed below:

1. Close the inlet throttling valves and the downstream ball valves to isolate the pH and ORP probes.
2. If the controllers are to be out of service for an extended period of time, disconnect the power to the controller.

Odor Reduction Station Recirculation Pump

Shut down the recirculation pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORPST for the odor reduction station recirculation pump to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source.
5. If the entire odor reduction system (or one of the recirculation pumps) is to be out of service for an extended period of time, close the isolation valves on the pump suction and discharge.

Note: The pump will also be automatically shut down by PLC-ORPST upon one of the following:

- a. High or low pressure signal from the downstream pressure switch.
- b. Low flow signal from the seal water flow switch.
- c. Low low liquid level signal from the scrubber liquid level sensor.

Odor Reduction Station NaOH Metering Pumps

Shut down the sodium hydroxide metering pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORPST for the sodium hydroxide metering pump to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, flush all chemical lines with non-potable water and disconnect power source.
5. If the entire odor reduction system (or one of the NaOH metering pumps) is to be out of service for an extended period of time, close the isolation valves on the pump suction and discharge.

Note: The pump will also be automatically shut down by PLC-ORPST upon one of the following:

- a. Low low level signal from the tank liquid level sensor.
- b. Ruptured diaphragm signal from the pump mounted conductivity sensor.

Odor Reduction Station NaOCI Metering Pump

Shut down the sodium hypochlorite metering pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORPST for the sodium hypochlorite metering pump to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, flush all

chemical lines with non-potable water and disconnect power source.

5. If the entire odor reduction system (or one of the NaOCl metering pumps) is to be out of service for an extended period of time, close the isolation valves on pump suction and discharge.

Note: The pump will also be automatically shut down by PLC-ORPST upon one of the following:

- a. Low low level signal from the tank liquid level sensor.
- b. Ruptured diaphragm signal from the pump mounted conductivity sensor.

Odor Reduction Station NaOH Storage Tank

Shut down the sodium hydroxide storage tank according to the procedures listed below:

1. Shut down the outlet isolation valves.
2. If the tank is to be out of service for an extended period of time, disconnect the power to the level transmitter and to the field-mounted control panel for heat tracing system. Drain the tank according to the procedures similar to those shown in Section 4.5.3.2.2.

Odor Reduction Station NaOCl Storage Tank

Shut down the sodium hypochlorite storage tank according to the procedures listed below:

1. Shut down the outlet isolation valves.
2. If the tank is to be out of service for an extended period of time, disconnect the power to the level transmitter. Drain the tank according to the procedures similar to those shown in Section 4.5.3.1.2.

NaOH and NaOCl Containment Sump Pumps

Shut down the respective sump pump according to the following procedures:

1. Press the Pump Stop pushbutton.

Note: A key is required to unlock the stop pushbutton when the sump pump needs to be started again.

2. Verify the pump has stopped.
3. Lock the appropriate lock switch.

4. If pump is to be out of service for an extended period of time, disconnect power source and close isolation valves.

Note: The sump pump will also automatically shut down on low liquid level or motor overload.

Odor Reduction Station Water Softening System

Shut down the water softening system according to the procedures listed below:

1. Ensure that each of the vessels of the water softening system is in either the “Operation” or “Stand-by” mode. (If the softening system is in some other mode, wait until the regeneration cycle is complete before proceeding.)
2. Close the isolation valves on the inlet and outlet sides of the water softening system.
3. If the water softening system is to be out of service for an extended period of time, disconnect power source.

4.2.4 Alarm and Status Annunciation

The following sections list the alarm and status annunciators associated with the Primary Sedimentation Facilities.

4.2.4.1 Channel Aeration Facilities

<u>Alarm/Status</u>	<u>Display Location</u>
Channel Air Blower No. 1 Run Light	LCP-PCAB (part of LCP-PSTE)
Channel Air Blower No. 2 Run Light	LCP-PCAB
Primary Channel Air Blower No. 1 Run/Stopped/Trip Lights	MCC-PSTE "A" BUS
Primary Channel Air Blower No. 2 Run/Stopped/Trip Lights	MCC-PSTE "B" BUS
Channel Air Blower No. 1 Discharge High Pressure Annunciator	LCP-PSTE
Channel Air Blower No. 2 Discharge High Pressure Annunciator	LCP-PSTE
Channel Air Blower No. 1 Discharge Low Pressure Annunciator	LCP-PSTE
Channel Air Blower No. 2 Discharge Low Pressure Annunciator	LCP-PSTE
Channel Air Blower No. 1 Failure Annunciator	LCP-PSTE
Channel Air Blower No. 2 Failure Annunciator	LCP-PSTE
Air Supply Fan No. 1 Run Light	LCP-PCAB
Air Supply Fan No. 2 Run Light	LCP-PCAB
PCAB Supply Fan No. 1 Run/Stopped/Trip Lights	MCC-PSTE "A" BUS
PCAB Supply Fan No. 2 Run/Stopped/Trip Lights	MCC-PSTE "B" BUS

<u>Alarm/Status</u>	<u>Display Location</u>
Air Supply Fan No. 1 No Flow Annunciator	LCP-PSTE
Air Supply Fan No. 2 No Flow Annunciator	LCP-PSTE
Air Supply Fan No. 1 Failure Annunciator	LCP-PSTE
Air Supply Fan No. 2 Failure Annunciator	LCP-PSTE
PST Gallery Exhaust Fan No. 1 Run Light	LCP-PCAB
PST Gallery Exhaust Fan No. 2 Run Light	LCP-PCAB
Primary Gallery Exhaust Fan No. 1 Run/Stopped/Trip Lights	MCC-PSTE "A" BUS
Primary Gallery Exhaust Fan No. 2 Run/Stopped/Trip Lights	MCC-PSTE "B" BUS
PST Gallery Exhaust Fan No. 1 Failure Annunciator	LCP-PSTE
PST Gallery Exhaust Fan No. 2 Failure Annunciator	LCP-PSTE
Channel Air System Failure Annunciator	PCC

4.2.4.2 Rapid Mix Chamber

<u>Alarm/Status</u>	<u>Display Location</u>
Rapid Mix Pump No. 1 Run Light	LCP-RM (part of LCP-PSTE)
Rapid Mix Pump No. 2 Run Light	LCP-RM
Rapid Mix Pump No. 3 Run Light	LCP-RM
Rapid Mix Pump No. 4 Run Light	LCP-RM
Rapid Mix Pump No. 5 Run Light	LCP-RM

<u>Alarm/Status</u>	<u>Display Location</u>
Rapid Mix Pump No. 1 Run/Stopped/Trip Lights	MCC-PSTE “A” BUS
Rapid Mix Pump No. 2 Run/Stopped/Trip Lights	MCC-PSTE “A” BUS
Rapid Mix Pump No. 3 Run/Stopped/Trip Lights	MCC-PSTE “B” BUS
Rapid Mix Pump No. 4 Run/Stopped/Trip Lights	MCC-PSTE “B” BUS
Rapid Mix Pump No. 5 Run/Stopped/Trip Lights	MCC-PSTE “A” BUS
Rapid Mix Pump No. 1 Failure Annunciator	LCP-PSTE
Rapid Mix Pump No. 2 Failure Annunciator	LCP-PSTE
Rapid Mix Pump No. 3 Failure Annunciator	LCP-PSTE
Rapid Mix Pump No. 4 Failure Annunciator	LCP-PSTE
Rapid Mix Pump No. 5 Failure Annunciator	LCP-PSTE
Rapid Mix Pump Failure Annunciator	PCC
PST Gallery Sump Pump Failure Annunciator	LCP-PSTE
PST Gallery Sump High High Level Annunciator	LCP-PSTE
PST Gallery Sump High Level Annunciator	PCC

4.2.4.3 Sludge Collection and Pumping Facilities

Sludge Collectors

<u>Alarm/Status</u>	<u>Display Location</u>
Collector No. 1 Run Light	LCP-PSC (part of LCP-PSTE)
Collector No. 2 Run Light	LCP-PSC
Collector No. 3 Run Light	LCP-PSC
Collector No. 4 Run Light	LCP-PSC
Collector No. 5 Run Light	LCP-PSC
Primary Sludge Collector No. 1 Forward/Reverse/Stopped/Trip Lights	MCC-PSTE "A" BUS
Primary Sludge Collector No. 2 Forward/Reverse/Stopped/Trip Lights	MCC-PSTE "A" BUS
Primary Sludge Collector No. 3 Forward/Reverse/Stopped/Trip Lights	MCC-PSTE "B" BUS
Primary Sludge Collector No. 4 Forward/Reverse/Stopped/Trip Lights	MCC-PSTE "B" BUS
Primary Sludge Collector No. 5 Forward/Reverse/Stopped/Trip Lights	MCC-PSTE "A" BUS
Collector No. 1 Failure Annunciator	LCP-PSTE
Collector No. 2 Failure Annunciator	LCP-PSTE
Collector No. 3 Failure Annunciator	LCP-PSTE
Collector No. 4 Failure Annunciator	LCP-PSTE
Collector No. 5 Failure Annunciator	LCP-PSTE
Primary Sedimentation Tank Collector Failure Annunciator	PCC

Primary Sludge Pumping

<u>Alarm/Status</u>	<u>Display Location</u>
Sludge Pump No. 1 Run Light	LCP-PSP (part of LCP-PSTE)
Sludge Pump No. 2 Run Light	LCP-PSP
Sludge Pump No. 3 Run Light	LCP-PSP
Primary Sludge Pump No. 1 Run/Stopped/Trip Lights	MCC-PSTE "A" BUS
Primary Sludge Pump No. 2 Run/Stopped/Trip Lights	MCC-PSTE "B" BUS
Primary Sludge Pump No. 3 Run/Stopped/Trip Lights	MCC-PSTE "A" BUS
Primary Sludge Pump No. 1 Failure Annunciator	LCP-PSTE
Primary Sludge Pump No. 2 Failure Annunciator	LCP-PSTE
Primary Sludge Pump No. 3 Failure Annunciator	LCP-PSTE
Primary Sludge Pump No. 1 Low Suction Pressure Annunciator	LCP-PSTE
Primary Sludge Pump No. 2 Low Suction Pressure Annunciator	LCP-PSTE
Primary Sludge Pump No. 3 Low Suction Pressure Annunciator	LCP-PSTE
Primary Sludge Pump No. 1 High Discharge Pressure Annunciator	LCP-PSTE
Primary Sludge Pump No. 2 High Discharge Pressure Annunciator	LCP-PSTE
Primary Sludge Pump No. 3 High Discharge Pressure Annunciator	LCP-PSTE
Sludge Valve No. 1A Auto Light	LCP-PSP
Sludge Valve No. 1B Auto Light	LCP-PSP

<u>Alarm/Status</u>	<u>Display Location</u>
Sludge Valve No. 2A Auto Light	LCP-PSP
Sludge Valve No. 2B Auto Light	LCP-PSP
Sludge Valve No. 3A Auto Light	LCP-PSP
Sludge Valve No. 3B Auto Light	LCP-PSP
Sludge Valve No. 4A Auto Light	LCP-PSP
Sludge Valve No. 4B Auto Light	LCP-PSP
Sludge Valve No. 5A Auto Light	LCP-PSP
Sludge Valve No. 5B Auto Light	LCP-PSP
Primary Sludge Valve No. 1A Failure Annunciator	LCP-PSTE
Primary Sludge Valve No. 1B Failure Annunciator	LCP-PSTE
Primary Sludge Valve No. 2A Failure Annunciator	LCP-PSTE
Primary Sludge Valve No. 2B Failure Annunciator	LCP-PSTE
Primary Sludge Valve No. 3A Failure Annunciator	LCP-PSTE
Primary Sludge Valve No. 3B Failure Annunciator	LCP-PSTE
Primary Sludge Valve No. 4A Failure Annunciator	LCP-PSTE
Primary Sludge Valve No. 4B Failure Annunciator	LCP-PSTE
Primary Sludge Valve No. 5A Failure Annunciator	LCP-PSTE
Primary Sludge Valve No. 5B Failure Annunciator	LCP-PSTE
Primary Sludge Grinder Run Light	LCP-PSPG
Primary Sludge Grinder Stop Light	LCP-PSPG

<u>Alarm/Status</u>	<u>Display Location</u>
Primary Sludge Grinder Trip Annunciator	LCP-PSPG
Primary Sludge Grinder Motor Overload Annunciator	LCP-PSPG
Primary Sludge Grinder Run Light	LCP-PSP
Primary Sludge Grinder Auto Light	LCP-PSP
LCP-PSPG Failure Annunciator	LCP-PSTE
Primary Sludge Pump Station Failure Annunciator	PCC
PLC-PSTE Failure Annunciator	PCC

4.2.4.4 Primary Skimmings Processing Facilities

Surface Skimmers

<u>Alarm/Status</u>	<u>Display Location</u>
Skimmer 1 Auto Light	LCP-PSK (part of LCP-PSTE)
Skimmer 2 Auto Light	LCP-PSK
Skimmer 3 Auto Light	LCP-PSK
Skimmer 4 Auto Light	LCP-PSK
Skimmer 5 Auto Light	LCP-PSK
Skimming Cycle Abort Light	LCP-PSK
Skimmer No. 1 Failure Annunciator	LCP-PSTE
Skimmer No. 2 Failure Annunciator	LCP-PSTE
Skimmer No. 3 Failure Annunciator	LCP-PSTE
Skimmer No. 4 Failure Annunciator	LCP-PSTE
Skimmer No. 5 Failure Annunciator	LCP-PSTE
Primary Sedimentation Tank Skimmer Failure Annunciator	PCC

Skimmings Pump Station

<u>Alarm/Status</u>	<u>Display Location</u>
Primary Skimmings Pump No. 1 Run Fast Light	LCP-PSKPS (at the PSK Pump Station)
Primary Skimmings Pump No. 2 Run Fast Light	LCP-PSKPS
Primary Skimmings Pump No. 1 Run Slow Light	LCP-PSKPS
Primary Skimmings Pump No. 2 Run Slow Light	LCP-PSKPS
Primary Skimmings Pump No. 1 Fast/Slow/Stopped/Trip Lights	MCC-PSTE "A" BUS
Primary Skimmings Pump No. 2 Fast/Slow/Stopped/Trip Lights	MCC-PSTE "B" BUS
Primary Skimmings Pump No. 1 Failure Annunciator	LCP-PSKPS
Primary Skimmings Pump No. 2 Failure Annunciator	LCP-PSKPS
Primary Skimmings Pump Motor No. 1 Failure Annunciator	LCP-PSKPS
Primary Skimmings Pump Motor No. 2 Failure Annunciator	LCP-PSKPS
Primary Skimmings Pumps Seal Water Failure Annunciator	LCP-PSKPS
LCP-PSKPS Failure Annunciator	LCP-PSTE
Primary Skimmings Wet Well High Level Annunciator	LCP-PSKPS
Primary Skimmings Wet Well Low Level Annunciator	LCP-PSKPS
Primary Skimmings Wet Well High Level Annunciator	LCP-PSTE

<u>Alarm/Status</u>	<u>Display Location</u>
Primary Skimmings Wet Well Low Level Annunciator	LCP-PSSTE
Compressor No. 1 Run Light	LCP-PSKBE
Compressor No. 2 Run Light	LCP-PSKBE
Compressor No. 1 Fail Light	LCP-PSKBE
Compressor No. 2 Fail Light	LCP-PSKBE
Compressor Low Air	LCP-PSKBE
LCP-PSKBE (Bubbler Compressor Level Indicator) Failure Annunciator	LCP-PSKPS
LCP-PSKBE (Bubbler Compressor Level Indicator) Failure Annunciator	LCP-PSSTE
Primary Skimmings Recycle Valve Auto Light	LCP-PSKPS
Primary Skimmings Recycle Valve Failure Annunciator	LCP-PSKPS
Primary Skimmings Discharge Valve Auto Light	LCP-PSKPS
Primary Skimmings Discharge Valve Failure Annunciator	LCP-PSKPS
Primary Skimmings Grinder Subnatant Valve Auto Light	LCP-PSKPS
Primary Skimmings Subnatant Valve Failure Annunciator	LCP-PSKPS
Primary Skimmings Grinder Run Light	LCP-PSKG
Primary Skimmings Grinder Stop Light	LCP-PSKG
Primary Skimmings Grinder Trip Annunciator	LCP-PSKG
Primary Skimmings Grinder Motor Overload Annunciator	LCP-PSKG
Primary Skimmings Grinder Auto Light	LCP-PSKPS

<u>Alarm/Status</u>	<u>Display Location</u>
Primary Skimmings Grinder Run Light	LCP-PSKPS
LCP-PSKG (Primary Skimmings Grinder) Failure Annunciator	LCP-PSKPS
LCP-PSKG (Primary Skimmings Grinder) Failure Annunciator	LCP-PSTE
Primary Skimmings Pump Station Failure Annunciator	PCC
Skimmings Dry Well Sump Pump Failure Annunciator	LCP-PSTE
Skimmings Dry Well High High Level Annunciator	LCP-PSTE
Primary Skimmings Dry Well Sump High Level Annunciator	PCC

4.2.4.5 Chemical Addition Facilities

<u>Alarm/Status</u>	<u>Display Location</u>
Polymer Containment Sump High Level Annunciator	LCP-PSTE
Polymer Mixing Area Sump High Level Annunciator	LCP-PSTE
PSTE Polymer Containment Sump High Level Annunciator	PCC
Polymer Mixing Area Sump High Level	PCC
Ferric Chloride Containment Sump High Level Annunciator	LCP-PSTE
PSTE Ferric Chloride Containment Sump High Level Annunciator	PCC

4.2.4.5.1 Polymer Addition System

<u>Alarm/Status</u>	<u>Display Location</u>
Bulk Polymer Supply Tank No. 1 High Level Annunciator	LCP-PSTE
Bulk Polymer Supply Tank No. 2 High Level Annunciator	LCP-PSTE
Bulk Polymer Supply Tank No. 1 Low Level Annunciator	LCP-PSTE
Bulk Polymer Supply Tank No. 2 Low Level Annunciator	LCP-PSTE
Bulk Polymer Supply Tank No. 1 Low Low Level Annunciator	LCP-PSTE
Bulk Polymer Supply Tank No. 2 Low Low Level Annunciator	LCP-PSTE
Transfer Pump No. 1 Run Light	LCP-PSTPOL (part of LCP-PSTE)
Transfer Pump No. 2 Run Light	LCP-PSTPOL
Polymer Transfer Pump No. 1 Run Light	SCR Controller (at pump)
Polymer Transfer Pump No. 2 Run Light	SCR Controller
Polymer Transfer Pump No. 1 Failure Annunciator	LCP-PSTE
Polymer Transfer Pump No. 2 Failure Annunciator	LCP-PSTE
Mixer No. 1 Run Light	LCP-PSTPOL
Mixer No. 2 Run Light	LCP-PSTPOL
Primary Polymer Mixer No. 1 Run/Stopped/Trip Lights	MCC-PSTE-1
Primary Polymer Mixer No. 2 Run/Stopped/Trip Lights	MCC-PSTE-2
Polymer Mix Tank No. 1 High High Level Annunciator	LCP-PSTE

<u>Alarm/Status</u>	<u>Display Location</u>
Polymer Mix Tank No. 2 High High Level Annunciator	LCP-PSTE
Polymer Mix Tank No. 1 Low Low Level Annunciator	LCP-PSTE
Polymer Mix Tank No. 2 Low Low Level Annunciator	LCP-PSTE
Polymer Mix Tank No. 1 Makeup Water Failure Annunciator	LCP-PSTE
Polymer Mix Tank No. 2 Makeup Water Failure Annunciator	LCP-PSTE
Polymer Mixer No. 1 Failure Annunciator	LCP-PSTE
Polymer Mixer No. 2 Failure Annunciator	LCP-PSTE
Addition Pump No. 1 Run Light	LCP-PSTPOL
Addition Pump No. 2 Run Light	LCP-PSTPOL
Addition Pump No. 3 Run Light	LCP-PSTPOL
Addition Pump No. 4 Run Light	LCP-PSTPOL
Addition Pump No. 5 Run Light	LCP-PSTPOL
Polymer Addition Pump No. 1 Run Light	SCR Controller (at pump)
Polymer Addition Pump No. 2 Run Light	SCRController
Polymer Addition Pump No. 3 Run Light	SCR Controller
Polymer Addition Pump No. 4 Run Light	SCR Controller
Polymer Addition Pump No. 5 Run Light	SCR Controller
Polymer Addition Pump No. 1 Failure Annunciator	LCP-PSTE
Polymer Addition Pump No. 2 Failure Annunciator	LCP-PSTE

<u>Alarm/Status</u>	<u>Display Location</u>
Polymer Addition Pump No. 3 Failure Annunciator	LCP-PSTE
Polymer Addition Pump No. 4 Failure Annunciator	LCP-PSTE
Polymer Addition Pump No. 5 Failure Annunciator	LCP-PSTE
Polymer Addition Pump No. 1 No Flow Annunciator	LCP-PSTE
Polymer Addition Pump No. 2 No Flow Annunciator	LCP-PSTE
Polymer Addition Pump No. 3 No Flow Annunciator	LCP-PSTE
Polymer Addition Pump No. 4 No Flow Annunciator	LCP-PSTE
Polymer Addition Pump No. 5 No Flow Annunciator	LCP-PSTE
PSTE Polymer Addition System Failure Annunciator	PCC
Eye/Wash Shower Polymer Area	LCP-PSTE
Polymer Addition East Safety Shower Annunciator	PCC

4.2.4.5.2 Ferric Chloride Addition System

<u>Alarm/Status</u>	<u>Display Location</u>
Bulk Ferric Chloride Supply Tank No. 1 High Level Annunciator	LCP-PSTE
Bulk Ferric Chloride Supply Tank No. 2 High Level Annunciator	LCP-PSTE
Bulk Ferric Chloride Supply Tank No. 1 Low Level Annunciator	LCP-PSTE
Bulk Ferric Chloride Supply Tank No. 2 Low Level Annunciator	LCP-PSTE

<u>Alarm/Status</u>	<u>Display Location</u>
Bulk Ferric Chloride Supply Tank No. 1 Low Low Level Annunciator	LCP-PSTE
Bulk Ferric Chloride Supply Tank No. 2 Low Low Level Annunciator	LCP-PSTE
Transfer Pump No. 1 Run Light	LCP-PSTFER (part of LCP-PSTE)
Transfer Pump No. 2 Run Light	LCP-PSTFER
Primary Ferric Chloride Transfer Pump No. 1 Run/Stopped/Trip Lights	MCC-PSTE-1
Primary Ferric Chloride Transfer Pump No. 2 Run/Stopped/Trip Lights	MCC-PSTE-2
Ferric Chloride Transfer Pump No. 1 Failure Annunciator	LCP-PSTE
Ferric Chloride Transfer Pump No. 2 Failure Annunciator	LCP-PSTE
Ferric Chloride Transfer Pump No. 1 No Flow Annunciator	LCP-PSTE
Ferric Chloride Transfer Pump No. 2 No Flow Annunciator	LCP-PSTE
Ferric Chloride Transfer Pump No. 1 Diaphragm Rupture Annunciator	LCP-PSTE
Ferric Chloride Transfer Pump No. 2 Diaphragm Rupture Annunciator	LCP-PSTE
Mixer No. 1 Run Light	LCP-PSTFER
Mixer No. 2 Run Light	LCP-PSTFER
Primary Ferric Chloride Mixer No. 1 Run/Stopped/Trip Lights	MCC-PSTE-1
Primary Ferric Chloride Mixer No. 2 Run/Stopped/Trip Lights	MCC-PSTE-2
Ferric Chloride Mix Tank No. 1 High High Level Annunciator	LCP-PSTE

<u>Alarm/Status</u>	<u>Display Location</u>
Ferric Chloride Mix Tank No. 2 High Level Annunciator	LCP-PSTE
Ferric Chloride Mix Tank No. 1 Low Level Annunciator	LCP-PSTE
Ferric Chloride Mix Tank No. 2 Low Level Annunciator	LCP-PSTE
Ferric Chloride Mix Tank No. 1 Makeup Water Failure Annunciator	LCP-PSTE
Ferric Chloride Mix Tank No. 2 Makeup Water Failure Annunciator	LCP-PSTE
Ferric Chloride Mixer No. 1 Failure Annunciator	LCP-PSTE
Ferric Chloride Mixer No. 2 Failure Annunciator	LCP-PSTE
Addition Pump No. 1 Run Light	LCP-PSTFER
Addition Pump No. 2 Run Light	LCP-PSTFER
Addition Pump No. 3 Run Light	LCP-PSTFER
Addition Pump No. 4 Run Light	LCP-PSTFER
Addition Pump No. 5 Run Light	LCP-PSTFER
Primary Ferric Chloride Addition Pump No. 1 Run/Stopped/Trip Lights	MCC-PSTE-1
Primary Ferric Chloride Addition Pump No. 2 Run/Stopped/Trip Lights	MCC-PSTE-1
Primary Ferric Chloride Addition Pump No. 3 Run/Stopped/Trip Lights	MCC-PSTE-2
Primary Ferric Chloride Addition Pump No. 4 Run/Stopped/Trip Lights	MCC-PSTE-2
Primary Ferric Chloride Addition Pump No. 5 Run/Stopped/Trip Lights	MCC-PSTE-1
Ferric Chloride Addition Pump No. 1 Failure Annunciator	LCP-PSTE

<u>Alarm/Status</u>	<u>Display Location</u>
Ferric Chloride Addition Pump No. 2 Failure Annunciator	LCP-PSTE
Ferric Chloride Addition Pump No. 3 Failure Annunciator	LCP-PSTE
Ferric Chloride Addition Pump No. 4 Failure Annunciator	LCP-PSTE
Ferric Chloride Addition Pump No. 5 Failure Annunciator	LCP-PSTE
Ferric Chloride Addition Pump No. 1 No Flow Annunciator	LCP-PSTE
Ferric Chloride Addition Pump No. 2 No Flow Annunciator	LCP-PSTE
Ferric Chloride Addition Pump No. 3 No Flow Annunciator	LCP-PSTE
Ferric Chloride Addition Pump No. 4 No Flow Annunciator	LCP-PSTE
Ferric Chloride Addition Pump No. 5 No Flow Annunciator	LCP-PSTE
Ferric Chloride Addition Pump No. 1 Diaphragm Rupture Annunciator	LCP-PSTE
Ferric Chloride Addition Pump No. 2 Diaphragm Rupture Annunciator	LCP-PSTE
Ferric Chloride Addition Pump No. 3 Diaphragm Rupture Annunciator	LCP-PSTE
Ferric Chloride Addition Pump No. 4 Diaphragm Rupture Annunciator	LCP-PSTE
Ferric Chloride Addition Pump No. 5 Diaphragm Rupture Annunciator	LCP-PSTE
USST Addition Pump No. 1 Run Light	LCP-PSTFER
USST Addition Pump No. 2 Run Light	LCP-PSTFER

<u>Alarm/Status</u>	<u>Display Location</u>
Unstabilized Sludge Ferric Chloride Addition Pump No. 1 Run/Stopped/Trip Lights	MCC-PSTE-1
Unstabilized Sludge Ferric Chloride Addition Pump No. 2 Run/Stopped/Trip Lights	MCC-PSTE-2
Ferric Chloride USST Addition Pump No. 1 Failure Annunciator	LCP-PSTE
Ferric Chloride USST Addition Pump No. 2 Failure Annunciator	LCP-PSTE
Ferric Chloride USST Addition Pump No. 1 No Flow Annunciator	LCP-PSTE
Ferric Chloride USST Addition Pump No. 2 No Flow Annunciator	LCP-PSTE
Ferric Chloride USST Addition Pump No. 1 Diaphragm Rupture Annunciator	LCP-PSTE
Ferric Chloride USST Addition Pump No. 2 Diaphragm Rupture Annunciator	LCP-PSTE
PSTE Ferric Chloride Addition System Failure Annunciator	PCC
USST Ferric Chloride Addition System Failure Annunciator	PCC
Eye/Wash Shower Ferric Chloride Area	LCP-PSTE
Ferric Chloride Addition East Safety Shower Annunciator	PCC

4.2.4.6 Odor Reduction Station

Odor Reduction Station Exhaust Fan

<u>Alarm/Status</u>	<u>Display Location</u>
Exhaust Fan OREF3 Run/Off Lights	MCC-PSTE
Exhaust Fan OREF4 Run/OFF Lights	MCC-PSTE

Exhaust Fan OREF3 Run Light	LCP-ORPST
Exhaust Fan OREF3 Motor Fan Failure Light	LCP-ORPST
Exhaust Fan OREF3 Failure Annunciator	LCP-ORPST
Exhaust Fan OREF4 Run Light	LCP-ORPST
Exhaust Fan OREF4 Motor Fan Failure Light	LCP-ORPST
Exhaust Fan OREF4 Failure Annunciator	LCP-ORPST
PST Odor Reduction Station Failure	PCC

Odor Reduction Station Scrubber

<u>Alarm/Status</u>	<u>Display Location</u>
ORPST Scrubber ORSC2 Low Level Annunciator	LCP-ORPST

Odor Reduction Station pH and ORP Controllers

<u>Alarm/Status</u>	<u>Display Location</u>
ORPST Scrubber ORSC2 High pH Alarm Annunciator	LCP-ORPST
ORPST Scrubber ORSC2 Low pH Alarm Annunciator	LCP-ORPST
ORPST Scrubber ORSC2 Low ORP Alarm Annunciator	LCP-ORPST
ORPST Scrubber ORSC2 High ORP Alarm Annunciator	LCP-ORPST

Odor Reduction Station Recirculation Pumps

<u>Alarm Status</u>	<u>Display Location</u>
Odor Reduction Recirculation Pump ORRP3 Run/Off Lights	MCC-PSSTE
Odor Reduction Recirculation Pump ORRP4 Run/Off Lights	MCC-PSSTE
Odor Reduction Recirculation Pump ORRP3 Run Light	LCP-ORPST

<u>Alarm Status</u>	<u>Display Location</u>
Odor Reduction Recirculation Pump ORRP3 Motor Failure Light	LCP-ORPST
ORPST Recirculation Pump ORRP3 Failure Annunciator	LCP-ORPST
Odor Reduction Recirculation Pump ORRP4 Run Light	LCP-ORPST
Odor Reduction Recirculation Pump ORRP4 Motor Failure Light	LCP-ORPST
ORPST Recirculation Pump ORRP4 Failure Annunciator	LCP-ORPST
ORPST Recirculation Pump Seal Water Failure Annunciator	LCP-ORPST
ORPST Scrubber ORSC2 Low Level	LCP-ORPST
Recirculation Pumps Area Shower Alarm Annunciator	LCP-ORPST
PST Odor Reduction Station Failure Annunciator	PCC

Odor Reduction Station NaOH Metering Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
ORPST Caustic (NaOH) Metering Pump ORMP5 Run/Off Lights	MCC-PSTE
ORPST Caustic (NaOH) Metering Pump ORMP6 Run/Off Lights	MCC-PSTE
ORPST Caustic Metering Pump ORMP5 Run Light	LCP-ORPST
ORPST Caustic Metering Pump ORMP5 Motor Failure Light	LCP-ORPST
ORPST Caustic Metering Pump ORMP5 Failure Annunciator	LCP-ORPST
ORPST Caustic Metering Pump ORMP6 Run Light	LCP-ORPST
ORPST Caustic Metering Pump ORMP6 Motor Failure Light	LCP-ORPST

ORPST Caustic Metering Pump ORMP6 Failure Annunciator	LCP-ORPST
PST Odor Reduction Station Failure Annunciator	PCC

Odor Reduction Station NaOCl Metering Pump

<u>Alarm/Status</u>	<u>Display Location</u>
ORPST Sodium Hypochlorite Metering Pump ORMP7 Run/Off Lights	MCC-PSTE
ORPST Sodium Hypochlorite Metering Pump ORMP8 Run/OFF Lights	MCC-PSTE
ORPST Sodium Hypochlorite Metering Pump ORMP7 Run Light	LCP-ORPST
ORPST Sodium Hypochlorite Metering Pump ORMP7 Motor Failure Light	LCP-ORPST
ORPST Sodium Hypochlorite Metering Pump ORMP7 Failure Annunciator	LCP-ORPST
ORPST Sodium Hypochlorite Metering Pump ORMP8 Run Light	LCP-ORPST
ORPST Sodium Hypochlorite ORMP8 Motor Failure Annunciator	LCP-ORPST
ORPST Sodium Hypochlorite ORMP8 Failure Annunciator	LCP-ORPST
PST Odor Reduction Station PCC Failure Annunciator	PCC

Odor Reduction Station NaOH Storage Tank And Containment Area

<u>Alarm/Status</u>	<u>Display Location</u>
ORPST Caustic Storage Tank ORSOHT2 Low Level Alarm Annunciator	LCP-ORPST

ORPST Caustic Storage Tank ORSOHT2 Low Low Level Alarm Annunciator	LCP-ORPST
ORPST Caustic Storage Tank ORSOH2 High Level Alarm Annunciator	LCP-ORPST
ORPST Caustic Storage Tank ORSOHT2 High Level Alarm, Horn and Indicator Light	NaOH Fill Station
ORPST Caustic Containment Sump High Level Alarm Annunciator	LCP-ORPST and PCC
Fill Panel Area Shower Alarm Annunciator	LCP-ORPST and PCC
Caustic Storage Area Shower Alarm Annunciator	LCP-ORPST and PCC

Odor Reduction Station NaOCl Storage Tank and Containment Area

<u>Alarm/Status</u>	<u>Display Location</u>
ORPST Sodium Hypochlorite Storage Tank ORSHT2 Low Level Alarm Annunciator	LCP-ORPST
ORPST Sodium Hypochlorite Storage Tank ORSHT2 Low Low Level Alarm Annunciator	LCP-ORPST
ORPST Sodium Hypochlorite Storage Tank High Level Alarm Annunciator	LCP-ORPST
ORPST Sodium Hypochlorite Storage Tank High Level Alarm Horn and Indicator Light	NaOCl Fill Station
ORPST Sodium Hypochlorite Containment Sump High Level Alarm Annunciator	LCP-ORPST and PCC
Sodium Hypochlorite Storage Area Shower Alarm Annunciator	LCP-ORPST and PCC

Odor Reduction Station Water Softening System

<u>Alarm/Status</u>	<u>Display Location</u>
ORPST Water Softening System ORSFT3 Alarm Annunciator	LCP-ORPST
PST Odor Reduction Station Failure Annunciator	PCC

4.2.5 Daily Operational Checks

4.2.5.1 General

1. Refer to the general daily operation check requirements described in Section 4.0.5.
2. Consult Sections 4.2.5.2. through 4.2.5.8 and the appropriate manufacturer's operation and maintenance manuals for specific monitoring requirements.

4.2.5.2 Primary Sedimentation Tanks

1. Visually check each sedimentation tank, all piping and connections for cracking and any signs of liquid leaks.
2. Check the turbulence in the influent and effluent channel to ensure proper mixing is occurring.
3. Check the scum layer in the influent channel and open the 24-inch slide gate to the rapid mix chamber to allow the scum to enter the rapid mix chamber. The water level of the influent channel and the rapid mix chamber are at similar elevations.
4. Check the positions of the inlet pressure slide gates and the manually-operated and motor-operated valves for each element of the facilities to confirm the requirements of your Operations Supervisor.
5. Check water levels in the sedimentation tanks, influent and effluent channels to confirm the requirements of your Operations Supervisor. Ensure for even flow to all the tanks that are in service and adjust the inlet pressure slide gates as required.
6. When polymer and ferric chloride are added, check for uniform floc formation at the influent end of the PST tanks.

7. Check depth of the sludge blanket in each sedimentation basin. If the sludge blanket depth is increasing, increase the sludge withdrawal rate.
8. The operating effectiveness of the scum collection in each sedimentation tank should be checked every two hours. Any accumulation of floating material not being collected should be hosed or raked to the trough. Scum should not be allowed to build up in the effluent channel.
9. Check for even flow over the launders and adjust the sharp crested weirs as required.
10. Check for algae growth and debris on the launders and hose down as needed to keep algae growth to a minimum.
11. Check for solids carryover indicative of unbalanced flow to the sedimentation tanks and/or a high solids inventory in the tank indicative that sludge withdrawal should be increased. If high solids carry over is evident, adjust the inlet pressure slide gates to the tanks as needed; check the sludge blanket level in the affected tank; and adjust the sludge withdrawal rate from the affected tank.
12. Consult the Manufacturer's O&M Manual for troubleshooting. The following O&M Manual should be consulted for the PST effluent weirs:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sedimentation Tank Fiberglass Weir Plates (Section 11017). Prepared by Warminster Fiberglass Company. 1997.
13. Verify that the stand-by equipment is ready for operation.

4.2.5.3 Channel Aeration System

1. Check oil level in blowers.
2. Check operation of each blower and fan to see that it is operating smoothly and quietly.
3. Check the drives for leaks, unusual noise, and excessive temperature (hand touch).
4. Check control settings of the channel air blowers locally and at the LCP-PSTE to confirm the requirements of your Operations Supervisor.

5. Check the discharge and suction pressures using the blower pressure gauges.
6. Check the temperature of the lines using the temperature gauges.
7. Check and record the run times for each blower at the respective MCC located at the PST-LCC-EAST.
8. Visually inspect influent and effluent channel to see if aeration diffusers are properly mixing.
9. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manuals should be consulted for the channel aeration system:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Rotary Positive Displacement Blowers (Section 11004). Prepared by Colorado Compressor, Inc. 1997.
Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - FRP Fans (Section 15833). Prepared by Hartzell Fan Inc. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Diffused Aeration Equipment (Section 11375). Prepared by EnviroQuip, Inc. 1997.

4.2.5.4 Rapid Mix Chamber

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check operation of each rapid mix pump to see that it is operating smoothly and quietly.
3. Check the drives for leaks, unusual noise, and excessive temperature (hand touch).
4. Check control settings of the rapid mix pump locally and at the LCP-PSTE to confirm the requirements of your Operations Supervisor.
5. Check and record the discharge pressures using the pump pressure gauges.
6. Check and record the run times for each pump at the respective MCC located at the PST-LCC-EAST.

7. Check that the lever weighted check valves on all operating pumps are open. This condition is alarmed at LCP-PSTE, but a visual check provides added redundancy. If an operating pump has a check valve that is closed, then check and open the discharge and suction isolation valves. If both discharge and suction isolation valves are open, and the associated check valve is in the closed position, then the respective pump should be taken out of service by locking the ROT switch in the “Off” position.
8. Visually inspect the rapid mix chamber to ensure mixing of the primary influent.
9. Check position of 24" pressure slide gate and 24" scum slide gate.
10. Inspect level in PST Gallery sump.
11. Check and record each run time of the PST Gallery sump pumps located at the LCP-PSTGS at the sump.
12. Consult the Manufacturer’s O&M Manual for troubleshooting and test procedures. The following O&M Manuals should be consulted for the rapid mix facilities:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Rapid Mix Pumps (Section 11007). Prepared by Vaughan Company, Inc. 1997

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Stainless Steel Slide Gates (Section 11040). Prepared by Golden Harvest, Inc. 1997

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Valves and Appurtenances (Section 15099-2.2-B6). Prepared by Golden Harvest. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sump Pumps (Section 11016). Prepared by Multi W Systems, Inc. 1997.

4.2.5.5 Sludge Collection and Pumping Facilities

Sludge Collectors

1. Check the sludge and scum removal equipment for any damaged or broken elements, excessive wear.
2. Inspect the operation of the collector for a jerking motion or for flights not riding perpendicular to the guide rails. If either occurs, it is necessary to adjust the tension on the chain.
3. Check drive chain and sprockets for wear and elongation of the chain. Chain length and tension must remain equal on both sides of the mechanism.
4. Inspect the shear pin and replace if necessary with the same size and material as is specified in the original drawings.
5. Check collector drive assembly for excessive noise, leaks and excessive temperature (hand touch).
6. Check control settings of the collector locally and at the LCP-PSTE to confirm the requirements of your Operations Supervisor.
7. Check and record the run times for each collector at the MCC located at the PST-LCC-EAST.
8. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the sludge and skimming collector equipment:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - PST Sludge Collector Equipment (Section 11008). Prepared by NRG Company. 1997.

Primary Sludge Pump Station

1. Check the pumps operation to see they are operating smoothly and quietly.
2. Check gear reducers for leaks, proper operating temperature, and unusual noise (hand touch).
3. Check the pump drives for leaks, unusual noise and excessive temperature (hand touch). If leakage at the packing is excessive, tighten bolts on gland follower or re-pack gland (see manufacturer's Operation and Maintenance manual). Whenever this is done the connecting rod alignment must also be checked. Wear chemical safety goggles when making gland adjustments.

4. Check the primary sludge grinder for excessive noise, vibration, or overheating (hand touch).
5. Check control settings of the primary sludge pumps, grinder, and motor operated valves locally and at the LCP-PSTE to confirm the requirements of your Operations Supervisor.
6. Check and record the run times for each primary sludge pump at the MCC located at the PST-LCC-EAST.
7. Check and record the run time for the primary grinder at the field panel LCP-PSPG.
8. Check and record flow meter totalizer for each pump when in operation. Check and record common sludge line flow meter totalizer.
9. Check oil level around plunger, add if required.
10. Check the operation of the oiler for the pump.
11. Check the oil reservoir level, at least once per shift.
12. Check condition of pump shear pin. It should not have any bends in it, inside or outside the driving flange or eccentric.
13. Check pump air chamber for liquid. If noted, then see manufacturer's Operation and Maintenance manual.
14. Check the operation of the automatic sequence once per month to confirm proper operation.
15. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manuals should be consulted for the primary sludge pump station:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Primary Sludge Pumps (Section 11010). Prepared by Komline-Sanderson. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sludge and Primary Skimmings Grinding Equipment (Section 11011). Prepared by Franklin Miller, Inc. 1997.

4.2.5.6 Primary Skimmings Processing Facilities

Surface Skimmers

1. Visually observe the operation of one or two skimmers and check for proper skimmer travel, effectiveness of removing accumulated skimmings, and proper operation of the surface spray system.
2. Check for algae which can cause a build-up of solids in the skimmers pipe. The algae must be scraped off. But to reduce the problem, increase the frequency of sluicing and cleaning the pipe, as well as the frequency of skimmings removal.
3. Check for excessive scum or septic conditions - This is usually a result of retained solids in the scum overflow tank or piping. It can be prevented by an occasional increase in the amount of flow, by turning the skimmer down deeper into the water.
4. Check operation of each skimmer to see that it is operating smoothly and quietly.
5. Check the actuators for leaks, unusual noise, and excessive temperature (hand touch).
6. Check control settings of the skimmers locally and at the LCP-PSTE to confirm the requirements of your Operations Supervisor.
7. Check for wear on the rotary skimmer worm gears.
8. Consult the Manufacturer's O&M Manual for troubleshooting. The following O&M Manual should be consulted for the rotary skimmers:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - PST Rotary Skimmers (Section 11009). Prepared by NRG Company. 1997. Note: Included with the PST Sludge Collector Equipment (Section 11008).

Primary Skimmings Pump Station

1. Check seal water flow to each pump. Adjust as necessary.
2. Check the drives of each pump, motor-operated valve, and grinder for leaks, unusual noise, and excessive temperature (hand touch).
3. Check the pumps and grinder operation to see they are operating smoothly and quietly.

4. Check control settings of the skimmings pump, motor-operated valves, and grinder locally and at the LCP-PSTE to confirm the requirements of your Operations Supervisor.
5. Check the discharge pressures using the pump pressure gauges.
6. Check and record the run times for each skimmings pump at the MCC located at the PST-LCC-EAST.
7. Check and record run time for the primary skimmings grinder at the field panel LCP-PSKG located in the Skimmings Dry Well.
8. Check that the lever weighted check valves on all operating pumps are open. This condition is alarmed at LCP-PSTE, but a visual check provides added redundancy. If an operating pump has a check valve that is closed, then check and open the discharge and suction isolation valves. If both discharge and suction isolation valves are open, and the associated check valve is in the closed position, then the respective pump should be taken out of service by locking the ROT switch in the “Off” position.
9. Check and record bubbler readings at the LCP-PSKBE.
10. Check the level in the Skimmings Dry Well sump.
11. Check and record run times of the sump pumps located at the LCP-PSKS.
12. Check the operation of the automatic sequence once per month to confirm proper operation.
13. Consult the Manufacturer’s O&M Manual for troubleshooting and test procedures. The following O&M Manuals should be consulted for the primary skimmings pump station:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Recessed Impeller Centrifugal Pumping Equipment (Section 11005). Prepared by WEMCO Pump. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sludge and Primary Skimmings Grinding Equipment (Section 11011). Prepared by Franklin Miller, Inc. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sump Pumps (Section 11016). Prepared by Multi W Systems, Inc. 1997.

4.2.5.7 Chemical Addition Facilities

4.2.5.7.1 Polymer Addition System

Polymer Bulk Storage Tanks and Mixing Tanks

1. Visually observe each tank and all piping and connections for cracking, any signs of leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, ducts, valves, sampling wells and manholes for any signs of damage or improper installation. All sampling wells and manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves of the tanks to confirm the requirements of your Operations Supervisor.
4. Check control settings of each element of the tank to confirm the requirements of your Operations Supervisor.
5. Check and record level of polymer in bulk storage tanks and the mixing tanks.
6. Check level of the sumps in polymer containment area and polymer mixing area.
7. Record run times of the sump pumps at the field panel.
8. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the bulk storage and mixing tanks and sump pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Fiberglass Reinforced Plastic Tanks (Section 11030). Prepared by Belco. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sump Pumps (Section 11016). Prepared by Multi W Systems, Inc. 1997.

Mixers

1. Check the drives for leaks, unusual noise, and excessive temperature (hand touch).
2. Check control settings of the mixer locally and at the LCP-PSTE to confirm the requirements of your Operations Supervisor.
3. Visually inspect polymer level in tank and mixing quality. Adjust position of mixer to provide proper mixing. If vortexing is occurring, ensure mixer has not moved and low level setting of tank is 13.5 inches above the top propeller.
4. Check and record the run times for each mixer at the respective MCC located at the PST-LCC-EAST.
5. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the mixers:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Chemical Mixing Equipment (Section 11031). Prepared by ChemWest, Inc. 1997.

Polymer Transfer and Addition Pumps

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check operation of each polymer transfer and addition pump to see that it is operating smoothly and quietly.
3. Check the drives for leaks, unusual noise, and excessive temperature (hand touch).
4. Check control settings of the polymer transfer and addition pumps locally and at the LCP-PSTE to confirm the requirements of your Operations Supervisor.
5. Check the discharge pressures using the pump pressure gauges.
6. Check and record NPW flow to mixing tanks when transfer pumps are in operation. Adjust as necessary to ensure correct flow.
7. Check and record the run times for each polymer transfer and addition pump

8. Calibrate the polymer transfer and addition pumps once a month. Adjust speed settings as needed to maintain correct dosage of polymer as required by your Operations Supervisor.
9. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the polymer transfer and addition pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Progressive Cavity Pumping Equipment (Section 11012). Prepared by Moyno Industrial Products. 1997.

4.2.5.7.2 Ferric Chloride Addition System

Ferric Chloride Bulk Storage Tanks and Mixing Tanks

1. Visually observe each tank and all piping and connections for cracking, any signs of leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, ducts, valves, sampling wells and manholes for any signs of damage or improper installation. All sampling wells and manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves of the tanks to confirm the requirements of your Operations Supervisor.
4. Check control settings of each element of the tank to confirm the requirements of your Operations Supervisor.
5. Check and record level of ferric chloride in the Bulk Storage Tanks.
6. Check level of the sump in ferric chloride containment area.
7. Record run times of the sump pump.
8. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the bulk storage and mixing tanks and sump pump:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Fiberglass Reinforced Plastic Tanks (Section 11030). Prepared by Belco. 1997.

Mixers

1. Check the drives for leaks, unusual noise, and excessive temperature (hand touch).
2. Check control settings of the mixer locally and at the LCP-PSTE to confirm the requirements of your Operations Supervisor.
3. Visually inspect ferric chloride level in tank and mixing quality. Adjust position of mixer to provide proper mixing. If vortexing is occurring, ensure mixer has not moved and how level setting of tank is 13.5 inches above the top propeller.
4. Check and record the run times for each mixer at the respective MCC located at the PST-LCC-EAST.
5. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the mixers:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Chemical Mixing Equipment (Section 11031). Prepared by ChemWest, Inc. 1997.

Ferric Chloride Transfer and Addition Pumps

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check operation of each ferric chloride transfer and addition pump to see that it is operating smoothly and quietly.
3. Check the drives for leaks, unusual noise, and excessive temperature (hand touch).
4. Check control settings of the ferric chloride transfer and addition pumps locally and at the LCP-PSTE to confirm the requirements of your Operations Supervisor.
5. Check and record NPW flow to mixing tanks when transfer pumps are in operation. Adjust as necessary to ensure correct flow.

6. Check and record the run times for each ferric chloride transfer and addition pump at the respective MCC located at the PST-LCC-EAST.
7. Calibrate the ferric chloride transfer pumps and addition pumps once a month. Adjust speed settings as needed to maintain correct dosage of ferric chloride as required by your Operations Supervisor.
8. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the ferric chloride transfer and addition pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Diaphragm Chemical Metering Pumps (Section 11018). Prepared by PulsaFeeder. 1997.

4.2.5.8 Odor Reduction Station

The daily check of the odor reduction station should be according to the following procedures:

Odor Reduction Station Exhaust Fans

1. Check the positions of the manually operated suction and discharge dampers, and interconnection ducts to confirm the requirements of your Operations Supervisor.
2. Check the exhaust fan operation to see that they are operating smoothly.
3. Check the exhaust fan for leaks, excessive noise, and temperature (hand touch).
4. Check that the lever weighted back draft on the operating fan is open. If an operating fan has a back draft damper that is closed, then check that the inlet and discharge isolation dampers are open. If the isolation dampers are open, and the associated backdraft damper is in the closed position, then the respective fan should be taken out of service by locking the ROT switch in the "Off" position.
5. Check control settings of the fan locally and at the LCP-ORPST to confirm the requirements of your Operations Supervisor.

6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station exhaust fans:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plan - Odor Reduction Scrubber Systems (Section 11050). Prepared by R.J. Environmental, Inc. 1997.

Odor Reduction Station Scrubber

1. Visually observe scrubber sump and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the tower and all pipes, ducts, valves, sampling valves, and manholes for any signs of damage or improper installation. All sampling valves and manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves, and dampers for each to confirm the requirements of your Operations Supervisor.
4. Check and record sump liquid level locally and at the LCP-ORPST, the mist elimination differential pressure, and the packed bed differential pressure, to satisfy the requirements established by your Operations Supervisor.
5. Check the scrubber liquid overflow (blowdown) for clarity. A milky solution indicates insufficient overflow rate.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station scrubber:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plan - Odor Reduction Scrubber Systems (Section 11050). Prepared by R.J. Environmental, Inc. 1997.

Odor Reduction Station pH and ORP Controllers

1. Visually observe each controller and all piping and connections for cracking, any signs of liquid leaks, and any other unusual problems.
2. Check the positions of the manually-operated valves, to confirm the requirements of your Operations Supervisor.

3. Check and record pH and ORP readings locally and at LCP-ORPST to satisfy the requirements established by your Operations Supervisor.
4. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station pH and ORP controllers:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant - Odor Reduction Scrubber Systems (Section 11050).
Prepared by R.J. Environmental, Inc. 1997.

Odor Reduction Station Recirculation Pumps

1. Check the positions of the manually operated valves on recirculation lines and pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the recirculation pump operation to see that they are operating smoothly and quietly.
3. Check the recirculation pumps for leaks, excessive noise, and temperature (hand touch).
4. Check seal water flow to each recirculation pump. Adjust as necessary.
5. Check and record the discharge pressure using the local recirculation pump pressure gauge.
6. Check control status of the recirculation pumps at the LCP-ORPST to confirm the requirements of your Operations Supervisor.
7. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction recirculation pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Odor Reduction Scrubber Systems (Section 11050).
Prepared by R.J. Environmental, Inc. 1997.

Odor Reduction Station NaOH Metering Pump

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check and record the discharge pressure using the local pressure gauge.
5. Check and record the discharge flowmeter reading.
6. Check control settings of the caustic metering pump locally and at the LCP-ORPST to confirm the requirements of your Operations Supervisor.
7. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station NaOH metering pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-diaphragm Chemical Metering Pumps (Section 11018). Prepared by PalsaFeeder, Inc. 1997.

Odor Reduction Station NaOCl Metering Pump

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check and record the discharge pressure using the local pressure gauge.
5. Check control settings of the sodium hypochlorite pump locally and at the LCP-ORUSS to confirm the requirements of your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station NaOCl metering pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Diaphragm Chemical Metering Pumps (Section 11018). Prepared by PalsaFeeder, Inc. 1997.

Odor Reduction Station NaOH Storage Tank

1. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation. All manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves of the tanks to confirm the requirements of your Operations Supervisor.
4. Check control settings of each element of the tank to confirm the requirements of your Operations Supervisor.
5. Check and record sodium hydroxide level in the tank locally and at LCP-ORPST to satisfy the requirements established by your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station NaOH storage tank:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant - Fiberglass Reinforced Plastic Tanks (Section 11030). Prepared by Belco Manufacturing. 1997.

Odor Reduction Station NaOCl Storage Tank

1. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation. All manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves of the tanks to confirm the requirements of your Operations Supervisor.

4. Check control settings of each element of the tank to confirm the requirements of your Operations Supervisor.
5. Check and record sodium hypochlorite level in the tank locally and at LCP-ORPST to satisfy the requirements established by your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station NaOCl storage tank:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant - Fiberglass Reinforced Plastic Tanks (Section 11030). Prepared by Belco Manufacturing 1997.

NaOH and NaOCl Containment Sump Pumps

1. Check sump levels in the NaOH and NaOCl storage areas.
2. Record run times of the sump pumps.
3. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the sump pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sump Pumps (Section 11016). Prepared by Multi W Systems, Inc. 1997.

Odor Reduction Station Water Softener System

1. Check water softener vessels for leaks.
2. Check and record water flow rate, calcium ion reading, and pressure.
3. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station water softener system:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant -Water Softening Equipment (Section 11233). Prepared by Culligan Technologies. 1997.

4.2.6 Training Record

The following record should be used by the Operator to assure a complete understanding of the Primary Sedimentation Facilities.

4.2.6.1 Reading Assignment

1. Chapters 8, 9, 13, 16, and 22. Operation of Wastewater Treatment Plants - MOP 11. Water Environment Federation, 1990.
2. Chapter 5, Operation of Wastewater Treatment Plants - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1993.
3. Chapter 1, Advanced Waste Treatment - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1991.

4.2.6.2 Field Instruction

The operator should review and know the location and purpose of each of the following items:

<u>Item</u>	<u>Operator Initials</u>
Primary Sedimentation Tanks	_____
Influent Channel	_____
Effluent Weirs	_____
Effluent Channel	_____
Channel Aeration System	_____
Channel Air Blowers	_____
Channel Air Diffusers	_____
Air Supply Fans	_____
PST Exhaust Fans	_____
LCP-PCAB	_____

<u>Item</u>	<u>Operator Initials</u>
PCC Alarms	_____
Rapid Mix Chamber	_____
24-inch Slide Gate	_____
24-inch Pressure Slide Gate	_____
Stop Plate	_____
Portable Hydraulic Operator	_____
Rapid Mix Pumps	_____
Ferric Chloride Injection Point	_____
Polymer Injection Diffuser	_____
LCP-RM	_____
PST Gallery Sump Pump	_____
Local Sump Controls	_____
PCC Alarms	_____
Primary Sludge Collection and Pumps	_____
Sludge Collectors	_____
Collection Drives	_____
Primary Sludge Pumps	_____
Primary Sludge Pump Automatic Lubricator	_____
Primary Sludge Flow Meters	_____
Primary Sludge Grinder	_____
Total Primary Sludge Flow Meter	_____
LCP-PSPG Controls and Alarms	_____
PCC Alarms	_____
Primary Skimmings Processing Facilities	_____
Rotary Skimmers	_____
Surface Spray Valves	_____

<u>Item</u>	<u>Operator Initials</u>
Primary Skimmings Pump	_____
Skimmings Valve 1	_____
Skimmings Valve 2	_____
Skimmings Valve 3	_____
Primary Skimmings Grinder	_____
LCP-PSKPS Controls and Alarms	_____
LCP-PSKG Controls and Alarms	_____
LCP-PSK Controls and Alarms	_____
LCP-PSKBE Controls and Alarms	_____
Skimming Dry Well Sump Pump	_____
Local Sump Controls (LCP-PSKS)	_____
PCC Alarms	_____
Chemical Addition Facilities	_____
Polymer Containment Area Sump Pump	_____
Local Controls	_____
Ferric Chloride Containment Area Sump Pump	_____
Local Controls	_____
Polymer Mixing Area Sump Pump	_____
Local Controls	_____
PCC Alarms	_____
Polymer Addition Facilities	_____
Polymer Bulk Storage	_____

<u>Item</u>	<u>Operator Initials</u>
Polymer Transfer Pumps	_____
Polymer Mixing Tanks	_____
Mixer	_____
NPW Solenoid Valve and Rotameter	_____
Polymer Addition Pump	_____
LCP-PSTPOL Controls and Alarms	_____
SCR Drivers	_____
PCC Alarms	_____
Ferric Chloride Addition Facilities	_____
Ferric Chloride Storage	_____
Ferric Chloride Transfer Pumps	_____
Ferric Chloride Mixing Tanks	_____
Mixers	_____
NPW Solenoid Valve and Rotameter	_____
Ferric Chloride Addition Pump	_____
Ferric Chloride USST Addition Pumps	_____
LCP-PSTFER Controls and Alarms	_____
PCC Alarms	_____
PST-LCC-EAST	_____
LCP-PSTE Controls and Alarms	_____
MCC-PSTE “A” BUS	_____
MCC-PSTE “B” BUS	_____
MCC-PSTE1	_____

<u>Item</u>	<u>Operator Initials</u>
MCC-PSTE2	_____
PST Panelview	_____
Odor Reduction Station Exhaust Fan	_____
Isolation Damper	_____
Backdraft Damper	_____
Low Flow Switch	_____
Local Controls	_____
LCP-ORPST Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station Scrubber	_____
Isolation Valves	_____
Level Control	_____
Mist Eliminator D/P	_____
Packed Bed D/P	_____
PCC Alarms	_____
Odor Reduction Station pH and ORP Controllers	_____
By-Pass Line Operation	_____
pH Controls	_____
RP Controls	_____
LCP-ORPST Alarms	_____
PCC Alarms	_____
Odor Reduction Station Recirculation Pumps	_____
Flow Testing	_____
Isolation Valves	_____

<u>Item</u>	<u>Operator Initials</u>
Seal Water Assembly	_____
Local Controls	_____
LCP-ORPST Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station NaOH Metering Pumps	_____
Isolation Valves	_____
Local Controls	_____
LCP-ORPST Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station NaOCl Metering Pumps	_____
Isolation Valves	_____
Local Controls	_____
LCP-ORPST Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station NaOH Storage Tank	_____
Isolation Valves	_____
Level Sensor	_____
LCP-ORPST Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station NaOCl Storage Tank	_____
Isolation Valves	_____

<u>Item</u>	<u>Operator Initials</u>
Level Sensor	_____
LCP-ORPST Controls and Alarms	_____
PCC-Alarms	_____
NaOH and NaOCl Containment Sump Pumps	
Local Controls	_____
LCP-ORPST Alarms	_____
PCC Alarms	_____
Odor Reduction Station Water Softening System	_____
Isolation/By-Pass Valves	_____
Low Pressure Switch	_____
Calcium Fan Controller	_____
Duplex Controller	_____
LCP-ORPST Alarms	_____
PCC-Alarms	_____

4.3 ACTIVATED SLUDGE FACILITIES

4.3.1 Description of Controls and Operation

4.3.1.1 General

Refer to the general control and operational philosophy presented in Section 4.0.1.

The process schematics for the Activated Sludge Facility are presented in Figures 3.3-1, 3.3-2, 3.3-3, 3.3-4, and 3.3-5.

The controls for the Activated Sludge Facility (ASF) consist of field controls and local control panels (LCPs). These LCPs are found either in the field near their respective equipment or in the Local Control Center for the AST (AST-LCC-N) located in the Electrical Room of the North Blower Structure. The main local control panel (LCP-ASTN) in the AST-LCC-N contains most of the LCPs for the Activated Sludge Tank equipment. It also contains PLC-ASTN to receive the discrete and analog signals, and LCP-PABN to interface the manufacturer provided control systems with the overall plant SCADA monitoring system. The AST-LCC-N also houses the switchgear (SG-ASTN) and motor control centers (MCC-ASTN1 and MCC-ASTN2) for the AST equipment.

4.3.1.2 Activated Sludge Tanks (ASTs)

Flow of Return Activated Sludge (RAS) into the first cell of each AST is measured by individual magnetic RAS flow meter/transmitters located in the AST Influent Gallery. These RAS flow meter/transmitters continuously monitor and transmit flow data to PLC-ASTN (Loop 0704). Logic programmed into PLC-ASTN sums the signals from all ASTs (Loop 0765), and sends signal to display the individual and totalized flow values on the SCADA system. Flow into each AST can be adjusted or fine tuned in the field by manual operated a 10" knife gate valve on each individual RAS inlet. Local flow indication is provided at each RAS meter on the RAS inlet to each AST.

The amount of Primary Effluent (PE) being conveyed to the ASTs can be calculated at the existing Primary Effluent Bypass Structure (existing PLC-PEB) by subtracting the Total Primary Effluent Bypass Flow from the Plant Influent Flow. Plant Influent Flow is obtained from the existing PLC-HWE at the facility headworks and the Total Primary Effluent Bypass Flow is measured by existing flow measurement

equipment and the flow signal is sent to the SCADA system. A motor slide gate at the PEBS upstream of the 72" PE pipeline is provided with a lockout-stop switch (LOS) that can be locked in the STOP position to prevent operation, push buttons to open and close the gate, and a Local-Auto selector switch. Position switches on the gate send discrete inputs to LCP-PEB to indicate [OPEN] when the gate is completely open and [CLOSED] when the gate is completely closed. When the gate is set in any intermediate position, both discrete inputs are sent and LCP-PEB will indicate both [OPEN] and [CLOSED].

When the Local-Auto selector switch is in the LOCAL position, the gate is controlled locally using the lockout-stop switch (LOS) and the OPEN and CLOSE push buttons. However, when the Local-Auto selector switch is in the AUTO position, LCP-PEB logic closes the gate automatically when High or High-High levels are indicated in the Primary Effluent Bypass Structure. Once the gate automatically closes on any of these conditions, it will need to be RESET and manually opened at the gate controls.

4.3.1.3 Selector Zone Mixing System

The Selector Zone Mixing System breaks each AST into four (4) characteristically different mixing zones, the first three (3) of which are sub-divided into six (6) smaller "cells" by baffle walls (See Section 3.3.2). Each of these six (6) cells is furnished with a mechanical mixer to keep the microorganisms in suspension and maintain a mixed environment. The mixers are each identified by the AST number in which they are located and the corresponding treatment cell in which they are found (i.e. Mixer 3F is located in AST 3, Anoxic Treatment Cell "F").

Each mixer is provided with a Remote-Off-Test (ROT) switch at the mixer location. A touch screen ON/OFF selector switch is also located in the SCADA System for operation of individual mixers. When the ROT switch is in the REMOTE position, the touch screen ON/OFF switches in SCADA will control the mixer operation. Setting the ON/OFF switch into the ON position sends a start command to MCC-ASTN1, and the mixer will run continuously. In the TEST position the mixer is called to start, but will spring return to the OFF position and shutdown the mixer when released. The OFF position at the ROT overrides all controls and is lockable. LCP-ASTN receives discrete signals from MCC-ASTN1 respective of each mixer, and sends discrete signals to the

PLC to display the mixer status on SCADA. The SCADA system will display [RUN] for each mixer that is operating, and display and log [MIXER 1A FAILURE] for a motor overload condition (shown for Mixer 1A as example). On loss of utility power, all mixers are shutdown by the PCL, and will be enabled in sequence approximately 8 ½ minutes after the Standby Generators are started up. A 5 second delay is provided between two consecutive start calls. For control information for the aerobic zone air diffusers and intermediate mixed liquor return pumps see Sections 4.3.1.4 and 4.3.1.5 below, respectively.

4.3.1.4 Air Diffusers

Three (3) separate air diffuser grids are located in the aerobic treatment zone of each AST. Process Air (PA) is provided for these diffusers by air compressors located in the North Blower Building (See Section 4.3.1.7). Each of the three (3) AST diffuser grids has its own dedicated flow meter, a motor operated Process Air Control Valve (PACV), and a manually operated butterfly valve. ASTs 1, 3, 5 and 7 have dissolved oxygen (DO) probes in each of the aeration grids. The Process Air Control Valves (PACV) are identified by their AST number and a letter identifying the specific diffuser grid it controls. A, B, and C associate with the Zone 1, 2, and 3 diffuser grids, respectively (i.e. PACV-5B indicates the control valve for the Zone 2 diffusers in AST 5).

PACV-_A is used to regulate the PA in the first third (Zone 1) of the aerobic zone of each AST. This valve has a motorized valve actuator and is provided with a Local-Off-Remote (LOR) selector switch and OPEN and CLOSE push buttons at the valve location. When the LOR selector switch is in the LOCAL position, the valve is controlled using the OPEN and CLOSE push buttons at the valve. The OFF position at the LOR is lockable, and overrides all local and remote controls. When the LOR selector switch is in the REMOTE position, PLC-ASTN receives a digital input to indicate the [REMOTE] status and permit valve operation from OPEN and CLOSE soft buttons at the SCADA system. Position switches are provided at the valve for [OPEN] and [CLOSE] indication. When the valve is fully open or fully closed, the respective switch sends a discrete signal to PLC-ASTN which initiates the valve status display on the SCADA

system. On overload or high temperature condition at the valve actuator, a discrete signal is sent to PLC-ASTN to initiate an alarm and display and log [PACV FAILURE] in the SCADA system. A dedicated air flow meter in this PA piping continually monitors the airflow through this PA control valve. The airflow measurement is locally indicated near the meter, and a proportional analog signal is set to PLC-ASTN to display the local air flow on the SCADA system. A pressure gauge in the piping downstream of the PA control valve provides local indication of the air pressure. Dissolved oxygen (DO) sensor/transmitters are located at the downstream end of this air diffuser grid in the odd numbered ASTs (AST 1, 3, 5, and 7) to continuously monitor the DO content. The DO level is displayed locally and a proportional analog signal is sent to PLC-ASTN for indication on the SCADA system. An operator adjustable logic set point for low DO will initiate an alarm, and display and log the alarm condition on the SCADA system.

PACV-_B is used to regulate the PA in the second third (Zone 2) of the aerobic zone of each AST. All signal and functions are the same as for the Zone 1 PACV.

PACV-_C is used to regulate the PA in the last third (Zone 3) of the aerobic zone of each AST. All signal and functions are the same as for the Zone 1 PACV, with one exception. The DO measurements obtained from the Zone 3 sensors provide the basis for control logic that is used to automatically adjust PA Blower output to maintain effluent DO levels in the ASTs.

PLC-ASTN will sum the air flow signals from the PACV-_A, PACV-_B, and PACV-_C flow meters, and display the total airflow to each AST on the SCADA system.

A Diffuser Pressure Monitoring System is provided with each aerobic diffuser grid to enable evaluation of diffuser performance locally in the field. Pressure tubing runs from the submerged diffuser grid to a connection box mounted to the handrail of the walkway above the grid it monitors. Two (2) portable pressure monitoring panels are provided to allow operators to make connection at the connection boxes and assess the performance of that diffuser grid. Each portable pressure monitoring panel contains a Diffuser Wet Pressure Gauge, Orifice Pressure Gauge, and a Bubble Line Rotameter to evaluate diffuser performance. The Diffuser Wet Pressure (DWP) Gauge indicates the differential pressure between the diffuser holder and bubble line. This measures the headloss across the diffuser membrane, and provides an indication to the extent of

diffuser fouling. The Orifice Pressure Gauge indicates the differential pressure between the diffuser holder and the diffuser header pipe. This measurement provides an approximation of the air flow in the aeration grid, and can be used to quantify air flow and cross-check the flow readings against other air flow devices. A Diffuser Pressure Monitoring Chart is used to make these approximations based on the depth of diffuser submergence, diffuser orifice size, and the diffuser type and DWP gauge reading.

4.3.1.5 Intermediate Mixed Liquor Return

Each AST is provided with a submersible Intermediate Mixed Liquor Return (IMLR) pump. These pumps return nitrified mixed liquor from the effluent end of the ASTs back to Cell "B" of the Anaerobic Zone and/or Cell "D" of the Anoxic Zone (See Section 3.3.2.4.1).

Each intermediate mixed liquor return pump is provided with a Remote-Off-Test (ROT) switch at each pump location. A touch screen START/STOP/RESET switch is also located at a local control panel in the AST-LCC-N and on the SCADA System for remote operation of individual IMLR pumps. When the ROT is in the REMOTE position, the touch screen START/STOP/RESET switches will control the pump operation. Setting the START/STOP/RESET switch into the START position sends a start command to MCC-ASTN2, and the pump will run continuously. In the TEST position, the pump is called to start but will spring return to the OFF position, shutting down the pump when released. The OFF position at the ROT overrides all controls and is lockable. LCP-ASTN receives discrete signals from MCC-ASTN2 respective of each intermediate mixed liquor return pump, and sends discrete signals to the PLC to display the pump status on SCADA. The SCADA system will display [RUN] for each IMLR pump that is operating, and will display and log [IMLR PUMP 1 FAILURE] for a detected motor overload or motor high temperature condition (shown for the IMLR Pump in AST 1 as example). A moisture sensor, integral to the pump housing, connects with a field-mounted moisture indicator that sends a discrete signal from MCC-ASTN2 to SCADA when moisture is detected. [IMLR PUMP 1 MOTOR MOISTURE] will be displayed and logged in the SCADA system when, in this example, moisture is detected in the AST 1 IMLR pump. On loss of utility power, all IMLR pumps are shutdown by SCADA, and

will be enabled in sequence approximately 8 minutes after the Standby Generators are started up. A 5 second delay is provided between two consecutive start calls. A riser is provided in each ASTs IMLR piping for the insertion of a portable flow velocity probe. This portable flow meter provides only local indication of the mixed liquor flow velocity in the chosen IMLR pipe, and aids operators in throttling the discharge valve(s) to adjust the flow as needed.

4.3.1.6 Tank Drainage Facilities

A self-priming centrifugal pump, located at the northern end of the AST Influent Gallery is used to drain the ASTs for maintenance purposes. The suction side of this pump manifolds into the tank drainage pipe header running the length of the gallery. Individual tank drains tee off this header into each AST, each with a normally closed, manual plug valve that must be opened to drain the tank.

The drainage pump is provided with START and STOP pushbuttons locally at the pump, with the STOP pushbutton being lockable to prevent pump operation. Pressing the START pushbutton sends a start command to MCC-ASTN2, and the pump will run continuously until the STOP button is depressed, or a no-flow condition occurs. A discrete signal is sent from the MCC to PLC-ASTN when this pump is operating, initiating [ASTDP-1 RUN] to be displayed on the SCADA system. MCC-ASTN2 contains RUN/OFF indicator lights for this drainage pump, as well as a running time meter. The discharge check valve is equipped with a position switch that sends a discrete signal to MCC-ASTN2. When the pump is called to operate, MCC-ASTN2 logic will monitor this valve's position, disabling the pump if flow is not detected within a set period of time. The MCC will also provide a discrete signal to PLC-ASTN when an overload condition occurs. Either of these drainage pump failure conditions will initiate the [ASTDP-1 FAIL] alarm, and display and log the pump failure on the SCADA system. Due to any of these failure conditions, the pump will remain locked-out until the logic is reset at the MCC. A pressure gauge on the discharge side of the pump provides local indication of the discharge pressure.

The sump pumps in the AST Influent Gallery are each provided with a local On-Off-Test (OOT) selector switch and Hand/Auto selector switch in a pump supplier

furnished control panel at the pump (LCP-ASTSP-1, 2, 3, 4). Each of these local control panels contains indicator lights to identify if the pump is running, enabled, or experiencing a fault condition; as well as a running time meter to log the durations of pump operation. When the OOT switch is placed in the TEST position, the pump is called to start, but will spring return to the OFF position and shutdown when released. The OFF position at the OOT overrides all controls and is lockable, and switching to the ON position transfers the pump control to the Hand/Auto selector switch. In HAND mode the pump will operate continuously until the stop signal is received from the LOW LEVEL float (el. 31.0'). When the pump is set to AUTO, two (2) provided float switches control pump operation. The pump will automatically start on a signal from the HIGH LEVEL float (el. 35.0'), and operate continuously until the stop signal is received from the LOW LEVEL float (el. 31.0'). A third float switch is provided for HIGH HIGH LEVEL (el. 35.5') indication, and initiates an alarm [AST SUMP HIGH HIGH LEVEL] on the SCADA system when triggered. On this [HIGH HIGH LEVEL] indication, a red alarm light at the local control panel for the pump will flash continuously until the sump level has been lowered. This alarm light will reset automatically when the sump condition has been corrected. Each pump is equipped with a temperature switch in the motor windings and a moisture sensing element. When moisture is detected, local indication is provided by an illuminated warning light in the pump's local control panel. On an overload or high temperature condition, a discrete signal is sent to PLC-ASTN to initiate an alarm, and display and log [ASTSP FAIL] on the SCADA system for the affected pump.

4.3.1.7 Process Air Blowers

Three (3) Process Air Blowers are furnished in the North Electrical Building to provide air to the fine bubble diffusers in the aerobic zone of the ASTs. The blowers are designed for continuous operation across their designed operating range. Each blower is provided with a dedicated Local Control Panel (LCP-B1, LCP-B2, LCP-B3) to monitor and control the blower and its appurtenances, and LCP-BSC (Blower Sequence Control) to coordinate the operation of these blowers as one (1) system. These panels interface with one another via a local communication system, and the blower status is shown in

SCADA. DO levels are continuously monitored in all three (3) aerobic zones of the odd numbered ASTs (See 4.3.1.4 Air Diffusers) and displayed on the Plant SCADA system, and Zone 3 DO levels are used for automatic PA Blower control through SCADA. From the LCP-BSC, plant operators are able to select between two (2) modes of operation to control Process Air Blower operation. These modes of operations are identified as Control Mode 1, which is "SCADA Control"; and Control Mode 2, which is "Schedule Control". In Control Mode 1 (SCADA Control), operators have two possible methods of adjusting the air flow setpoint, SCADA Manual and SCADA Auto. SCADA Manual allows operators to manually enter an air flow setpoint at the OIT that the logic control will maintain. While SCADA Auto will enable the SCADA system to adjust the amount of air added to the ASTs based on the measured DO level. Control Mode 2 utilizes a preset 24-hour operational schedule to coordinate blower operation to emulate diurnal flow patterns and fluctuations. Operators are able to divide the 24-hour operating schedule into as many as four (4) separate periods, each with a separate air flow, start time, and duration setting.

Each of the Local Control Panels (LCP-B1, LCP-B2, and LCP-B3) is identical in appearance and function, and shall therefore be referred to generally as "LCP-BCP". For coordination of each blower's operation, these panels are hardwired to LCP-BSC, the blower motor starters, and MCC-ASTN. These LCP-BCPs contain a Human Machine Interface (HMI) with an LCD touch screen to provide local blower control functions, and status and alarm indications. Each of these panels provides control for (1) motor starting; (2) surge and overload detection; (3) shut-down control and sequencing; (4) alarm and emergency shut-down; (5) inlet guide vane control; (6) variable discharge diffuser vane control; (7) discharge isolation valve control; (8) blow-off valve control; and (9) the oil pressure lubrication system operation. Blower operation is monitored at each of these dedicated panels by discrete and analog signals received from position indicators and instrument transmitters located at each blower. Alarm interlocks coordinated with operational requirements of auxiliary devices and the operator entered instrumentation set-points provide indication at each panel on fault conditions. Status indication at PLC-BCP includes (1) blower status; (2) inlet air and lube oil temperature; (3) differential pressure across the blower; (4) status and position of the inlet and discharge guide vanes;

(5) control mode and position of the blow-off and isolation valves; (6) high-speed shaft, motor bearing, and gearbox vibration indication; and (7) blower motor current draw. Alarm indication at PLC-BCP includes (1) high pressure differential across the inlet filter, blower, and oil filter; (2) blower surge; (3) high temperature of the inlet air, lube oil, high-speed shaft bearings, motor bearings, and motor windings; (4) high vibration of the high-speed shaft, motor bearing and gearbox; (5) low pressure for the main oil pump, oil system, and cooling water supply; (6) low oil temperature; (7) low oil reservoir level; and (8) motor starter or PLC-BCP failure.

LCP-BSC communicates with each LCP-BCP to sequence and adjust blower operation in conjunction with the process air demands, and is hardwired to LCP-ASTN to provide the communication and control links to the plant SCADA system. This fiber optic link allows all process and blower performance data to be monitored remotely, air flow requirements or automatic operation to be set, and blower status and alarm functions to be indicated plant-wide. The HMI at LCP-BSC is able to access the graphic displays at each of the local blower control panels, and can control each individual blower from this operator terminal; however, there is no direct way to start or stop individual blowers from LCP-BSC. The main operating screen is identical to those for the individual blowers, but the display hierarchy also includes screens for blower sequencing and air flow indication and adjustment.

A HAND/AUTO selector at the LCP-BCP HMI screen provides these two alternative means for starting a blower. ***It should be noted that switching a blower designation from AUTO to HANDL can only be done with the blower shut down. Switching this designation on an operating blower will automatically shut the blower down.*** Blower start is interlocked with multiple auxiliary functions, and confirmation of these auxiliary functions is required prior to starting a blower motor. In HAND mode, the blower is controlled at LCP-BCP using the START control function at the HMI, and can also be stopped locally using the STOP control function. This LOCAL mode of operation should only be used during maintenance and testing of individual blowers, normally this switch should remain in the AUTO position to allow automatic blower control and sequencing through the LCP-BSC. The HAND/AUTO selector and the START/STOP control functions are password protected at LCP-BCP based on three (3)

security levels coordinated with the Government. Air flow adjustment functions and the LEAD/LAG/STANDBY selection options at LCP-BSC are also password protected. When the selector is set to AUTO, the start sequence is automatically controlled by the control logic in LCP-BSC, and operating commands are transmitted to the individual LCP-BCPs to control the blower operation. The LCP-BSC logic determines the order of operation and operating level for all blowers to maintain the required airflow while optimizing blower energy consumption. During operation of multiple blowers, each operating blower operates at the same air flow rate to stabilize the air output and avoid disturbances. The selector function a LCP-BSC allows operators to select which blowers serve in the LEAD, LAG, and STANDBY roles, dictating blower sequencing in the control logic. Revision of the LEAD/LAG/STANDBY blower selection can only be done while all blowers are shut down. When a LEAD blower is switched to a LAG blower designation during operation, the blower will be shut down and cannot be restarted until the programmed start delay time period has passed. Inside each LCP-BCP is a NORMAL/SERVICE/TEST key lock selector switch coordinated to the same key. In the NORMAL position, the blower is operated either from LCP-BCP or LCP-BSC, based on the position of the HAND/AUTO selector switch. In the SERVICE position, permissive start of each of the individual interlocked blower system components is allowed, and discrete input is sent to the PLC-BCP to indicate [OUT OF SERVICE]. This mode allows manual opening and closing of the blow-off valve; inlet guide and discharge diffuser vanes; cooling water solenoid valve; and isolation valve for testing or maintenance. In the TEST position, the start signal will be diverted to a "test" relay that simulates a motor start to facilitate start-up testing without starting the motor. This automatically cycles the starting and stopping of the auxiliary lube oil pump; and the opening and closing of the inlet guide and discharge diffuser vanes and blow-off and isolation valves.

The process air blowers can be started from either the LCP-BCP or LCP-BSC, although starting and stopping blowers from LCP-BSC requires manipulation of airflow set points. When the HAND/AUTO selector function at the LCP-BCP is in the HAND position, the START control function at the blower's HMI automatically initiates the start sequence. The HAND setting for any blower should only be used for maintenance and

testing purposes, and the AUTO setting should be maintained during normal operation. When the HAND/AUTO selector function at the LCP-BCP is in the AUTO position, the control logic at LCP-BSC will automatically initiate the blower start sequence. On initiation of the START Command, the blow-off valve must be in the open position and the isolation valve must be closed. Both inlet guide vanes and variable diffuser vanes must be in the minimum, or closed position. LCP-BCP sends signal to open the cooling water supply valve, and to MCC-ASTN2 to energize the auxiliary lube oil pump. If any of these start-up system components are not properly positioned, the PLC-BCP logic sends the signal for them to move into proper position. The auxiliary lube oil pump will pre-lubricate the PA blower for a minimum of two (2) minutes prior to the motor being started. Once all start/safety functions (including oil temperature and pressure) are confirmed, signal is sent to energize the motor starter for the blower. When the blower reaches operating speed, the PLC-BCP control logic will open the isolation valve while closing the blow-off valve, and release control of the inlet guide vanes and variable diffuser vanes to system's automatic control to achieve the set air flow. At operating speed, the main oil lubrication pump takes over the lubrication functions, and the auxiliary oil pump is de-energized. A spin timer prevents the restart of blowers until the motor rotation has stopped, and time delays prevent nuisance alarms during the start-up cycle. Sequence fail alarms are indicated and motor shut-down occurs when any portion of the start, run, or stop sequence is not properly executed, or required components are not properly positioned.

To stop blower operation, there are three (3) types of stop sequences programmed into the PLC-BCP logic. These include a "Normal Stop", a "Soft Stop", and "Emergency Stop". The "Normal Stop" sequence is initiated when the blower is operating in HAND or AUTO mode, and an Operator issues the STOP command from a control panel. This stop sequence begins with the inlet guide vanes and discharge diffuser vanes closing to their minimum position. On confirmation of this position, the blow-off valve is driven to the full open position. When the blow-off valve is fully open, the blower motor is de-energized and the isolation valve closed. The spin timer starts when power is cut to the motor, and the auxiliary lube oil pump is started for a post-lube time set. After the motor stops spinning the blower restart is enabled, and the blow-off valve is returned to the fully

closed position. The "Soft Stop" sequence is automatically initiated by the control logic when certain alarm conditions are indicated. These alarm conditions include high oil temperature, high inlet air temperature, or high motor winding temperature; isolation valve not fully opening or blow-off valve not fully closing; low cooling water pressure; blower surge; or high differential pressure across the blower. This stop sequence begins with the blow-off valve being driven to the full open position, and the isolation valve being closed. Simultaneously, the inlet guide vanes and discharge diffuser vanes are closed to their minimum position. Once the valve positions are confirmed, the blower motor is de-energized, the spin timer is started, and the auxiliary lube oil pump is started for a post-lube time set. The "Emergency Stop" sequence can be either automatically initiated by the control logic on indication of certain alarm conditions, or can be manually initiated by a hard-wired Emergency Stop switch located at each LCP-BCP. Alarm conditions that initiate an automatic emergency stop include low-low oil pressure; high speed shaft vibration, high gearbox vibration, or high motor bearings vibration; loss of RUN confirmation from the motor starter during start sequence or normal operation; high gearbox bearing temperature; or PLC failure. This stop sequence is similar to a "Soft Stop" sequence, except that the blower motor is immediately de-energized and the auxiliary lube oil pump is not activated.

4.3.1.8 Channel Aeration Facilities

Three (3) Channel Aeration (CA) Blowers are furnished in the North Electrical Building to provide air mixing to prevent solids from settling in the channels between process areas. These blowers are suited for continuous operation. One (1) blower feeds air to the AST channel diffusers, another to the SST influent channel diffusers, and the final serves as a standby. The standby blower is able to feed air to either location. Each CA Blower is provided with a Remote-Off-Test (ROT) switch at the blower location and an ON/OFF selector switch in the SCADA system. When the ROT switch is in the REMOTE position and the SCADA selector is switched ON, a start command is sent to MCC-ASTN2 for the blower to run continuously. A discrete signal is sent to PLC-ASTN when a blower is running, and the [RUN] status is displayed and logged on the SCADA system. In the event of a blower failure, a discrete signal is sent to the PLC-ASTN, and

the [FAILURE] status is displayed and logged on the SCADA system. When the ROT switch is in the OFF position, the switch will override all controls and is lockable. When the ROT switch is in the TEST position, the blower motor will momentarily start and spring return to OFF when released. A differential pressure indicator/switch on the inlet air filter enables remote monitoring of the air filter, and initiates an alarm signal on high-differential pressure. The differential pressure is continually displayed and logged in the SCADA system. When high differential pressure occurs, a discrete signal is sent to PLC-ASTN, and an alarm is displayed and logged on the SCADA system. A high-low pressure switch on the discharge of each blower sends a discrete signal to PLC-ASTN when the pressure exceeds or drops below the set range. The PLC will indicate the appropriate alarm signal for display and logging on the SCADA system. PLC logic will shut down and lock out the blower on any of these fault conditions, and will allow the blower to be RESET once the fault condition is cleared.

4.3.2 Step by Step Start-Up Procedures

4.3.2.1 Initial Start-Up Procedures

Initial Start-Up Strategy

The initial start-ups of the Activated Sludge Facilities and Secondary Sedimentation Facilities must be closely coordinated. The prescribed steps developed and employed by Malcolm Pirnie and Veolia for the initial start-up of these two (2) facilities are described below.

Step 1 – Certification of Proper Installation from the Manufacturers

1. Obtain Manufacture's installation certifications and training for the following equipment:
 - AST Process Air Blowers
 - AST Air Diffusers
 - AST/SST Channel Aeration Blowers
 - AST Dissolved Oxygen Meters
 - AST Submersible Mixers
 - AST IMLR Pumps
 - SST Sludge Collectors
 - SST Skimmers

- SST RAS Pumps
- SST Skimmings Pumps
- WAS Pumps
- DAF Thickeners and Polymer Addition System
- DAF TWAS Pumps
- Standby Generators

Step 2 – Preliminary Field Testing of Process Equipment

1. Conduct Preliminary Testing of Equipment as AST/SST start-up is staged:
 - Fill ASTs 1, 2, 6 and 7 with Primary Effluent at a rate of approximately 5 MGD (3472 gpm). Observe climbing liquid elevations across each baffle location for excessive elevation differential. Water surface differential shall **not** exceed 2-inches between the upstream and downstream sides of any baffle.
 - Start Process Air Blower to deliver air to AST1 **after** the diffusers are submerged. Observe diffuser performance. Note: The minimum PA from one blower is 7460 scfm to prevent the blower from going into surge. This will require that until the air demand for the in-service ASTs is at 7,500 scfm, air will need to be “wasted” or “blown” off into one or more ASTs that are filled with water.
 - Start AST1 IMLR Pump and Zones 1A through 1F Submersible Mixers when the tank is 2/3 full. Observe pump and mixer operation.
 - Stop primary effluent flow to the ASTs when they are 2/3 full.

Step 3 – “Seeding” and Acclimation of Activated Sludge System

- Add “seed” sludge to ASTs 1, 2, 6 and 7.
- Continue to operate the aeration and air diffusers to achieve a target DO concentration > 3.0 mg/l. Manually check the DO concentration and adjust the Process Air Blower set point as needed for target DO.
- Continue operating the Submersible Mixers (Zones 1A through 1F).
- Continue to operate the IMLR Pumps
- Intermittently feed all in-service ASTs until MLSS is achieved and ASTs are full.
- After all in-service ASTs are full line up SST 10 to receive AST mixed liquor flow.
- Feed the ASTs at approximately 2 MGD each and begin filling SST 10 with mixed liquor.
- After SST 10 is full line up the RAS withdrawal system on SST 10 and the RAS inlet systems on the in-service ASTs.
- Start the RAS pump (s) and to deliver approximately 2 MGD to each in-service AST.
- After stable operation of SST 10 line up SST 9 to receive AST mixed liquor flow. Stable operation should take approximately 2 days.

- Increase the flow rate to each in-service AST by approximately 1.5 MGD and begin filling SST 9 with AST mixed liquor flow.
- After SST 9 is full line up the RAS withdrawal system on SST 9.
- Increase the RAS flow by approximately 1.5 MGD to each in-service AST.
- After stable operation of SST 9 line up SST 8 to receive AST mixed liquor flow. Stable operation should take approximately 2 days.
- Repeat the above steps until for SSTs 8, 7, 6 and 5.
- Fill ASTs 3, 4 and 5 with primary effluent and line up the RAS inlet system to each AST. Start the IMLR and zone mixers when the ASTs are 2/3 full.
- Repeat the above steps for bringing SSTs 4, 3, 2 and 1 on-line.
- Increase RAS flow and air flow to maintain desired parameters.

4.3.2.2 General Start-Up Procedures

Routine Startup of Individual ASTs

Once the initial startup of the Activated Sludge Facilities has been completed per Section 4.3.2.1 above, periodic draining of basins will be required for routine maintenance of the facility. The restarting of individual ASTs when the activated sludge treatment process is in operation should be in accordance with the following procedures:

1. Refer to the General Start-up Procedures in Section 4.0.2.
2. All areas should be clean of installation or maintenance equipment and items which are not part of the process system.
3. Ensure selector switches for AST equipment are placed in the proper positions for operation.
4. Ensure that LCP-ASTN and LCP-BSC located in AST-LCC-N are operating properly; and all field located equipment LCPs for the AST are properly energized.
5. Ensure that the circuit breakers at Motor Control Centers, electrical distribution panels, and switchgear (SG-ASTN) are energized for all equipment to be operated. Also ensure local ON/OFF disconnect boxes are energized.

6. Ensure that all indication and measurement instruments are properly calibrated, energized, and properly communicating with their respective panels.
7. Ensure that all valves and gates into the AST are in the proper position. These includes:
 - a. Knife gate valve to Return Activated Sludge (RAS) diffuser.
 - b. Paired gate valves to Primary Effluent diffuser.
 - c. Eccentric plug valves to Tank Drain piping.
 - d. Slide gates from AST Influent Channel into each AST.
8. Ensure RAS pump station is operating.
9. Ensure Secondary Sedimentation Facility is operating.
10. Confirm Process Air Blowers are operating.
11. Confirm Channel Aeration Blowers are operating.
12. Introduce PE into empty AST at rate not to exceed 5 MGD (3472 gpm) by actuation of manual gate valves to PE diffuser.
 - a. Observe climbing liquid elevations across each baffle wall for excessive elevation differential. Water surface differential shall **not** exceed 2-inches between the upstream and downstream sides of any baffle.
 - b. Begin air flow to air diffusers once they are submerged and observe performance. Verify blower control system automatically balances air flow rate with new diffuser load.
 - c. Shut-off PE diffuser flow to AST when level reaches approximately half full.
13. With AST half full, operate IMLR Pump and Zones 1A through 1F Submersible Mixers, observing and confirm equipment operation.

14. With mechanical equipment and air diffusers operating, resume filling of AST by actuation of knife gate valve to RAS diffuser and gate valves to PE diffuser. Continue filling AST with 1:1 flow of RAS to PE, observing rising liquid elevations across each baffle wall for excessive elevation differential. Water surface differential shall **not** exceed 2-inches.
15. Stop flow of RAS and PE when AST is full and flow begins to spill over discharge weir. Continue operating IMLR Pump, Mixers, and Air Diffusers; monitoring for a target DO concentration > 3.0 mg/l and maximum MLSS concentration of 2500 mg/l.
16. When DO and MLSS concentration are stabilized (as near as practicable to target values and per direction of Operations Supervisor), continue introducing PE and RAS into AST to overflow to SSTs, and fully balance the AST process.

4.3.2.3 Individual Equipment Start-Up Procedures

4.3.2.3.1 Activated Sludge Tanks (ASTs)

AST Influent Channel

Refer to the Initial or General Startup procedures in Sections 4.3.2.1 and 4.3.2.2 respectively, for the startup of the Activated Sludge Treatment Tanks. Additional procedures to be noted during startup are listed below:

1. Ensure plug valves to Tank Drainage System and the Pre-Anoxic Zone RAS Diffuser are in the right position; and the AST Influent Channel slide gates and PE Diffuser gate valves are also in the right position.
2. Confirm that all maintenance equipment, tools, and debris have been removed from the empty AST(s).

3. Confirm all maintenance procedures have been completed on AST equipment and equipment is operational and ready for service. Confirm all support systems are operating normally. This includes, but is not limited to the following:
 - a. Flowmeters for RAS Diffuser and PA Air droplegs to diffuser grids.
 - b. Air Diffusers and monitoring instrumentation.
 - c. Mechanical mixers and IMLR Pumps.
 - d. Access doors to baffle panels are closed and locked.
4. Confirm no personnel remain within the AST(s), and the Operations Supervisor is aware of tank filling.
5. Begin filling AST(s) following procedures identified in Sections 4.3.2.1 and 4.3.2.2 for filling rate and equipment startup.
6. Monitor filling of AST(s) and adjust fill rate to achieve target DO concentration > 3.0 mg/l and maximum MLSS concentration of 2500 mg/l. Continue monitoring of tank until process concentrations are achieved and stabilize.
7. Once process concentrations are acceptable and stabilized, begin overflowing tank(s) into AST Effluent Channel. Continue monitoring process concentration, and adjust flow as needed to maintain concentrations.

4.3.2.3.2 Selector Zone Mixing System

Submersible Mixers

Startup the submersible mixers according to the procedures listed below:

1. Verify mixer oil casing is properly filled with oil.
2. Verify the motor cable entry is securely tightened.
3. Ensure mixer is properly fixed to the guide bar.

4. Place local Submersible Mixer ROT switch in the TEST position and test mixer to verify proper direction of rotation.
5. Place local Submersible Mixer ROT switch in the REMOTE position.
6. Place the Submersible Mixer into operation as follows:

Mode of Operation

- a. Once the AST is at least half full place the ON/OFF selector switch in the SCADA system into the ON position.
- b. When the selector switch is in the ON position, LCP-ASTN sends a start command to MCC-ASTN1, and the mixer will run continuously.
- c. Visually verify the mixer(s) operation.

4.3.2.3.3 Air Diffusers

Process Air Control Valves

Verify the functioning of the Process Air Blowers and pressure in the PA Distribution Header Pipe. Startup all process air control valves according to the procedures listed below:

1. Verify all service and maintenance has been completed on the valve actuator, and it is ready for service.
2. Check that power supply voltage agrees with that stamped on the actuator nameplate.
3. Make sure power supply is connected and actuator is turned on.
4. Verify upstream manual isolation valve is in the full open position at the position indicator on the actuator. If indication does not show full open, manually open valve using 8" hand wheel.
5. Place valve actuator in operation as follows:

Automatic Mode of Operation

- a. Place the actuator LOR switch to the REMOTE setting.
- b. Valve is modulated using OPEN and CLOSE soft buttons at the SCADA system. Valve adjustments are based on the local pipe air flow and diffuser zone DO measurements.

Manual Mode of Operation

- a. Place the actuator LOR switch to the LOCAL setting.
- b. Valve is modulated at the actuator using the OPEN/CLOSE selector switch. Valve adjustments are based on the local pipe air flow and diffuser zone DO measurements.
- c. Local manual valve actuation is also possible via manual handwheel drive. The HAND/AUTO lever at the actuator handwheel is depressed to engage the handwheel, and the wheel rotation opens or closes the valve.

Air Diffuser Grids

Verify the functioning of the Process Air Blowers and pressure in the PA Distribution Header Pipe. Startup the fine bubble diffusers according to the procedures listed below:

1. Inspect the diffuser grids for loose nuts, missing or improperly placed hardware, missing retaining rings, non-connected joints, etc.
2. Make all repairs prior to filling AST.
3. Place Air Diffusers into operation as follows:

Mode of Operation

- a. Fill the AST with clean water to a level 1" below the top of the diffusers. *Note: Filling of AST should proceed so no abnormal or damaging stresses are imposed on the air diffuser piping.* During this initial filling, proceed with the following steps:
 - i. Disconnect diffuser grid purge hoses.
 - ii. As the liquid level begins to cover the air distributor pipe, introduce air at low flow rate and observe for leaking from piping joints. Repair as needed with air flow turned off.
 - iii. Observe each purge sump for proper operation. With positive air flow, purge will discharge any water in the sump assembly, or air if no water is present. Repair as needed.
- b. Turn off water when level reaches approximately 1" below top of the diffusers. Check level of the diffuser grid. Level shall not exceed $\pm 1/4$ " for all diffuser heads.
- c. Increase air flow to diffusers to average air flow, and resume filling of AST.
- d. Continue filling AST until water surface covers diffusers by 4" to 6". Stop filling and verify uniform air distribution for all air diffusers. Repair as needed.
- e. Once system is confirmed to be leak free and all entrapped water has been purged, reattach purge hoses and check clamp coupling for leaks.
- f. Continue filling AST until water surface covers diffusers by 3' to 4'. Operate system for 3 to 4 hours before introducing mixed liquor and continuing filling of AST.

4.3.2.3.4 Intermediate Mixed Liquor Return

IMLR Pumps

Startup the submersible propeller Intermediate Mixed Liquor Return Pumps (IMLR) according to the procedures listed below:

1. Verify pump oil casing is properly filled with oil.

2. Verify the motor cable entry is securely tightened.
3. Ensure pump is properly fixed to the guide bar.
4. Place local IMLR Pump ROT switch in the TEST position and test pump to verify proper direction of rotation.
5. Place local IMLR Pump ROT switch in the REMOTE position.
6. Place the IMLR into operation as follows:

Mode of Operation

- a. Once the AST is at least 2/3 full place the ON/OFF selector switch in the SCADA system into the ON position.
- b. When the selector switch is in the ON position, LCP-ASTN sends a start command to MCC-ASTN2, and the pump will run continuously.
- c. Visually verify IMLR Pump operation.

4.3.2.3.5 Tank Drainage Facilities

Tank Drainage Pump

Startup the self-priming centrifugal Tank Drainage Pump according to the procedures listed below:

1. Verify pump pedestal is properly filled with oil.
2. Ensure self feeding grease lubricator is full and properly inserted into mechanical seal.
3. Ensure pump case is full of water for priming purposes.

Mode of Operation

- a. Depress START pushbutton at the pump location to send a start command to MCC-ASTN2, and the pump will be called to operate.

- b. The pump will operate continuously, until the STOP pushbutton is depressed or a no-flow condition occurs.
- c. Verify the pump is operating.

AST Sump Pumps

Startup the sump pumps according to the procedures listed below:

1. Verify pumps are connected to power of proper voltage and phase.
2. Check sump area for trash and debris. Clean out as necessary.
3. Place the ON/OFF/TEST switch at pump briefly in the TEST position to verify proper rotation of pump motor.
4. Verify level of float switches, and ensure floats operate freely without interference.
5. Place the ON/OFF/TEST switch at the pump in the ON position.
6. Place the pumps into operation as follows:

Automatic Mode of Operation

- a. Place the HAND/AUTO selector switch at the pump to the AUTO setting.
- b. The pump(s) will operate based on indication by the level switches in the sump area.
- c. Verify the operation of the pump(s) by manually lifting the Low and High Level float switches. A start command is sent to MCC-ASTN2 when the pump is called to operate.

Manual Mode of Operation

- a. Place the HAND/AUTO selector switch at the pump to the HAND setting.
- b. A start command is sent to MCC-ASTN2, and the pump will operate continuously until the Low Level switch shuts the pump down.
- c. Verify operation of the pump(s).

4.3.2.3.6 Process Air Blowers

The initial startup of the Process Air Blowers should follow the procedures listed below:

1. Prior to initial startup perform a final check of the compressor.
 - a. Remove all tools, rags, and loose objects from the compressor. Verify inlet piping is free of debris.
 - b. Consider a temporary protective screen to cover the compressor inlet during early operation.
 - c. Verify all system piping is properly supported and not bearing on the compressor casing.
 - d. Check all bedplate anchor bolts for tightness, including compressor, piping, and accessory equipment and appurtenances.
 - e. Check driver and compressor lubrication systems and verify oil level in reservoir. Verify condition of oil filters, and cycle auxiliary oil pump to check for leaks and functioning. Verify pressure control valve is properly set. Circulate cooling water, checking for leaks and proper valve functioning.
 - f. Check settings of all switches; gauges for proper functioning and calibration; and control circuitry for proper functioning.
 - g. Check all driver safety devices for proper settings and operation.
 - h. Turn compressor shaft by hand to verify free rotation.
 - i. Check mechanical performance of driver and verify proper direction of rotation. Verify coupling is secure and aligned.
 - j. Check compressor level and drive alignment.

- k. Verify operation of the guide vane and diffuser vane actuators, as well as additional accessory equipment.
 - l. Verify inlet and discharge temperature and pressure indicators are functional to monitor operation.
2. Verify all shutoff valves on discharge side are open, and inlet guide and discharge diffuser vanes are in their proper position.
 3. Start auxiliary oil pump and verify oil pressure.
 4. "Bump" the main drive motor for a few revolutions and let coast to a stop. Verify assembly coasts freely to a stop; listening for any rubbing, chattering, or unusual gear or bearing noise.
 5. Start compressor and accelerate to full speed, and shut off. Listen for unusual noises as compressor coasts to a stop.
 6. Re-start compressor and accelerate to full speed. When compressor reaches full speed, open inlet guide vanes and discharge diffuser vanes; and close blow-off valve. Note minimum surge-free vane positions for future surge-free startup positioning. Check vibration and oil temperature and pressure continuously to verify operation of compressor.
 7. Continue operating, and gradually increase load to establish normal operating conditions. Operate for approximately 1-hour, monitoring compressor instrumentation for signs of abnormal operation. Check for abnormal noise, hot spots, and leaking.
 8. Shutdown compressor and allow to coast to a complete stop. Check coupling alignment.
 9. Check oil reservoir for level and water contamination.
 10. Inspect inlet protective screen if previously applied, and remove if it is clean.

Startup of the Process Air Blowers should follow the procedures listed below:

1. Verify all maintenance activities have been completed, oil reservoir is full, and all tools and maintenance equipment has been removed from the blower area.
2. Verify any fault or alarm conditions have been corrected and cleared.
3. From LCP-BSC or the individual LCP-BCP, place the blower in HAND using the HAND/AUTO selector function. Note: The HAND/AUTO selector function at both HMI panels is password protected and proper authorization is required.
4. Open the individual LCP-BCP to access the key locked NORMAL/SERVICE/TEST selector.
5. Using key, switch to TEST to simulate motor starting and cycle through interlocked blower system components to verify operation.
6. Using key, return switch to NORMAL position and close the LCP-BCP.
7. At LCP-BSC verify existing LEAD/LAG/STANDBY blower selection, or adjust as needed based on blower run times and maintenance requirements. Note: The LEAD/LAG/STANDBY selector function at LCP-BSC is password protected and proper authorization is required.
8. Place the blower in operation as follows:

Automatic Mode of Operation

- a. At the individual LCP-BCP enter authorization code and place the blower HAND/AUTO selector switch into the AUTO position.

- b. Verify current operating mode setting and existing air flow setting at LCP-BSC, and adjust as directed to meet process demand. Note: Air flow adjustment at LCP-BSC is password protected and proper authorization is required.
- c. Blower operating level and order of operation are determined by the LCP-BSC control logic.
- d. Blower startup sequence is automatically initiated by the LCP-BSC control logic, and the automatic startup sequence will occur in the following order:
 - i. Blow-off valve opens (or open position is confirmed) and isolation valve closes (or closed position is confirmed).
 - ii. Inlet Guide Vanes and Discharge Diffuser Vanes are placed in the minimum surge-free position as established during initial startup procedure (or minimum surge-free position is confirmed).
 - iii. Auxiliary lube oil pump is energized and cooling water supply valve is opened. Auxiliary lube oil pump pre-lubricates PA blower for a minimum of 2-minutes.
 - iv. Blower motor is started after all start/safety functions and proper instrumentation readings are confirmed
 - v. Once the blower reaches operating speed, the control logic simultaneously opens the isolation valve while closing the blow-off valve; adjusts the inlet guide vanes and discharge diffuser vanes to achieve the set air flow; and de-energizes the auxiliary lube oil pump (as the main oil pump takes over).
- e. Verify operation of the blower(s).

Manual Mode of Operation

Process Air Blowers should not be operated in manual mode unless blower testing or maintenance is being performed. Normal operation of blowers uses automatic mode of operation.

At the individual LCP-BCP, enter authorization code and place the blower HAND/AUTO selector switch into the HAND position.

- a. At the HMI on the individual LCP-BCP, enter authorization code and select the START control function. Note: START commands at both LCP-BCP and LCP-BSC are password protected and proper authorization is required. The START control function initiates an automatic startup sequence in the following order:
 - i. Blow-off valve opens (or open position is confirmed) and isolation valve closes (or closed position is confirmed).
 - ii. Inlet Guide Vanes and Discharge Diffuser Vanes are placed in the minimum surge-free position as established during initial startup procedure (or minimum surge-free position is confirmed).
 - iii. Auxiliary lube oil pump is energized and cooling water supply valve is opened. Auxiliary lube oil pump pre-lubricates PA blower for a minimum of 2-minutes.
 - iv. Blower motor is started after all start/safety functions and proper instrumentation readings are confirmed
 - v. Once the blower reaches operating speed, the control logic simultaneously opens the isolation valve while closing the blow-off valve; adjusts the inlet guide vanes and discharge diffuser vanes to achieve the set air flow; and de-energizes the auxiliary lube oil pump (as the main oil pump takes over).
- b. Complete testing or maintenance on blower. Verify blower is ready for operation and all settings have been properly set. Shut down blower (per Section 4.3.3.2.5), and return HAND/AUTO switch to the AUTO setting. Note: Air flow adjustment at LCP-BCP is password protected and proper authorization is required.

4.3.2.3.7 Channel Aeration Facilities

Channel Aeration Blowers

The initial startup the Channel Aeration Blowers should follow the procedures listed below:

1. Prior to initial startup perform a final check of the Channel Aeration Blowers:
 - a. Remove all tools, rags, and loose objects from the compressor. Verify inlet piping is free of debris.
 - b. Verify that shaft-lock on drive shaft has been removed, and drive shaft and blower rotate freely by hand. Listen for unusual noises.
 - c. Check the alignment of the transmission and drive belts.
 - d. Ensure all pipe and blower connections are tight and sealed, and all instrumentation and protective devices are installed and secured.
 - e. Verify proper oil level in blower and grease level in motor bearings.
 - f. Check wiring diagram and wiring hook-ups for conformance with manufacturer's requirements.
 - g. Verify motor is properly grounded.
2. Open shut-off valve.
3. Ensure weighted discharge air relief valve is properly set.
4. Place blower ROT switch in the TEST position and test blower to verify direction of rotation.
5. Place blower ROT switch in the REMOTE position.

On initial startup monitor the following:

- a. Motor voltage- confirm full load voltage does not exceed rating.
- b. Motor and bearing temperature- confirm temperatures are not excessive.
- c. Motor amperage- confirm it is at or near listed design value.
- d. During initial 8-hours of operation, monitor for any leaking oil, excessive vibration, or excessive noise.

6. Place the Channel Aeration Blower into operation as follows:

Mode of Operation

1. At the ON/OFF selector on the SCADA system, place selector in the ON position.
2. Start command is sent to MCC-ASTN2, and the blower is called to continuous operation.
3. Verify operation of the blower.

4.3.3 Step by Step Shutdown Procedures

4.3.3.1 General Shutdown Procedures

Only individual ASTs will be taken out of service, and the shutdown sequences should follow the following procedures:

1. Close the 10" plug valve to stop flow of RAS into the AST(s) to be drained. Coordinate this with closing of the 10" knife gate valve and shutting down of the magnetic flow meter(s).
2. Close the paired 24" gate valves on the PE Diffuser piping and the 10" gate valves on the RAS Diffuser pipe for the AST(s) to be drained.
3. Turn off the IMLR Pump(s) and mechanical mixers in AST(s) to be drained.
4. Open the 8" plug valve in the Tank Drain pipe for the AST(s) to be drained. Allow the tank(s) to drain by gravity, controlling the rate of tank discharge to prevent excessive water differential across baffle walls.

5. Start the Tank Drainage Pump (See Section 4.3.2.3.5) when gravity drainage begins to subside, continue pumping out AST(s) ensuring that excessive water differential does not develop across baffle walls.
6. Reduce the Process Air flow to the diffuser grids of the AST(s) to be drained, providing only 0.6 SCFM per diffuser. Air flow to the draining AST(s) must be controlled at the Process Air Control Valves, and PA Blower airflow set point adjusted as needed.
7. As the water surface in the AST drains to within 1 to 2-feet of the diffusers, the air flow must be completely shut. See Air Diffuser manufacturer's O&M Manual for the Fine Bubble Aeration System for proper long term storage procedures when the AST(s) will be empty for any extended period of time.
8. See air diffuser manufacturer's O&M Manual for long term storage procedures of the Fine Bubble Aeration System if the AST(s) will remain empty for any extended period of time.
9. Wash down the interior of the AST(s) taken out of service. Wash toward the east end, operating the Tank Drainage Pump to discharge accumulations from wash down activities.
10. With the AST(s) empty, close the 8" plug valve in the tank drain(s) of the empty AST(s), and shutdown the Tank Drainage Pump. Visually inspect the interior walls of structure and exposed AST equipment.

4.3.3.2 Individual Equipment Shutdown Procedures

4.3.3.2.1 Selector Zone Mixing System

Submersible Mixers

Shutdown individual selector zone mixers according to the following procedures:

1. Turn the ON/OFF selector switch to the OFF position in the SCADA system for each mixer to be shutdown.

2. Place the ROT switch at the mixer location into the OFF position.
3. Verify the mixer has stopped.
4. Lock the ROT switch in the OFF position.
5. If the mixers are to be out of service for an extended period of time, disconnect from power source.

Note: The selector zone mixers will shutdown automatically on a motor overload condition.

4.3.3.2.2 Air Diffusers

Process Air Control Valves

Shutdown Process Air Control Valves to the air diffuser drop legs according to the following procedures:

1. Close the Process Air Control Valve to stop the air flow to the diffuser grid to be taken out of service.
 - a. If the LOR is in REMOTE, use the soft button for CLOSE at the SCADA system.
 - b. If the LOR is in LOCAL, use the selector switch at the valve to CLOSE.
2. Adjust the air flow setting for the Process Air Blowers to account for the change in process demand.
3. Verify air flow has stopped in the affected PA piping.
4. Place the LOR switch into the OFF position, and lock.

Air Diffuser Grids

Shutdown Air Diffuser Grids according to the following procedures:

1. Reduce the air flow to the diffuser grids in the AST(s) to be drained down to a rate equivalent to 0.6 SCFM per diffuser. Air flow to the individual grids is adjusted at the Process Air Control Valves, and PA Blower airflow set point must be adjusted as needed.
2. Stop RAS flow into the AST(s) to be taken out of service by actuation of the manual isolation valve(s) to the RAS diffuser.
3. Turn off the air completely when the level of the draining AST(s) reaches 1 to 2-feet above the diffusers by closing the Process Air Control Valves at each grid. Adjust the PA Blower air flow setting as needed to meet process demand and account for the reduced demand.
4. See air diffuser manufacturer's O&M Manual for long term storage procedures of the Fine Bubble Aeration System if the AST(s) will remain empty for any extended period of time.

4.3.3.2.3 Intermediate Mixed Liquor Return

IMLR Pumps

Shutdown the IMLR Pumps according to the following procedures:

1. Turn the ON/OFF selector switch to the OFF position in the SCADA system.
2. Place the ROT switch at the mixer location into the OFF position.
3. Verify the pump has stopped.
4. Lock the ROT switch in the OFF position.
5. If the pump is to be out of service for an extended period of time, disconnect from power source.

Note: The IMLR pumps will shutdown automatically on a motor overload condition or a motor high temperature condition. *A moisture sensor in the*

pump housing will initiate an alarm when moisture is detected, but will not shutdown the pump.

4.3.3.2.4 Tank Drainage Facility

Tank Drainage Pump

Shutdown the Tank Drainage Pump according to the following procedures:

1. Depress LOCK-OUT STOP pushbutton at the pump location.
2. Confirm that pump has stopped.
3. Close manual isolation plug valves on suction side and discharge side of pump. Suction side plug valve is hand wheel operated, and two (2) discharge side plug valves are chain operated.
4. If the pump is to remain out of service for an extended period of time, lock the pushbutton in the STOP position and disconnect pump from power source.

Note: The Tank Drain pump will shutdown automatically on a no-flow condition.

AST Sump Pump

Shutdown the AST sump pumps according to the following procedure:

1. If the pump is currently running, press the PUMP STOP push button at the pump location.
2. Confirm the pump is stopped.
3. Place the ON/OFF/TEST switch at the pump in the OFF position.
4. If the pump is to remain out of service for an extended period of time, disconnect pump from power source at the disconnect switch at the pump location.

Note: The sump pump will shutdown automatically on motor high winding temperature or motor overload. Sump pump will also shutdown automatically on indication by [LOW LEVEL] switch. *A moisture sensor in the pump housing will initiate a local alarm when moisture is detected, but will not shutdown the pump.*

4.3.3.2.5 Process Air Blowers

Process Air Blowers

During routine operation, the Process Air Blowers are started and stopped automatically to maintain a set process airflow or automatically adjust to the measured DO levels. This sequencing is coordinated by LCP-BSC logic, and is based on a preset operational strategy and the LEAD/LAG/STANDBY blower designations. When an operating blower is shutdown, LCP-BSC will start the available standby blower or increase the output of the operating blowers to maintain the set process airflow. Individual PA Blowers are shutdown according to the following three (3) sequences:

1. Normal Controlled Stop Sequence:
 - a. From the HMI at the individual LCP-BCP, place the blower in HAND using the HAND/AUTO selector function. *Note: The HAND/AUTO selector function at both HMI panels is password protected and proper authorization is required.*
 - b. From the HMI at either the LCP-BSC or the individual LCP-BCP, enter the authorization code and select the STOP control function. Note: STOP commands at both HMI panels are password protected and proper authorization is required.
 - c. Initiation of the STOP control function initiates the controlled shutdown sequence in the following order:
 - i. The Inlet Guide Vanes and Discharge Diffuser Vanes are moved to the minimum position for shutdown.
 - ii. The blow-off valve is driven into the full open position, and the discharge isolation valve is closed.

- iii. The PA Blower motor is de-energized, and the spin timer is started.
- iv. As the blower is de-energized, the auxiliary lube pump is started to provide post-lubrication to the blower for 5-minutes.
- v. Once the spin timer has elapsed and the post-lubrication is complete, a restart will be enabled and the blow-off valve will be closed.
- d. Once the blower and its accessory devices have all come to a stop, disconnect power to the blower at the LCP-BCP Disconnect Switch.
- e. If the blower is to remain out of service for an extended period of time, the NORMAL/SERVICE/TEST key lock selector switch inside the LCP-BCP can be placed in the SERVICE position. This will send a discrete input to indicate the blower is [OUT OF SERVICE].

2. Emergency Stop Sequence:

- a. An EMERGENCY STOP pushbutton is located on the front of each LCP-BCP. When EMERGENCY STOP is depressed, the blower will stop whether in HAND or AUTO.
- b. Once the EMERGENCY STOP is depressed, the following shutdown sequence occurs:
 - i. The blower motor is immediately de-energized and the spin timer started. The Auxiliary Lube Pump will not start.
 - ii. The Inlet Guide Vanes and Discharge Diffuser Vanes are moved to the minimum position for shutdown.
 - iii. The blow-off valve is driven into the full open position, and the discharge isolation valve is closed.
- c. Once the blower has come to a stop, disconnect power to the blower at the LCP-BCP Disconnect Switch, and twist the EMERGENCY STOP pushbutton to reset.
- d. If the blower is to remain out of service for an extended period of time, the NORMAL/SERVICE/TEST key lock selector switch inside the

LCP-BCP can be placed in the SERVICE position. This will send a discrete input to indicate the blower is [OUT OF SERVICE].

Note: A blower will automatically shut down during the following failure conditions: [HIGH OIL TEMPERATURE], [HIGH MOTOR WINDING TEMPERATURE], [BLOW-OFF VALVE TRAVEL FAILURE], and [HIGH BLOWER DIFFERENTIAL PRESSURE]. This automatic shutdown is considered a "Soft Stop", and occurs in the following sequence:

- i. Blow-off Valve is driven full open.
- ii. The Inlet Guide Vanes and Discharge Diffuser Vanes are moved to the minimum position for shutdown.
- iii. When the blow-off valve is fully open and the discharge isolation valve is fully closed, the blower motor will de-energize, and the spin timer will start.
- iv. The Auxiliary Lube Pump is started and runs for 5-minutes when the blower motor is de-energized.

4.3.3.2.6 Channel Aeration Blowers

Channel Aeration Blowers

Shutdown the Channel Aeration Blowers according to the following procedure:

1. Turn the ON/OFF selector switch to the OFF position in the SCADA system for the blower to be shutdown. *Note: To maintain continuous channel aeration, shutdown of blower must be coordinated with startup of standby blower.*
2. At the blower location, place the ROT switch into the OFF position.
3. Close the level operated discharge valve.
4. Lock the ROT in the OFF position.

Note: A Channel Aeration Blower will shutdown automatically on [HIGH DISCHARGE PRESSURE], [LOW DISCHARGE PRESSURE], and [HIGH FILTER DIFFERENTIAL PRESSURE].

4.3.4 Alarm and Status Indication

The following sections list the alarms and status indicators associated with the Activated Sludge Facilities.

4.3.4.1 Activated Sludge Tanks (ASTs)

<u>Alarm/Status</u>	<u>Display Location</u>
RIO-ASTN Fail Alarm	SCADA
ASTN Process Air Blower	SCADA
System Fail Alarm	
AST 1 Out of Service Status	SCADA, LCP-ASTN
AST 2 Out of Service Status	SCADA, LCP-ASTN
AST 3 Out of Service Status	SCADA, LCP-ASTN
AST 4 Out of Service Status	SCADA, LCP-ASTN
AST 5 Out of Service Status	SCADA, LCP-ASTN
AST 6 Out of Service Status	SCADA, LCP-ASTN
AST 7 Out of Service Status	SCADA, LCP-ASTN
High Effluent DO Deviation Alarm	SCADA, LCP-ASTN

4.3.4.2 Selector Zone Mixing System

Submersible Mixers AST1

<u>Alarm/Status</u>	<u>Display Location</u>
Mixer 1A Fail Alarm	SCADA, LCP-ASTN
Mixer 1A Run Status	SCADA, LCP-ASTN
Mixer 1B Fail Alarm	SCADA, LCP-ASTN
Mixer 1B Run Status	SCADA, LCP-ASTN
Mixer 1C Fail Alarm	SCADA, LCP-ASTN
Mixer 1C Run Status	SCADA, LCP-ASTN
Mixer 1D Fail Alarm	SCADA, LCP-ASTN

Mixer 1D Run Status	SCADA, LCP-ASTN
Mixer 1E Fail Alarm	SCADA, LCP-ASTN
Mixer 1E Run Status	SCADA, LCP-ASTN
Mixer 1F Fail Alarm	SCADA, LCP-ASTN
Mixer 1F Run Status	SCADA, LCP-ASTN

Submersible Mixers AST2

<u>Alarm/Status</u>	<u>Display Location</u>
Mixer 2A Fail Alarm	SCADA, LCP-ASTN
Mixer 2A Run Status	SCADA, LCP-ASTN
Mixer 2B Fail Alarm	SCADA, LCP-ASTN
Mixer 2B Run Status	SCADA, LCP-ASTN
Mixer 2C Fail Alarm	SCADA, LCP-ASTN
Mixer 2C Run Status	SCADA, LCP-ASTN
Mixer 2D Fail Alarm	SCADA, LCP-ASTN
Mixer 2D Run Status	SCADA, LCP-ASTN
Mixer 2E Fail Alarm	SCADA, LCP-ASTN
Mixer 2E Run Status	SCADA, LCP-ASTN
Mixer 2F Fail Alarm	SCADA, LCP-ASTN
Mixer 2F Run Status	SCADA, LCP-ASTN

Submersible Mixers AST3

<u>Alarm/Status</u>	<u>Display Location</u>
Mixer 3A Fail Alarm	SCADA, LCP-ASTN
Mixer 3A Run Status	SCADA, LCP-ASTN
Mixer 3B Fail Alarm	SCADA, LCP-ASTN
Mixer 3B Run Status	SCADA, LCP-ASTN
Mixer 3C Fail Alarm	SCADA, LCP-ASTN
Mixer 3C Run Status	SCADA, LCP-ASTN
Mixer 3D Fail Alarm	SCADA, LCP-ASTN
Mixer 3D Run Status	SCADA, LCP-ASTN

Mixer 3E Fail Alarm	SCADA, LCP-ASTN
Mixer 3E Run Status	SCADA, LCP-ASTN
Mixer 3F Fail Alarm	SCADA, LCP-ASTN
Mixer 3F Run Status	SCADA, LCP-ASTN

Submersible Mixers AST4

<u>Alarm/Status</u>	<u>Display Location</u>
Mixer 4A Fail Alarm	SCADA, LCP-ASTN
Mixer 4A Run Status	SCADA, LCP-ASTN
Mixer 4B Fail Alarm	SCADA, LCP-ASTN
Mixer 4B Run Status	SCADA, LCP-ASTN
Mixer 4C Fail Alarm	SCADA, LCP-ASTN
Mixer 4C Run Status	SCADA, LCP-ASTN
Mixer 4D Fail Alarm	SCADA, LCP-ASTN
Mixer 4D Run Status	SCADA, LCP-ASTN
Mixer 4E Fail Alarm	SCADA, LCP-ASTN
Mixer 4E Run Status	SCADA, LCP-ASTN
Mixer 4F Fail Alarm	SCADA, LCP-ASTN
Mixer 4F Run Status	SCADA, LCP-ASTN

Submersible Mixers AST5

<u>Alarm/Status</u>	<u>Display Location</u>
Mixer 5A Fail Alarm	SCADA, LCP-ASTN
Mixer 5A Run Status	SCADA, LCP-ASTN
Mixer 5B Fail Alarm	SCADA, LCP-ASTN
Mixer 5B Run Status	SCADA, LCP-ASTN
Mixer 5C Fail Alarm	SCADA, LCP-ASTN
Mixer 5C Run Status	SCADA, LCP-ASTN
Mixer 5D Fail Alarm	SCADA, LCP-ASTN
Mixer 5D Run Status	SCADA, LCP-ASTN
Mixer 5E Fail Alarm	SCADA, LCP-ASTN

Mixer 5E Run Status	SCADA, LCP-ASTN
Mixer 5F Fail Alarm	SCADA, LCP-ASTN
Mixer 5F Run Status	SCADA, LCP-ASTN

Submersible Mixers AST6

<u>Alarm/Status</u>	<u>Display Location</u>
Mixer 6A Fail Alarm	SCADA, LCP-ASTN
Mixer 6A Run Status	SCADA, LCP-ASTN
Mixer 6B Fail Alarm	SCADA, LCP-ASTN
Mixer 6B Run Status	SCADA, LCP-ASTN
Mixer 6C Fail Alarm	SCADA, LCP-ASTN
Mixer 6C Run Status	SCADA, LCP-ASTN
Mixer 6D Fail Alarm	SCADA, LCP-ASTN
Mixer 6D Run Status	SCADA, LCP-ASTN
Mixer 6E Fail Alarm	SCADA, LCP-ASTN
Mixer 6E Run Status	SCADA, LCP-ASTN
Mixer 6F Fail Alarm	SCADA, LCP-ASTN
Mixer 6F Run Status	SCADA, LCP-ASTN

Submersible Mixers AST7

<u>Alarm/Status</u>	<u>Display Location</u>
Mixer 7A Fail Alarm	SCADA, LCP-ASTN
Mixer 7A Run Status	SCADA, LCP-ASTN
Mixer 7B Fail Alarm	SCADA, LCP-ASTN
Mixer 7B Run Status	SCADA, LCP-ASTN
Mixer 7C Fail Alarm	SCADA, LCP-ASTN
Mixer 7C Run Status	SCADA, LCP-ASTN
Mixer 7D Fail Alarm	SCADA, LCP-ASTN
Mixer 7D Run Status	SCADA, LCP-ASTN
Mixer 7E Fail Alarm	SCADA, LCP-ASTN
Mixer 7E Run Status	SCADA, LCP-ASTN

Mixer 7F Fail Alarm	SCADA, LCP-ASTN
Mixer 7F Run Status	SCADA, LCP-ASTN

4.3.4.3 Air Diffusers

Process Air Control Valve 1A

<u>Alarm/Status</u>	<u>Display Location</u>
PACV-1A Remote Status	SCADA, LCP-ASTN
PACV-1A Closed Status	SCADA, LCP-ASTN
PACV-1A Failure Alarm	SCADA, LCP-ASTN
PACV-1A Airflow Status	SCADA, LCP-ASTN

Process Air Control Valve 1B

<u>Alarm/Status</u>	<u>Display Location</u>
PACV-1B Remote Status	SCADA, LCP-ASTN
PACV-1B Closed Status	SCADA, LCP-ASTN
PACV-1B Failure Alarm	SCADA, LCP-ASTN
PACV-1B Airflow Status	SCADA, LCP-ASTN

Process Air Control Valve 1C

<u>Alarm/Status</u>	<u>Display Location</u>
PACV-1C Remote Status	SCADA, LCP-ASTN
PACV-1C Closed Status	SCADA, LCP-ASTN
PACV-1C Failure Alarm	SCADA, LCP-ASTN
PACV-1C Airflow Status	SCADA, LCP-ASTN

AST1 Air Diffuser Grids

<u>Alarm/Status</u>	<u>Display Location</u>
AST1 Total Airflow Status	SCADA, LCP-ASTN
AST1 Zone 1 Dissolved Oxygen Status	LCP-ASTN

AST1 Zone 1 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN
AST1 Zone 2 Dissolved Oxygen Status	LCP-ASTN
AST1 Zone 2 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN
AST1 Zone 3 Dissolved Oxygen Status	LCP-ASTN
AST1 Zone 3 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN

Process Air Control Valve 2A

Alarm/Status

Display Location

PACV-2A Remote Status	SCADA, LCP-ASTN
PACV-2A Closed Status	SCADA, LCP-ASTN
PACV-2A Failure Alarm	SCADA, LCP-ASTN
PACV-2A Airflow Status	SCADA, LCP-ASTN

Process Air Control Valve 2B

Alarm/Status

Display Location

PACV-2B Remote Status	SCADA, LCP-ASTN
PACV-2B Closed Status	SCADA, LCP-ASTN
PACV-2B Failure Alarm	SCADA, LCP-ASTN
PACV-2B Airflow Status	SCADA, LCP-ASTN

Process Air Control Valve 2C

Alarm/Status

Display Location

PACV-2C Remote Status	SCADA, LCP-ASTN
PACV-2C Closed Status	SCADA, LCP-ASTN
PACV-2C Failure Alarm	SCADA, LCP-ASTN
PACV-2C Airflow Status	SCADA, LCP-ASTN

AST2 Air Diffuser Grids

<u>Alarm/Status</u>	<u>Display Location</u>
AST2 Total Airflow Status	SCADA, LCP-ASTN
AST2 Zone 1 Dissolved Oxygen Status	LCP-ASTN
AST2 Zone 1 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN
AST2 Zone 2 Dissolved Oxygen Status	LCP-ASTN
AST2 Zone 2 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN
AST2 Zone 3 Dissolved Oxygen Status	LCP-ASTN
AST2 Zone 3 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN

Process Air Control Valve 3A

<u>Alarm/Status</u>	<u>Display Location</u>
PACV-3A Remote Status	SCADA, LCP-ASTN
PACV-3A Closed Status	SCADA, LCP-ASTN
PACV-3A Failure Alarm	SCADA, LCP-ASTN
PACV-3A Airflow Status	SCADA, LCP-ASTN

Process Air Control Valve 3B

<u>Alarm/Status</u>	<u>Display Location</u>
PACV-3B Remote Status	SCADA, LCP-ASTN
PACV-3B Closed Status	SCADA, LCP-ASTN
PACV-3B Failure Alarm	SCADA, LCP-ASTN
PACV-3B Airflow Status	SCADA, LCP-ASTN

Process Air Control Valve 3C

Alarm/Status

PACV-3C Remote Status
PACV-3C Closed Status
PACV-3C Failure Alarm
PACV-3C Airflow Status

Display Location

SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN

AST3 Air Diffuser Grids

Alarm/Status

AST3 Total Airflow Status
AST3 Zone 1 Dissolved
Oxygen Status
AST3 Zone 1 Low Dissolved
Oxygen Alarm
AST3 Zone 2 Dissolved
Oxygen Status
AST3 Zone 2 Low Dissolved
Oxygen Alarm
AST3 Zone 3 Dissolved
Oxygen Status
AST3 Zone 3 Low Dissolved
Oxygen Alarm

Display Location

SCADA, LCP-ASTN
LCP-ASTN
SCADA, LCP-ASTN
LCP-ASTN
SCADA, LCP-ASTN
LCP-ASTN
SCADA, LCP-ASTN

Process Air Control Valve 4A

Alarm/Status

PACV-4A Remote Status
PACV-4A Closed Status
PACV-4A Failure Alarm
PACV-4A Airflow Status

Display Location

SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN

Process Air Control Valve 4B

Alarm/Status

PACV-4B Remote Status
PACV-4B Closed Status
PACV-4B Failure Alarm
PACV-4B Airflow Status

Display Location

SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN

Process Air Control Valve 4C

Alarm/Status

PACV-4C Remote Status
PACV-4C Closed Status
PACV-4C Failure Alarm
PACV-4C Airflow Status

Display Location

SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN

AST4 Air Diffuser Grids

Alarm/Status

AST4 Total Airflow Status
AST4 Zone 1 Dissolved
 Oxygen Status
AST4 Zone 1 Low Dissolved
 Oxygen Alarm
AST4 Zone 2 Dissolved
 Oxygen Status
AST4 Zone 2 Low Dissolved
 Oxygen Alarm
AST4 Zone 3 Dissolved
 Oxygen Status
AST4 Zone 3 Low Dissolved
 Oxygen Alarm

Display Location

SCADA, LCP-ASTN
LCP-ASTN

SCADA, LCP-ASTN

LCP-ASTN

SCADA, LCP-ASTN

LCP-ASTN

SCADA, LCP-ASTN

Process Air Control Valve 5A

Alarm/Status

PACV-5A Remote Status
PACV-5A Closed Status
PACV-5A Failure Alarm
PACV-5A Airflow Status

Display Location

SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN

Process Air Control Valve 5B

Alarm/Status

PACV-5B Remote Status
PACV-5B Closed Status
PACV-5B Failure Alarm
PACV-5B Airflow Status

Display Location

SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN

Process Air Control Valve 5C

Alarm/Status

PACV-5C Remote Status
PACV-5C Closed Status
PACV-5C Failure Alarm
PACV-5C Airflow Status

Display Location

SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN

AST5 Air Diffuser Grids

Alarm/Status

AST5 Total Airflow Status
AST5 Zone 1 Dissolved
 Oxygen Status
AST5 Zone 1 Low Dissolved
 Oxygen Alarm
AST5 Zone 2 Dissolved
 Oxygen Status

Display Location

SCADA, LCP-ASTN
LCP-ASTN

SCADA, LCP-ASTN

LCP-ASTN

AST5 Zone 2 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN
AST5 Zone 3 Dissolved Oxygen Status	LCP-ASTN
AST5 Zone 3 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN

Process Air Control Valve 6A

Alarm/Status

Display Location

PACV-6A Remote Status	SCADA, LCP-ASTN
PACV-6A Closed Status	SCADA, LCP-ASTN
PACV-6A Failure Alarm	SCADA, LCP-ASTN
PACV-6A Airflow Status	SCADA, LCP-ASTN

Process Air Control Valve 6B

Alarm/Status

Display Location

PACV-6B Remote Status	SCADA, LCP-ASTN
PACV-6B Closed Status	SCADA, LCP-ASTN
PACV-6B Failure Alarm	SCADA, LCP-ASTN
PACV-6B Airflow Status	SCADA, LCP-ASTN

Process Air Control Valve 6C

Alarm/Status

Display Location

PACV-6C Remote Status	SCADA, LCP-ASTN
PACV-6C Closed Status	SCADA, LCP-ASTN
PACV-6C Failure Alarm	SCADA, LCP-ASTN
PACV-6C Airflow Status	SCADA, LCP-ASTN

AST6 Air Diffuser Grids

Alarm/Status

Display Location

AST6 Total Airflow Status	SCADA, LCP-ASTN
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AST6 Zone 1 Dissolved Oxygen Status	LCP-ASTN
AST6 Zone 1 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN
AST6 Zone 2 Dissolved Oxygen Status	LCP-ASTN
AST6 Zone 2 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN
AST6 Zone 3 Dissolved Oxygen Status	LCP-ASTN
AST6 Zone 3 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN

Process Air Control Valve 7A

<u>Alarm/Status</u>	<u>Display Location</u>
PACV-7A Remote Status	SCADA, LCP-ASTN
PACV-7A Closed Status	SCADA, LCP-ASTN
PACV-7A Failure Alarm	SCADA, LCP-ASTN
PACV-7A Airflow Status	SCADA, LCP-ASTN

Process Air Control Valve 7B

<u>Alarm/Status</u>	<u>Display Location</u>
PACV-7B Remote Status	SCADA, LCP-ASTN
PACV-7B Closed Status	SCADA, LCP-ASTN
PACV-7B Failure Alarm	SCADA, LCP-ASTN
PACV-7B Airflow Status	SCADA, LCP-ASTN

Process Air Control Valve 7C

<u>Alarm/Status</u>	<u>Display Location</u>
PACV-7C Remote Status	SCADA, LCP-ASTN
PACV-7C Closed Status	SCADA, LCP-ASTN

PACV-7C Failure Alarm	SCADA, LCP-ASTN
PACV-7C Airflow Status	SCADA, LCP-ASTN

AST7 Air Diffuser Grids

<u>Alarm/Status</u>	<u>Display Location</u>
AST7 Total Airflow Status	SCADA, LCP-ASTN
AST7 Zone 1 Dissolved Oxygen Status	LCP-ASTN
AST7 Zone 1 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN
AST7 Zone 2 Dissolved Oxygen Status	LCP-ASTN
AST7 Zone 2 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN
AST7 Zone 3 Dissolved Oxygen Status	LCP-ASTN
AST7 Zone 3 Low Dissolved Oxygen Alarm	SCADA, LCP-ASTN

4.3.4.4 Intermediate Mixed Liquor Return

IMLRP-1 Pump

<u>Alarm/Status</u>	<u>Display Location</u>
IMLR Pump 1 Run Status	SCADA, LCP-ASTN
IMLR Pump 1 Failure Alarm	SCADA, LCP-ASTN
IMLR Pump 1 Motor Moisture Alarm	SCADA, LCP-ASTN

IMLRP-2 Pump

<u>Alarm/Status</u>	<u>Display Location</u>
IMLR Pump 2 Run Status	SCADA, LCP-ASTN
IMLR Pump 2 Failure Alarm	SCADA, LCP-ASTN

IMLR Pump 2 Motor Moisture
Alarm

SCADA, LCP-ASTN

IMLRP-3 Pump

Alarm/Status

Display Location

IMLR Pump 3 Run Status

SCADA, LCP-ASTN

IMLR Pump 3 Failure Alarm

SCADA, LCP-ASTN

IMLR Pump 3 Motor Moisture
Alarm

SCADA, LCP-ASTN

IMLRP-4 Pump

Alarm/Status

Display Location

IMLR Pump 4 Run Status

SCADA, LCP-ASTN

IMLR Pump 4 Failure Alarm

SCADA, LCP-ASTN

IMLR Pump 4 Motor Moisture
Alarm

SCADA, LCP-ASTN

IMLRP-5 Pump

Alarm/Status

Display Location

IMLR Pump 5 Run Status

SCADA, LCP-ASTN

IMLR Pump 5 Failure Alarm

SCADA, LCP-ASTN

IMLR Pump 5 Motor Moisture
Alarm

SCADA, LCP-ASTN

IMLRP-6 Pump

Alarm/Status

Display Location

IMLR Pump 6 Run Status

SCADA, LCP-ASTN

IMLR Pump 6 Failure Alarm

SCADA, LCP-ASTN

IMLR Pump 6 Motor Moisture
Alarm

SCADA, LCP-ASTN

IMLRP-7 Pump

Alarm/Status

IMLR Pump 7 Run Status
IMLR Pump 7 Failure Alarm
IMLR Pump 7 Motor Moisture
Alarm

Display Location

SCADA, LCP-ASTN
SCADA, LCP-ASTN
SCADA, LCP-ASTN

4.3.4.5 Tank Drainage Facility

Tank Drainage Pump

Alarm/Status

ASTDP-1 Run Status
ASTDP-1 Failure Alarm

Display Location

SCADA, LCP-ASTN
SCADA, LCP-ASTN

AST Sump Pump 1

Alarm/Status

ASTSP-1 Motor Moisture Alarm
ASTSP-1 Failure Alarm
AST Sump 1 High High
Level Alarm

Display Location

LCP-ASTSP-1
SCADA, LCP-ASTN
LCP-ASTSP-1, SCADA,
LCP-ASTN

AST Sump Pump 2

Alarm/Status

ASTSP-2 Motor Moisture Alarm
ASTSP-2 Failure Alarm
AST Sump 2 High High
Level Alarm

Display Location

LCP-ASTSP-2
SCADA, LCP-ASTN
LCP-ASTSP-2, SCADA,
LCP-ASTN

AST Sump Pump 3

Alarm/Status

ASTSP-3 Motor Moisture Alarm
ASTSP-3 Failure Alarm

Display Location

LCP-ASTSP-3
SCADA, LCP-ASTN

AST Sump 3 High High Level Alarm	LCP-ASTSP-3, SCADA, LCP-ASTN
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AST Sump Pump 4

<u>Alarm/Status</u>	<u>Display Location</u>
ASTSP-4 Motor Moisture Alarm	LCP-ASTSP-4
ASTSP-4 Failure Alarm	SCADA, LCP-ASTN
AST Sump 4 High High Level Alarm	LCP-ASTSP-4, SCADA, LCP-ASTN

4.3.4.6 Process Air Preparation Facility

Process Air Blower 1

<u>Alarm/Status</u>	<u>Display Location</u>
PA Blower 1 Run Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Ready Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Lead/Lag/Standby Status	LCP-BSC (SCADA)
PA Blower 1 Airflow Status	LCP-BSC (SCADA)
PA Blower Total Airflow Status	LCP-BSC (SCADA)
PA Blower Flow Set point Out of Range Alarm	LCP-BSC (SCADA)
PA Blower 1 Assignment Error Alarm	LCP-BSC (SCADA)
PA Blower 1 Inlet Air Temperature Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Discharge Air Temperature Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Discharge Air Temperature Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Inlet Suction Air Pressure Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Inlet Suction Pressure Alarm	LCP-B1, LCP-BSC (SCADA)

PA Blower 1 Discharge Air Pressure Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Discharge Air Pressure Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Low Discharge Air Pressure Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Differential Pressure Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Inlet Filter Differential Pressure High Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Differential Pressure Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Inlet Guide Vane Position Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Inlet Guide Vane Open Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Inlet Guide Vane Closed Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Discharge Diffuser Vane Position Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Discharge Diffuser Vane Open Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Discharge Diffuser Vane Closed Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Blow-off Valve Open Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Blow-off Valve Closed Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Blow-off Valve Open Alarm	LCP-B1, LCP-BSC (SCADA)

PA Blower 1 Discharge Isolation Valve Open Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Discharge Isolation Valve Closed Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Lube Oil Temperature Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Lube Oil Temperature High Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Lube Oil Pump Fail to Start Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Lube Oil Pump Overload Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Lube Oil Filter Differential Pressure High Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Lube Oil Pressure Low Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Lube Oil Pressure Low-Low Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Lube Oil Level Low Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Cooling Water Low Pressure Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Cooling Water Low Pressure Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Motor Power Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Motor Starter Failure Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Emergency-Stop Pressed Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Speed Radial Bearing Vibration Status (X-Axis)	LCP-B1, LCP-BSC (SCADA)

PA Blower 1 High Speed Radial Bearing Vibration Status (Y-Axis)	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Blower Bearing Vibration Failure Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Speed Radial Bearing IE Temperature Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Speed Radial Bearing DE Temperature Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Speed Thrust Bearing Temperature Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Low Speed Radial Bearing IE Temperature Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Low Speed Radial Bearing DE Temperature Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Blower Bearing Temperature Failure Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Gearbox Vibration Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 DE Motor Vibration Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 OE Motor Vibration Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Blower Bearing Vibration Failure Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Motor Bearing Vibration Failure Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Motor DE Bearing Temperature Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Motor OE Bearing Temperature Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Motor Bearing Temperature Failure Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Surge Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Blower Overload Alarm	LCP-B1, LCP-BSC (SCADA)

PA Blower 1 Start Fail Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Motor Winding Temperature Status	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 High Motor Winding Temperature Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Rotating Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Control Power Failure Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 PLC Communication Failure Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 System Warning Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 System Failure Alarm	LCP-B1, LCP-BSC (SCADA)
PA Blower 1 Out of Service Status	LCP-B1, LCP-BSC (SCADA)

Process Air Blower 2

<u>Alarm/Status</u>	<u>Display Location</u>
PA Blower 2 Run Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Ready Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Lead/Lag/Standby Status	LCP-BSC (SCADA)
PA Blower 2 Airflow Status	LCP-BSC (SCADA)
PA Blower Total Airflow Status	LCP-BSC (SCADA)
PA Blower Flow Set point Out of Range Alarm	LCP-BSC (SCADA)
PA Blower 2 Assignment Error Alarm	LCP-BSC (SCADA)
PA Blower 2 Inlet Air Temperature Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Discharge Air Temperature Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 High Discharge Air Temperature Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Inlet Suction Air Pressure Status	LCP-B2, LCP-BSC (SCADA)

PA Blower 2 High Inlet Suction Pressure Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Discharge Air Pressure Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 High Discharge Air Pressure Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Low Discharge Air Pressure Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 High Differential Pressure Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Inlet Filter Differential Pressure High Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Differential Pressure Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Inlet Guide Vane Position Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Inlet Guide Vane Open Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Inlet Guide Vane Closed Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Discharge Diffuser Vane Position Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Discharge Diffuser Vane Open Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Discharge Diffuser Vane Closed Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Blow-off Valve Open Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Blow-off Valve Closed Status	LCP-B2, LCP-BSC (SCADA)

PA Blower 2 Blow-off Valve Open Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Discharge Isolation Valve Open Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Discharge Isolation Valve Closed Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Lube Oil Temperature Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Lube Oil Temperature High Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Lube Oil Pump Fail to Start Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Lube Oil Pump Overload Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Lube Oil Filter Differential Pressure High Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Lube Oil Pressure Low Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Lube Oil Pressure Low-Low Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Lube Oil Level Low Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Cooling Water Low Pressure Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Cooling Water Low Pressure Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Motor Power Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Motor Starter Failure Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Emergency-Stop Pressed Alarm	LCP-B2, LCP-BSC (SCADA)

PA Blower 2 High Speed Radial Bearing Vibration Status (X-Axis)	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 High Speed Radial Bearing Vibration Status (Y-Axis)	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 High Blower Bearing Vibration Failure Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 High Speed Radial Bearing IE Temperature Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 High Speed Radial Bearing DE Temperature Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 High Speed Thrust Bearing Temperature Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Low Speed Radial Bearing IE Temperature Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Low Speed Radial Bearing DE Temperature Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 High Blower Bearing Temperature Failure Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Gearbox Vibration Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 DE Motor Vibration Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 OE Motor Vibration Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 High Blower Bearing Vibration Failure Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 High Motor Bearing Vibration Failure Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Motor DE Bearing Temperature Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Motor OE Bearing Temperature Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 High Motor Bearing Temperature Failure Alarm	LCP-B2, LCP-BSC (SCADA)

PA Blower 2 Surge Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Blower Overload Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Start Fail Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Motor Winding Temperature Status	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 High Motor Winding Temperature Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Rotating Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Control Power Failure Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 PLC Communication Failure Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 System Warning Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 System Failure Alarm	LCP-B2, LCP-BSC (SCADA)
PA Blower 2 Out of Service Status	LCP-B2, LCP-BSC (SCADA)

Process Air Blower 3

<u>Alarm/Status</u>	<u>Display Location</u>
PA Blower 3 Run Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Ready Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Lead/Lag/Standby Status	LCP-BSC (SCADA)
PA Blower 3 Airflow Status	LCP-BSC (SCADA)
PA Blower Total Airflow Status	LCP-BSC (SCADA)
PA Blower Flow Set point Out of Range Alarm	LCP-BSC (SCADA)
PA Blower 3 Assignment Error Alarm	LCP-BSC (SCADA)
PA Blower 3 Inlet Air Temperature Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Discharge Air Temperature Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Discharge Air Temperature Alarm	LCP-B3, LCP-BSC (SCADA)

PA Blower 3 Inlet Suction Air Pressure Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Inlet Suction Pressure Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Discharge Air Pressure Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Discharge Air Pressure Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Low Discharge Air Pressure Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Differential Pressure Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Inlet Filter Differential Pressure High Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Differential Pressure Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Inlet Guide Vane Position Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Inlet Guide Vane Open Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Inlet Guide Vane Closed Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Discharge Diffuser Vane Position Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Discharge Diffuser Vane Open Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Discharge Diffuser Vane Closed Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Blow-off Valve Open Status	LCP-B3, LCP-BSC (SCADA)

PA Blower 3 Blow-off Valve Closed Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Blow-off Valve Open Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Discharge Isolation Valve Open Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Discharge Isolation Valve Closed Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Lube Oil Temperature Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Lube Oil Temperature High Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Lube Oil Pump Fail to Start Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Lube Oil Pump Overload Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Lube Oil Filter Differential Pressure High Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Lube Oil Pressure Low Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Lube Oil Pressure Low-Low Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Lube Oil Level Low Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Cooling Water Low Pressure Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Cooling Water Low Pressure Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Motor Power Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Motor Starter Failure Alarm	LCP-B3, LCP-BSC (SCADA)

PA Blower 3 Emergency-Stop Pressed Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Speed Radial Bearing Vibration Status (X-Axis)	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Speed Radial Bearing Vibration Status (Y-Axis)	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Blower Bearing Vibration Failure Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Speed Radial Bearing IE Temperature Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Speed Radial Bearing DE Temperature Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Speed Thrust Bearing Temperature Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Low Speed Radial Bearing IE Temperature Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Low Speed Radial Bearing DE Temperature Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Blower Bearing Temperature Failure Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Gearbox Vibration Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 DE Motor Vibration Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 OE Motor Vibration Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Blower Bearing Vibration Failure Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Motor Bearing Vibration Failure Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Motor DE Bearing Temperature Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Motor OE Bearing Temperature Status	LCP-B3, LCP-BSC (SCADA)

PA Blower 3 High Motor Bearing Temperature Failure Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Surge Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Blower Overload Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Start Fail Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Motor Winding Temperature Status	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 High Motor Winding Temperature Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Rotating Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Control Power Failure Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 PLC Communication Failure Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 System Warning Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 System Failure Alarm	LCP-B3, LCP-BSC (SCADA)
PA Blower 3 Out of Service Status	LCP-B3, LCP-BSC (SCADA)

4.3.4.7 Channel Aeration Blowers

Channel Aeration Blower 1

<u>Alarm/Status</u>	<u>Display Location</u>
CA Blower 1 Inlet Filter Differential Pressure Status	SCADA
CA Blower 1 Inlet Filter Differential Pressure High Alarm	SCADA
CA Blower 1 Discharge Pressure High Alarm	SCADA
CA Blower 1 Discharge Pressure Low Alarm	SCADA
CA Blower 1 Run Status	SCADA, MCC-ASTN2
CA Blower 1 Off Status	MCC-ASTN2
CA Blower 1 Fail Alarm	SCADA

Channel Aeration Blower 2

<u>Alarm/Status</u>	<u>Display Location</u>
CA Blower 2 Inlet Filter Differential Pressure Status	SCADA
CA Blower 2 Inlet Filter Differential Pressure High Alarm	SCADA
CA Blower 2 Discharge Pressure High Alarm	SCADA
CA Blower 2 Discharge Pressure Low Alarm	SCADA
CA Blower 2 Run Status	SCADA, MCC-ASTN2
CA Blower 2 Off Status	MCC-ASTN2
CA Blower 2 Fail Alarm	SCADA

Channel Aeration Blower 3

<u>Alarm/Status</u>	<u>Display Location</u>
CA Blower 3 Inlet Filter Differential Pressure Status	SCADA
CA Blower 3 Inlet Filter Differential Pressure High Alarm	SCADA
CA Blower 3 Discharge Pressure High Alarm	SCADA
CA Blower 3 Discharge Pressure Low Alarm	SCADA
CA Blower 3 Run Status	SCADA, MCC-ASTN2
CA Blower 3 Off Status	MCC-ASTN2
CA Blower 3 Fail Alarm	SCADA

4.3.5 Daily Operational Checks

4.3.5.1 General

1. Refer to the general daily operation check requirements described in Section 4.0.5.
2. Consult Sections 4.3.5.2 through 4.3.5.8 and the appropriate manufacturer's operation and maintenance manuals for specific monitoring requirements.

4.3.5.2 Activated Sludge Tanks (ASTs)

1. Check fluid surface in ASTs for excessive foaming and floating trash and debris. Make adjustments to spray water as needed and remove floating trash and debris. Report excessive foam to the Operations Supervisor. Visualize spray nozzle performance and note any indications of spray nozzle fouling. Report all nonfunctioning nozzles to the Maintenance Manager and Operations Supervisor.
2. Verify the Primary Effluent Gate at the Primary Effluent Bypass Structure is in the open position and no high level alarms are indicated. Record and report all alarms to the Operations Supervisor.
3. Check level of Primary Effluent in the AST Influent Channel to verify adequate flow, and verify weir gates are in the closed position. Examine surface of PE for accumulation of floatables, record and report findings to Operations Supervisor.
4. Check positioning of both 24" PE knife gate valves to each operating AST's Primary Effluent Diffuser to ensure adequate flow in the ASTs.
5. Check the individual RAS flow meter readings at the SCADA system for each operating AST. Make field adjustment as needed to the 10" RAS knife gate valve to achieve proper flow ratio. Verify the flow ratio of RAS to PE is achieved in each AST as established by the Operations Supervisor.

4.3.5.3 Selector Zone Mixing System

Submersible Mixers

1. Confirm proper [RUN] status indication at the SCADA system for every submersible mixer in each operating AST. Record and report any alarm or failure indication to the Operations Supervisor.
2. Verify smooth and quiet operation of the mixers in the field. Record and report any sign of abnormal operation to the Operations Supervisor.
3. Check and record the submersible mixer run times at MCC-ASTN1. Notify Maintenance Manager and Operations Supervisor of any required scheduled maintenance to properly coordinate operation and maintenance activities.
4. Consult the *ITT Flygt Mixer 4640 Installation, Operation, and Maintenance Manual* for troubleshooting of the submersible mixers.

4.3.5.4 Air Diffusers

Process Air Control Valves (PACV)

1. Confirm airflow reading at the SCADA system to each air diffuser drop leg for each operating AST. Record and report any valve failure or alarm indication to the Operations Supervisor.
2. Verify airflow readings and valve positioning in the field at each operating PACV. Confirm local airflow indication coordinates with SCADA airflow indication. Record and report high or low reading discrepancy to the Maintenance Manager.
3. Visually observe the operation of the PACVs, and check for proper travel, leaks, unusual noise, and excessive temperature (hand touch). Record and report all noted problems to the Maintenance Manager.

4. Verify local pressure indication at each process air drop leg is within acceptable range. Record and report high readings to the Maintenance Manager and Operations Supervisor.
5. Verify local DO readings in the field, and confirm coordination of reading with SCADA system DO indication. Record and report all non-uniform readings to Operations Supervisor and Maintenance Manager.
6. Periodically wipe each sensor with a wet rag to maintain proper readings. Zero and re-calibrate each DO sensor as recommended by manufacturer, or as coordinated by maintenance schedule.
7. Consult the *Rotork Electric IQT Range Installation and Maintenance Instructions* for troubleshooting of the PACV actuators.
8. Consult the *Hach LDO Dissolved Oxygen Probe* and *Hach SC100 Controller Data Sheets* for troubleshooting of the DO sensors.

Air Diffuser Grids

1. Observe the aeration pattern on the surface of each operating AST. Survey for uniformity of aeration patterns and excessive foam development. Report any indication of coarse bubbling or excessive foam production to the Operations Supervisor.
2. Open the Air Diffuser Grid purge system ball valve for every operating diffuser grid at least once per week to purge trapped liquid. Close the ball valve when purged liquid stops flowing and mist appears at the discharge.
3. "Air Bump" each operating diffuser grid once per week by placing the individual controlling PACV into "Local" mode and increasing airflow to 1.5 SCFM per diffuser. Maintain increased airflow for 30-minutes, and then return to normal rate.

4. Using the manufacturer provided portable Pressure Monitoring System, monitor the diffuser pressure drop once per week in each operating diffuser grid. Record data on provided Pressure Log Sheets, and refer to manufacturer's Diffuser Pressure Monitoring Chart for data interpretation. Track and review data with Operations Supervisor to establish fouling rate of diffusers and establish cleaning schedule.
5. Consult the *Sanitaire Pressure Monitoring System Installation, Operation and Maintenance Manual* and the *Sanitaire Fine Bubble Aeration System Installation, Operation and Maintenance Manual* for troubleshooting of the portable pressure monitoring system or process air diffusers.

4.3.5.5 Intermediate Mixed Liquor Return

IMLR Pumps

1. Confirm proper [RUN] status indication at the SCADA system for the IMLR pumps in each operating AST. Record and report any alarm or failure indication to the Operations Supervisor.
2. Check and record the IMLR pump run times at MCC-ASTN2. Notify Maintenance Manager and Operations Supervisor of any required scheduled maintenance to properly coordinate operation and maintenance activities.
3. Verify smooth and quiet operation of all operating IMLR pumps. Record and report any unusual operation to the Maintenance Manager.
4. Visually observe IMLR piping and connections in each AST for any signs of leaks, or other unusual problems. Record and report any problems to the Maintenance Manager.
5. Confirm IMLR pump discharges into appropriate mixing cell(s) for each operating AST. Confirm appropriate discharge location(s) with Operations Supervisor, based on the process requirements.

6. Using portable flow meter, check the IMLR flow rate in all operating ASTs. Confirm measured flow rate with Operations Supervisor, and throttle discharge valves as needed to achieve required flow.
7. Consult the *ITT Flygt Operating and Maintenance Instructions, 118221 Submersible Propeller Pumps* for troubleshooting of the IMLR Pumps.

4.3.5.6 Tank Drainage Facility

1. Check position of all 8" tank drain plug valves in the AST Influent Gallery. All tank drain valves shall be in the full closed position.
2. Check any Out-Of-Service ASTs for trash and debris, or excessive water accumulation. Report excessive standing water or trash and debris accumulation to the Operations Supervisor.

Tank Drainage Pump

1. Verify that Tank Drainage Pump operating status [RUN/OFF] is appropriately indicated at MCC-ASTN2, and record the pump run time. Notify Maintenance Manager of any required scheduled maintenance for the Tank Drainage Pump.
2. Visually observe tank drainage piping and connections in the AST Influent Gallery for any visible leaking, damage, or other unusual problems. Record and report any problems to the Maintenance Manager.
3. Verify proper positioning of all valves in the tank drainage pump discharge piping. Periodically exercise valves in empty tank drain piping to check for free and proper valve travel. Record and report any problems to the Maintenance Manager.

4. Consult the *Crown Installation and Operation Manual, Self-Priming Centrifugal Pumps: Series PO8LA* for troubleshooting of the Tank Drainage Pump.

AST Sump Pumps

1. Check alarm and status indication at the SCADA system for the AST Influent gallery sump pumps, and confirm with local control panel indication. Record and report any alarm or failure indication to the Operations Supervisor.
2. Check the sump pump run times at their local control panels, and record. Notify Maintenance Manager of any required scheduled maintenance.
3. Check each sump area for accumulation of trash and debris. Remove as needed, and dispose of properly. Verify free operation of each float switch. Record and report any problems to the Maintenance Manager.
4. Visually inspect sump pump piping, valve positioning, and piping connections for any signs of leaking, damage, or other unusual problems. Record and report any problems to the Maintenance Manager.
5. Consult the *Gierlich-Mitchell, Inc. Specification 11 82 05 – Sump Pumps Operation and Maintenance Manual* for troubleshooting of the sump pumps.

4.3.5.7 Process Air Preparation Facility

1. Check operating blower(s) to verify smooth operation. Record and report any unusual operation to the Maintenance Manager.
2. Check each individual LCP-BCP for any indication of alarm conditions or unusual status indications. Record and report any noted indications to the Operations Supervisor and Maintenance Manager.

3. Check and record blower run times weekly at the individual LCP-BCPs. Check uniformity of readings as displayed at each LCP-BCP, LCP-BSC, and on the SCADA system for uniformity. Report non-uniform readings to the Operations Supervisor.
4. Check gear box, oil reservoir, hoses, and lube oil pumping system for leaks, excessive heat, or unusual noise. Record and report all noted problems to the Maintenance Manager.
5. Check the condition of the oil and the level in the oil reservoir on the base of the blower skid. Replenish oil as needed.
6. Check control settings on the individual blower local control panels and LCP-BSC, and confirm the setting requirements with the operations Supervisor.
7. Read and record air pressure in the main discharge header. Report variance from operational set point to Operations Supervisor.
8. Check and record blower vibration monitoring system of operating blower(s). Report changes in the daily readings to the Maintenance Manager.
9. Check and record discharge air temperature of operating blower(s). Report high temperature readings to the Operations Supervisor.
10. Check and record the oil pressure and temperature of operating blower(s). Report high readings to the Operations Supervisor and Maintenance Manager.
11. Verify cooling water flow to the oil heat exchangers. Report any visible leaking or cooling water flow disruption to the Operations Supervisor. Operating blower(s) REQUIRE cooling water for the oil heat exchangers.
12. Check and record kilowatt meter readings for operating blower(s). Report all high and low readings to the Operations Supervisor and Maintenance Manager.

13. Check inlet guide vane actuator motor for excessive noise or heat. Record and report noted problems to Maintenance Manager.
14. Verify proper operation of motor operated valves, checking for proper valve travel, any leaking, unusual noise, or excessive temperature (by touch). Record and report noted problems to Maintenance Manager.
15. Check for debris drawn against the inlet filter panel and remove as necessary.
16. Check and record inlet vacuum reading on operating blower(s). When inlet vacuum reading increases approximately 2-3/4-inches W.C. above clean filter reading, notify Operations Supervisor and Maintenance Manager for filter cleaning/replacement.
17. Consult the *DRESSER Roots Installation, Operation & Maintenance Manual Specification Number: 11 82 18 – Process Air Blowers and Appurtenances (Volumes 1 and 2)* for troubleshooting of the process air blowers.

4.3.5.8 Channel Aeration Blowers

1. Check for alarm and status indication at LCP-ASTN and the SCADA system for the Channel Aeration Blowers. Record and report any alarm or failure indication to the Operations Supervisor.
2. Check operating Channel Aeration Blowers for smooth and quiet operation. Record and report any unusual blower operation to Maintenance Manager.
3. Check operating Channel Aeration Blower drives for leaks, unusual noise, or excessive temperature (by touch). Record and report any noted problems to Maintenance Manager.
4. Check and record oil level in oil reservoir. Replenish oil as needed.

5. Check and record local differential pressure indication across inlet filter of operating blower(s). Schedule filter cleaning/replacement with Operations Supervisor.
6. Check operation of the discharge valves. Record and report any noted problems to the Maintenance Manager.
7. Check wear, tension, and alignment of drive belts. Record and report any noted problems to the Maintenance Manager.
8. Consult the *United Blower, Inc. Specification Section: 11 82 01 – Rotary Positive Displacement Blowers Installation, Operation, and Maintenance Manual* for troubleshooting of the sump pumps.

4.3.6 Training Record

The following record should be used by the Operator to assure a complete understanding of the Activated Sludge Facilities.

4.3.6.1 Reading Assignment

1. Operation of Wastewater Treatment Plants – MOP 11 (6th Ed.), Chapters 12, 14, 16, 20, and 24. Water Environment Federation, 2008.
2. Operation of Wastewater Treatment Plants – A Field Study Training Program (7th Ed.). Chapter 1 – Activated Sludge, and Chapter 5 - Maintenance. Sacramento: California State University Sacramento Foundation, 2007.

2.3.6.1 Field Instruction

The operator should review and know the location and purpose of the following items:

<u>Item</u>	<u>Operator Initials</u>
Activated Sludge Tanks	_____
RAS Flow Meters	_____
RAS Flow Control Valve	_____
PE Isolation/Flow Control Valves	_____
Influent Channel Slide Gates/Stop Logs	_____
Selector Zone Mixing System	_____
Submersible Mixers/Local ROT switches	_____
MCC-ASTN1	_____
PLC-ASTN	_____
Air Diffusers	_____
Process Air Control Valves	_____
Process Air Flow Meters	_____
Dissolved Oxygen Probes	_____
Diffuser Pressure Monitoring Panels	_____
PLC-ASTN	_____
Intermediate Mixed Liquor Return	_____
IMLR Pumps	_____
IMLR Discharge Valves	_____
Portable Flow Meter	_____
MCC-ASTN2	_____
PLC-ASTN	_____
Tank Drainage Facility	_____
Tank Drainage Pump	_____
Tank Drain Plug Valves	_____
Sump Pumps	_____
LCP-ASTSP-1,2,3,4	_____
PLC-ASTN	_____

MCC-ASTN2	_____
Process Air Preparation Facility	_____
Process Air Blowers	_____
Process Air Blow-off Valves	_____
Process Air Isolation Valves	_____
Process Air Blower Lube Oil Reservoir	_____
Process Air Blower Cooling Water Supply	_____
Process Air Blower Auxiliary Lube Oil Pump	_____
Inlet Guide Vane Actuators	_____
Discharge Diffuser Vane Actuators	_____
PA Blower Base Plate Instrumentation Panel	_____
Process Air Blower Motor Starters	_____
LCP-BCP (LCP-B1, B2, B3)	_____
LCP-BSC	_____
LCP-ASTN	_____
MCC-ASTN2	_____
SG-ASTN	_____
Channel Aeration Facilities	_____
Channel Aeration Blowers	_____
Channel Aeration Blower Isolation Valves	_____
AST Influent Channel Isolation Valve	_____
AST Effluent Channel Isolation Valve	_____
Portable Channel Aeration Flow Meter	_____
AST Influent Channel Course Air Diffusers	_____
AST Effluent Channel Course Air Diffusers	_____
SST Influent Channel Course Air Diffusers	_____
MCC-ASTN2	_____
LCP-ASTN	_____

4.4 SECONDARY SEDIMENTATION FACILITIES

4.4.1 Description of Controls and Operation

4.4.1.1 General

Refer to the general control and operational philosophy description presented in Section 4.0.1. Process schematics associated with the Secondary Sedimentation Facilities (SSF) are provided in Section 3.4 and referenced as applicable throughout Section 4.4. The controls, status, and annunciator panels for the SSF consist of the field controls and local control panels (LCPs). The primary LCP (LCP-SST1) is located in the SSF local control center SST-LCC-1, which also houses switchboards, variable frequency drives (VFDs), and the motor control center (MCC-SST1).

4.4.1.2 Sludge Collectors

The SSF include 10 secondary sedimentation tanks (SST). Each SST is equipped with a plastic flight and chain sludge collector and drive. Each collector drive is provided with both a locally mounted remote-off-test (ROT) switch and a forward/jog reverse (F/JR) selector switch.

For each ROT switch, in the “Remote” position, the collectors are controlled by an on/off selector switch in the SCADA system. When the ROT switch is in the “Remote” position and the on/off selector switch is in the “On” position, the sludge collectors run continuously. The “Off” position of each ROT switch is lockable and overrides all other controls.

The “Test” position of the ROT switch is spring loaded (returning to “Off”) and enables the F/JR switch to operate the sludge collector drive. The “Forward” and spring loaded “Jog Reverse” positions of the F/JR switch operate the drive in the indicated direction.

Each drive shaft is equipped with a shear pin to prevent damage to the motor in the event of an overload. Any shear pin failure is displayed and logged in the SCADA system, disabling drive operation. Any motor overload is also displayed and logged into

the SCADA system. A motor “Run” indicator is displayed in the SCADA system whenever the motor is in operation.

4.4.1.3 Return Activated Sludge (RAS) Pumping

RAS flows by gravity from the 10 SSTs to the RAS/WAS Wet Well, with each SST having a 10-inch magnetic flow meter to measure the RAS withdrawal rate. Each of the 10 flow meters has remote-mounted local indication of the flow rate. The RAS flow from each SST, as well as the total combined RAS flow from the SSTs to the RAS/WAS Wet Well, is displayed in the SCADA system.

The RAS Pump Station includes six (6) vertical turbine RAS pumps: three driven by variable frequency drives (RAS Pumps 1A, 1B, and 1C) and three that operate at constant speed (RAS Pumps 1D, 1E, and 1F). The VFD driven and the constant speed RAS pumps operate in a lead\lag\standby rotation. A three-position, lead variable speed RAS pump selector switch and a three-position, lead constant speed selector switch are incorporated into the SCADA system. The lead-lag status of the variable and constant speed pumps is determined by the setting of each respective switch. The variable speed and constant speed pump lead-lag-standby configurations are shown in the tables below, respectively. If a selected variable or constant speed pump does not operate for any reason, the pump in standby mode is automatically started by the PLC after a software time delay, as a substitute.

VARIABLE SPEED PUMP SELECTOR SWITCH POSITION		
LEAD PUMP	LAG PUMP	STANDBY PUMP
1A	1B	1C
1B	1C	1A
1C	1A	1B

CONSTANT SPEED PUMP SELECTOR SWITCH POSITION		
LEAD PUMP	LAG PUMP	STANDBY PUMP
1D	1E	1F
1E	1F	1D
1F	1D	1E

Each of the variable speed pumps is equipped with a locally-mounted ROT switch. The "Remote" position activates SCADA system control, and the lockable "Off" position prevents the respective pump from operating, overriding all other controls. The "Test" is used to test the operation of the RAS pump and will spring-return to the "Off" position.

Each of the variable speed pumps is also equipped with a hand-off-auto (HOA) switch in the SCADA system. In the "Hand" mode, the respective pump runs continuously at the speed set at the VFD. In the "Off" mode, the pump only operates in the "Test" mode at the ROT switch, and in the "Auto" mode the pump is controlled by the PLC program.

An input signal from each variable speed pump indicates the motor status, which is displayed in the SCADA system. If the PLC program does not receive a signal that the motor is running within an operator adjustable time limit, the pump is automatically be shut down. The loss of flow for a variable speed pump is detected by a discharge check valve position switch mounted on the check valve swing arm. The loss of flow is indicated by a discrete digital signal to the programmable logic controller (PLC). This signal has an operator adjustable time delay before disabling the discrete digital output start/stop command to the VFD to interlock and shutdown the pump. If a variable speed pump is disabled due to the loss of flow, a failure alarm is displayed and logged in the SCADA system. In this circumstance, after corrective measures have been completed, the reset pushbutton in the SCADA system must be pressed before the affected pump(s) can be operated again. Pump motor overload signals from the VFD are also displayed and logged in the SCADA system.

Each of the constant speed pumps is also furnished with a locally-mounted ROT switch. The "Remote" position activates SCADA system control, and the lockable "Off"

position prevents the respective pump from operating, overriding all other controls. The “Test” is used to test the operation of the RAS pump and will spring-return to the “Off” position. Also like the variable speed pumps, each of the constant speed pumps is also equipped with a hand-off-auto (HOA) switch in the SCADA system. In the "Hand" mode, the respective pump runs continuously. In the "Off" mode, the pump only operates in the “Test” mode at the ROT switch, and in the "Auto" mode the pump is controlled by the PLC program.

An input signal from MCC-SST1 indicates the motor status, which is displayed in the SCADA system. The loss of flow for a variable speed pump is detected by a discharge check valve position switch mounted on the check valve swing arm. The loss of flow is indicated by a discrete digital signal to the PLC. If a constant speed pump is disabled due to the loss of flow, a failure alarm is displayed and logged in the SCADA system. Pump motor overload signals are also displayed and logged in the SCADA system. In the event of either a loss of flow or motor overload, after corrective measures have been completed, the starter and PLC logic must be reset at MCC-SST1 before the affected pump(s) can be operated again.

A common seal water supply manifold serves all six pumps in the RAS Pump Station and is equipped with both a flow switch (thermal mass flow meter) and a pressure gauge. The flow switch provides a discrete digital input to the PLC indicating a no flow condition. The PLC logic compares the call to start any of the RAS pumps to the presence of seal water flow. If the presence of seal water is not detected over a preset operator adjustable time duration, a seal water failure alarm is displayed and logged into the SCADA system. In the event of this alarm, the PLC logic shuts down and locks out the RAS pumps. After corrective measures are implemented, the PLC logic must be reset in the SCADA system.

The PLC automatically varies and sequences two (2) variable speed and two (2) constant speed pumps to maintain a continuous RAS flow as set as an operator adjustable percent (25%-100%) of total activated sludge influent flows in SCADA. The selected RAS pumps are automatically adjusted based on the following activated sludge tank (AST) influent flow conditions:

- 2,700 to 5400 GPM: 1 VFD pump
- 5,401 to 10,800 GPM: 2 VFD pumps (shared load)
- 10,801 to 16,200 GPM: 1 constant speed + 2 VFD pumps (shared load)
- 16,201 to 21,600 GPM: 2 constant speed + 2 VFD pumps (shared load)

If the flow conditions through the RAS Pump Station are high enough so that two variable speed pumps are both operating at 100% speed, the PLC ramps both VS pumps back to 50% speed before starting the selected constant speed pump. Once the constant speed pump is operating at the appropriate speed, the two variable speed pumps are automatically modulated to keep pace with the flow conditions as stated above. Operator adjustable software time-delays in the PLC program to prevent nuisance starting and stopping of either the variable or constant speed pumps if the flow conditions are close to the limits of either starting another pump or removing a pump from service.

The RAS Pump Station can also be operated in a manual mode by placing the HOA selector switch of the desired variable speed pump in the “Hand” position. In this mode the speed of the VFD can be manually adjusted at the VFD panel by the touch screen speed control to establish the proper RAS flows. When manual mode is selected, the PLC program interrupts automatic flow-pacing function of the VFD and that pump is skipped in the automatic operational sequence, as previously described.

Upon loss of utility power and prior to the availability of standby power, the operation of the RAS pumps is automatically disabled. While on standby power, the PLC permits only four (4) pumps to operate, in sequence, as indicated below. Note that each pump is enabled after the time delay programmed into the PLC.

1. Lead variable speed pump
2. Leg variable speed pump
3. Lead constant speed pump
4. Leg constant speed pump

Once utility power is restored, after the time delay, the disabling interlocks are automatically removed.

A schematic of the RAS Pump Station is provided in Figure 3.4-2.

4.4.1.4 Waste Activated Sludge (WAS) Pumping

Waste Activated Sludge (WAS) is withdrawn from the RAS/WAS Wet Well via two (2) variable speed progressive cavity pumps (duty and standby) and pumped to the WAS Thickening Facility. Both pumps are equipped with ROT and on/off selector switches in the SCADA system. The duty and standby pumps are also manually toggled via the SCADA system.

When the ROT selector switch is in the “Off” position, the on/off selector switch has no control. The “Off” position of the ROT switch is lockable and overrides all controls. When the ROT selector switch is in the “Remote” position, and the on/off selector switch in the “On” position, that pump runs continuously unless a failure is experienced as described below. When the ROT switch is in the “Test” position, the pump runs until the switch is released, spring-returning to “Off.” The speed of each of the WAS pumps is manually regulated by means of a 10-turn potentiometer.

The status of the WAS pump motors (i.e., running or not) is displayed in the SCADA system. WAS pump failures are indicated via alarms at the pumps’ respective LCPs, as well as at the primary LCP (LCP-SST1), located in the SSF local control center (SST-LCC-1). The discharge check valve lever switch associated with each of the two WAS pumps provide a discrete “no flow” signal to the PLC. If low flow is detected for a preset operator adjustable time-delay, the PLC will shut down and lockout the applicable pump. A corresponding pump failure alarm will be displayed and logged in the SCADA system. Likewise, pump motor overload triggers an alarm that is displayed and logged in the SCADA system. Any type of failure (i.e., loss of flow or motor overflow) requires that the PLC logic be reset by means of the respective pump hand switch after corrective measures have been taken.

A flow meter is provided on the WAS discharge header. Both the instantaneous and totalized flow are indicated in the SCADA system.

A schematic of the WAS Pump Station is provided in Figure 3.4-3.

4.4.1.5 Surface Skimmers

Each of the 10 SSTs is equipped with an automatic surface rotary skimmer located at the tank influent. The skimmers are provided with a remote-off-local (ROL) switch, a forward pushbutton switch, and backward pushbutton. The “Off” position of the ROL switch is lockable and overrides all controls.

When the ROL switch is in the “Local” position, the skimmer is controlled by the forward and backward pushbuttons, which cause the skimmer to rotate in the indicated direction while the respective pushbutton is depressed.

In the “Remote” position the skimmer is controlled by the programmable logic controller (PLC). Operator adjustable interval and duration timers in the PLC periodically cycle each skimmer to tilt forward and then backward for a preset durations. Each skimmer shall tilt in sequence, forward and then backward, for the preset duration time, from skimmer 1 to skimmer 10, repeating the cycle at the next preset interval time. A discrete output signal from the PLC opens the motor operated flow valve when the skimmer begins to tilt forward to provide a flow of spray water. After the forward and backward cycle when the skimmer has returned to the upright position, the PLC signal causes the motor operated flow valve to close, discontinuing the application of spray water. If the ROL switch for a particular skimmer is in the “Off” or “Local” position, that skimmer is skipped in the sequence. If the ROL switch is placed in the “Remote” position before the next skimming sequence interval, that skimmer is returned to the skimming sequence.

The position of the skimmers is monitored with limit switches, which indicate “Forward,” “Center,” or “Backward” in the PLC. If the skimmer fails to tilt or return upright (after an operator adjustable preset time of 60 seconds in the PLC) as called for by the skimming sequence program, or if an overload is detected, the PLC initiates an alarm in the SCADA system. The PLC skimmings cycle is also halts the skimmings cycle program upon the loss of power and prior to the availability of standby power. In this event, the reset must be activated to resume the skimmings cycle program.

The skimming cycle can be both aborted and reset via the SCADA system. The abort function interrupts the PLC-operated skimming sequence program and disables operation of all the skimmers. Resetting the skimming sequence program enables the skimmers for operation when the next timed interval is called for. The status of each skimmer is indicated in the SCADA system.

A signal is transmitted from the Secondary Skimmings Pump Station to likewise inhibit skimmer operation when a skimmings pump is running, when the skimmings wet well is full or inhibited, or when the skimmings system is in the separation cycle. Once the inhibiting signal has been released, the skimmers resume the programmed operation.

A schematic of the surface skimmers is included in Figure 3.4-1.

4.4.1.6 Skimmings Pump Station

Skimmings from each SST discharge by gravity to the Secondary Skimmings Wet Well. A level sensor and a level indicator transmitter monitor the wet well level, which is displayed in the SCADA system. Level transmitter failure is also displayed and logged in the SCADA system. Two operator adjustable internal logic switches in the PLC monitor discrete levels (i.e., high and low) in the wet well. If skimmings wet well level rises to the level set by the high logic switch, the SST skimmer drive operation is interrupted and an alarm is displayed and logged in the SCADA system. If skimmings wet well level falls to the level set by low logic switch, both Secondary Skimmings Pumps 1A and 1B are automatically disabled, and pump operation is inhibited until the level rises to that set by the high logic switch, at which time the secondary skimmings pump operation program will start. If the wet well level either rises or falls to that set by the respective high or low logic switches, an alarm is displayed and logged in the SCADA system. Communication failures are also logged and displayed in the SCADA system.

The PLC controls the two secondary skimmings pumps (duty and standby) for each complete skimmings pumping cycle. A soft selector switch is provided in the SCADA system. When this switch is in the “Alternate” position, operation alternates between the two (2) pumps after each completed cycle. If the operating (duty) pump fails, the other (standby) pump is prompted to operate by the PLC. When the switch is

in the “Pump 1A” position, only Pump 1A operates as prompted by the PLC. Alternatively, when the selector switch is in the “Pump 1B” position, only Pump 1B shall operate as commanded by the PLC.

Both Pumps 1A and 1B are equipped with ROT switches at the motors. In addition, both pumps have a HOA selector switch and a fast speed/slow speed selector switch in the SCADA system. When the ROT selector switch is in the “Off” position (which is lockable), selector switch HOA for the associated pump has no control function.

When the ROT selector switch is in the “Remote” position, the HOA selector switch determines the mode of operation for the associated pump: “Hand,” “Off,” or “Auto.” The “Test” position of the ROT selector switch starts the motor of the associated pump automatically, spring-returning to the “Off” position when released. With the ROT selector switch in the “Remote” position and the HOA selector switch in the “Hand” position, the associated pump runs continuously at the speed selected by the fast speed/slow speed selector switch. The selected speed is indicated in the SCADA system, as are motor overload alarms for both pumps. With the ROT selector switch in the “Remote” position and the HOA selector switch in the “Auto” position, the associated pump is controlled by the PLC program.

The loss of flow is detected by a discharge check valve position switch mounted on the check valve swing arm of each pump. This condition triggers an operator adjustable software time delay associated with before disabling the associated pump. The signal from the check valve position switch does not have to be present to start the pump; however it must become satisfied before the operator adjustable time limit expires.

A true loss of flow activates a secondary skimmings pump failure alarm, which is displayed and logged in the SCADA system.

Any type of failure, motor overload, or loss of flow requires the reset pushbutton to be pressed to reset the PLC logic. This action should only be taken after appropriate measures have been completed to determine and correct the cause of the pump failure.

A common seal water supply manifold that serves Secondary Skimmings Pumps 1A and 1B is equipped with a flow switch and a pressure gauge. The seal water flow switch provides a discrete digital input to the PLC, indicating a no flow condition. The

PLC compares the call to start either of the skimmings pumps to the presence of seal water flow from the flow switch. The PLC proves this condition for a preset operator adjustable time duration and activates and log a pump seal water failure alarm in the SCADA system. Subsequently, the PLC shuts down and locks out the skimmings pumps, requiring the actuation of a reset in the SCADA system. Seal water flow is indicated by a rotameter at each of the two skimmings pumps.

The subnatant from the Secondary Skimmings Wet Well is pumped back to the SST Influent Channel, or recycled to the wet well to homogenize the mixture, or the homogenized mixture will be pumped to the Unstabilized Sludge Storage Tanks (USSTs) manually or automatically (as determined by the plant operator). “Auto” mode functions as programmed by the secondary skimmings pump operation program in the PLC. Function in “Hand” (i.e., manual) mode is set by the plant operator.

In the “Auto” mode of operation, the HOA selector switches of both skimmings pumps must be placed in the “Auto” position, the pump selector switch must select the desired pump or alternate function, and all three motor operated valves’ local-auto selector switches must also be in the “Auto” position. If at any time during the secondary skimmings pumping operation, all three flow control valves are closed, the duty pump is inhibited and the standby pump will not start.

All three flow control valves associated with the Second Skimmings Pump Station operate in a similar manner. The valves are equipped with a lock-out-stop switch (LOS), a local-auto selector switch, a pushbutton close switch, and a pushbutton open switch, all at the valve location. The LOS switch shall be lockable, overriding all other controls. When the local-auto selector switches are in the “Local” position, the valves are controlled by the open and closed pushbutton switches. When the local-auto selector switches are in the “Auto” position, the valves are controlled by the PLC programming, as described below.

The status of each valve’s control (i.e., “Local” or “Auto”) is displayed in the SCADA system. The position of the valves is monitored by respective open and closed position switches. If a valve fails to open or close (after a preset time of 60 seconds in the PLC) as commanded by the secondary skimmings pump operation program in the

PLC, or if a valve operator has an overload, the PLC initiates a failure alarm that is displayed and logged in the SCADA system.

When the Secondary Skimmings Wet Well level rises to the level set by the operator adjustable logic switch in the PLC, the program inhibits all 10 SST skimmers, as noted in Section 4.4.1.5 Surface Skimmers. In this event, the skimmings are allowed to separate in the wet well for an operator adjustable preset time duration of 0 to 12 hours, as programmed into the PLC. When the separation timer times out the three flow control valves are signaled, as follows: subnatant valve to open; recirculation valve to close; and discharge valve to close. In addition, the duty operating pump is signaled to start at low speed. The operating pump pumps the subnatant to the SST Influent Channel. When the Secondary Skimmings Wet Well level falls to the level set by the operator adjustable logic switch in the PLC, a signal is issued as follows: the subnatant flow control valve to close; the duty operating pump to stop; and the SST skimmers to resume operation. An operator adjustable predetermining counter (adjustable from 1 to 100 and counting down to 0) is provided to set the number of cycles of subnatant return as described above. When the predetermining counter reaches zero, the recirculation valve is signaled to open. Upon the recirculation valve opening, the subnatant valve is signaled to close, the SST skimmer are inhibited, and the duty operating pump continues to operate at slow speed, recycling the skimmings in the wet well to homogenize the mixture.

The skimmings are recycled to the wet well (i.e., homogenized) for an operator adjustable (0 to 30 minutes) preset time duration programmed into the PLC. When the homogenizing timer times out, the recirculation valve is signaled to close, the discharge valve is signaled to open, and the duty pump is signaled to change to operation at fast speed. The duty pump transfers the homogenized skimmings to the USSTs. When the level in the wet well again falls to the level set by operator adjustable logic switch in the PLC, the discharge valve is signaled to close, the duty operating pump is signaled to stop, and signal the SST skimmers are signaled to resume operation. The separation timer, the predetermining counter, and the homogenizing timer are all subsequently reset, the status of the duty and standby pumps are alternated, and subnatant pumping is resumed.

The Secondary Skimmings Pump Station has duplex sump pumps equipped with two HOA selector switches and a duty pump selector switch to manually select the lead pump. These switches are mounted in an LCP located at the pump location. The panel monitors the sump level via four float switches. The pump selected as "lead" operates when the level rises to the level set by the high float switch and continues until the level falls to the low level set by low float switch. The low-low float switch serves as a backup to shut off the pump(s). With the HOA selector switch in the "Auto" position the pumps alternate automatically as duty and standby on each pump down cycle. If the duty pump fails, the standby pump initiates operation. The sump pumps are equipped with high motor temperature switches in the motor windings to stop operation on winding high temperature. Both pumps are also equipped with moisture sensing elements and warning lights for moisture detection, with associated alarms displayed in the LCP. Alarms are displayed and logged into the SCADA system for sump pump winding high temperature, moisture, and failure, as well as when the sump level rises to the high high set point.

Upon loss of utility power and prior to the availability of standby power, SST Secondary Skimmings Pump Station operation is discontinued, stopping the Secondary Skimmings Pumps and rendering the three flow control valve in their present positions. Once power is restored, after the time delay, the PLC permits the program to be resumed.

The secondary skimmings pumps require a manual reset in the SCADA system. The pumps must be reset prior to the program being resumed.

A schematic of the Secondary Skimmings Pump Station is shown in Figure 3.4-4.

4.4.1.7 RAS Chlorination

A description of the controls and operation associated with the RAS chlorination is provided in Section 4.5.1.2 .

4.4.1.8 Tank Drainage Facilities

The SST drain pump is equipped with manual lockout-stop and start switches at the motor location. When the start switch is activated the pump motor runs

continuously unless either a motor overload or loss-of-flow failure occurs. The status of the motor (i.e., running or not) is displayed in the SCADA system. The discharge check valve lever switch provides a discrete "no flow" signal to the PLC and MCC-SST1. If the loss of flow is detected for a preset operator adjustable time-delay, the PLC will shut down and lockout the SST drain pump. A corresponding pump failure alarm will be displayed and logged in the SCADA system. Likewise, pump motor overload triggers an alarm that is displayed and logged in the SCADA system. Any type of failure (i.e., loss of flow or motor overflow) requires that the pump motor reset pushbutton at MCC-SST1 be actuated after corrective measures have been taken.

Each of the three SSF sump pumps systems are equipped with a HOA switch mounted in an LCP at each pump's respective location. The LCP monitors the sump level with float switches for low, high, and high-high settings. In "Auto" mode, the pumps operate when the level rises to the level set by the "high" float switch and continue until the level falls to the low level set by the "low" float switch. In the "Hand" mode, the pumps operate continuously.

The sump pumps also have a high temperature switch in the motor windings to stop pump operation on high winding temperature, as well as a moisture sensing element, which activates a warning light in the LCP if moisture is detected. An alarm is displayed and logged in the SCADA system in the event that either pump winding high temperature is surpassed or if the pump motor becomes overloaded. An alarm is also displayed and logged into the SCADA system if the water level in the sump rises to the level of the "high-high" float switch. Moreover, in this event, a beacon strobe light is activated and continues until the level in the respective sump has been lowered to the "high" level, at which time the strobe light is automatically disabled.

A schematic of the tank drainage facilities is provided in Figure 3.4-5.

4.4.2 Step by Step Start-Up Procedures

4.4.2.1 General Start-Up Procedures

Initial Start-Up Procedures

Initial start-up procedures for the SSF are integrated with the start-up of the activated sludge facilities (ASF), as discussed in Section 4.3.2.1.

General Start-Up Procedures

The following procedures should be used to start the SSF for routine operation:

1. Refer to the General Start-Up Procedures in Section 4.0.2.
2. Visually inspect tanks, covers, and all of the SSF for any signs of damage or improper installation. The areas should be cleaned of all installation or maintenance equipment and other articles which are not part of the system.
3. Ensure all ROT switches are in the "Off" position.
4. Determine which of the SSTs will be in service. Check the tank to be sure that there are no tools, ladders or other items in the tank to be in service.
5. Ensure that all LCPs are energized.
6. Ensure that all electrical panels are energized.
7. Ensure that the circuit breakers at MCC-SST1 are energized for all equipment to be operated. Also, ensure local On/Off disconnect boxes are energized.
8. Ensure that the tank drain valves are closed in each tank that is to come on line.
9. Ensure that the Unstabilized Sludge Storage Tank (USST) facilities are on-line and operational.
10. Open the knife gate valves between the SST Influent Channel and the SSTs to be in service.
11. If not already open, open the SST stop plates associated with the SSTs to be in service.
12. Start the sludge collectors associated with the in-service tanks when they are mostly full (see Section 4.4.2.2.1).

13. To determine if sufficient sludge has built up in the hopper, extract a sample of sludge from the sludge sample ports or use a "sludge judge" to perform a visual check. Take a sample of the sludge after the tank has been in operation for 30 minutes. Continue checking sludge level every 30 minutes until the level is 6 inches thick above the top of the hoppers. Sludge should not exceed 2 feet above the top of the hoppers. Sludge sampling procedures are similar to those associated with the Primary Sedimentation Tanks (PSTs), as described in Section 4.2.2.2.3. Once sufficient sludge has built up in the hoppers, start the RAS and WAS Pumps, as discussed in Sections 4.4.2.2.2 and 4.4.2.2.3, respectively.
14. Once skimmings have built up (visually check under the SST covers), start the rotary skimmers and secondary skimmings pumps, as described in Sections 4.4.2.2.4 and 4.4.2.2.5, respectively.

4.4.2.2 Individual Equipment Start-Up Procedures

4.4.2.2.1 Sludge Collectors

Start up the sludge and skimming collectors according to the following procedure:

1. Select the collector that will be in service.
2. Ensure the tank to be placed in service is mostly filled with water.
3. Check the tank to be sure that there is no equipment or debris in the tank.
4. Place the respective ROT switch in the "Remote" position.
5. Set On/Off switch in the "On" position. The collector will start and operate continuously.
6. Check operation of drive for noise, vibration, or excessive load on the drive chain.
7. When starting the mechanism up after a period of non-operation, carefully check the shear pin hubs on the drive sprockets to ensure that they function properly. To verify proper operation, remove the shear pin and check to see that the drive sprocket can rotate independently from the shear pin hub.

If the drive sprocket is frozen to the shear pin hub:

- a. Disassemble the shear pin hub mechanism.
- b. Clean the surfaces in contact with each other with an emery cloth.

- c. Apply a liberal coating of a lithium based grease to the contact surfaces.
 - d. Reassemble the mechanism and again check it for proper operation.
8. If the tanks have been allowed to remain full for an extended period of mechanism inactivity, ensure that there is not an excessive "sludge blanket" covering the bottom of the tank. If this cannot be accomplished visually, a "sludge judge" should be used.
 9. When starting up a large group of mechanisms which have been inoperative for a significant time period, do not start all of the mechanisms at one time. Instead, start one mechanism, ensure that it is functioning properly, and proceed mechanism by mechanism. This procedure mitigates the damages resulting from unforeseen problems with the whole group of collectors.

4.4.2.2 Return Activated Sludge (RAS) Pumping

Variable Speed Pumps

Start up the variable speed RAS pumps according to the following procedure:

1. Ensure that seal water is being supplied to the pumps.
2. Place the respective ROT switches for the pumps in the "Remote" position.
3. Place the pumps into operation as follows:

Automatic Mode of Operation

- a. Verify that the valving is in the proper orientation.
- b. Place the appropriate HOA switch in the SCADA system in the "Auto" position.

Manual Mode of Operation

- a. Verify that the valving is in the proper orientation.
 - b. Place the appropriate HOA switch in the SCADA system in the "Hand" position to start the selected pump. The pumps will operate continuously at the speed set at the VFD.
4. Visually verify that the pump is operating.

Constant Speed Pumps

Start up the constant speed RAS pumps according to the following procedure:

1. Ensure that seal water is being supplied to the pumps.
2. Place the respective ROT switches for the pumps in the "Remote" position.
3. Place the pumps into operation as follows:

Automatic Mode of Operation

- a. Verify that the valving is in the proper orientation.
- b. Place the appropriate HOA switch in the SCADA system in the "Auto" position.

Manual Mode of Operation

- a. Verify that the valving is in the proper orientation.
 - b. Place the appropriate HOA switch in the SCADA system in the "Hand" position to start the selected pump. The pumps will operate continuously.
4. Visually verify that the pump is operating.

4.4.2.2.3 Waste Activated Sludge (RAS) Pumping

Start up the WAS pumps according to the following procedure:

1. Verify that the valving is in the proper position.
2. Select the in service pump in the SCADA system.
3. Place the ROT switch in the "Remote" position.
4. Place the on/off selector switch in the "On" position.
5. The duty WAS pump will operate continuously at the speed set at the 10-turn potentiometer.

4.4.2.2.4 Surface Skimmers

Start up the SST rotary skimmers according to the following procedure:

1. Select the skimmer(s) that will be in service.

2. Verify that no debris or obstacles are around the skimmers and motors.
3. Place the respective ROL switch in the "Remote" position.
4. The skimmer operates as called for by signals from the PLC as described in Section 4.4.1.5. The rotary skimmers operate in a sequential cycle and not simultaneous operation.

4.4.2.2.5 Skimmings Pump Station

Secondary Skimmings Pumps

Start up the secondary skimmings pumps according to the following procedure:

1. Select the skimming pump that will be in service.
2. Ensure that seal water is being supplied to the pump.
3. Place the respective ROT switch for the pump in the "Remote" position.
4. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Verify the skimmings pipe valving is in the proper orientation and place the local/auto selector switch at the valve(s) in the "Auto" position.
- b. Place the appropriate HOA switch in the SCADA system in the "Auto" position. The skimmings pump will operate as called for by the PLC as described in Section 4.4.1.6.
- c. Visually verify the pump is operating.

Manual Mode of Operation

- a. Verify the skimming pipe valving is in the proper orientation, position the low speed/high speed selector switch in the SCADA system in the appropriate position, and verify that the selected pump discharge and suction valves are open.
- b. Place the appropriate HOA switch in the SCADA system in the "Hand" position to start the selected pump.
- c. Visually verify the pump is operating.

Secondary Skimmings Pump Station Sump Pumps

Start up the Secondary Skimmings Pump Station sump pumps according to the following procedure:

1. Select the lead pump via the duty pump selector switch at the LCP panel mounted at the pump location.
2. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Verify the skimmings pipe valving is in the proper orientation and place the local/auto selector switch at the valve(s) in the "Auto" position.
- b. Place the HOA switches in the "Auto" position to enable the pumps to alternate cycles.
- c. The pump will operate when it receives a signal provided by the sump level indicators that the sump is at a high level and will run until the sump reaches low level.

Manual Mode of Operation

- a. Place the HOA switch for the pump to be in service in the "Hand" position.
 - b. The pump motor starts and the pump will operate continuously.
3. Visually verify pump is operating.

4.4.2.2.6 RAS Chlorination

Start-up procedures for the RAS chlorination facilities are discussed in Section 4.5.2.1.2.

4.4.2.2.7 Tank Drainage Facilities

Tank Drain Pump

Start up the SST drain pump according to the following procedure:

1. Activate the start switch at the motor location.
2. Visually verify that the pump is operating.

SST Effluent Gallery Sump Pumps

Start up the SST Effluent Gallery sump pumps according to the following procedure:

1. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the HOA selector switch in the LCP in the "Auto" position.
- b. The pump will operate when it receives a signal provided by the sump level indicators that the sump is at a high level and will run until the sump reaches low level.

Manual Mode of Operation

- a. Place the HOA switch in the "Hand" position.
- b. The pump motor starts and the pump will operate continuously.

2. Visually verify pump is operating.

4.4.3 Step by Step Shutdown Procedures

4.4.3.1 General Shutdown Procedures

The SST(s) to be taken out of service should be shut down according to the following procedure:

1. Refer to General Shutdown Procedures in Section 4.0.3.
2. Close the influent knife gate valves or the stop plates for the SST(s).
3. Manually remove skimmings from the SST(s).
4. Turn off the rotary skimmers, as discussed in Section 4.4.3.2.5.
5. Keep the sludge collection equipment running to collect any remaining sludge.
6. Continue sludge pumping cycle for several hours as determined by the Operations Supervisor to remove residual sludge.
7. Shutdown the sludge withdrawal system for the SST(s) to be taken out of service by one of the following methods depending on the current operation:

- a. If the RAS and WAS pumps are only operating for the SST(s) to be taken out of service, then shutdown the RAS withdrawal system by closing the associated sludge hopper isolation plug valves and subsequently shutting down the RAS and WAS pumps, as discussed in Sections 4.4.3.2.2 and 4.4.3.2.3, respectively.
 - b. If the RAS and WAS pumps are operating for more than one SST, then close the sludge hopper isolation plug valves associated with the tank(s) to be taken out of service.
10. Shutdown the sludge collection equipment, as discussed in Section 4.4.3.2.1. If all of the SSTs are to be taken out of service, shut down the secondary skimmings pumps, as discussed in Section 4.4.3.2.5.
11. Check to be sure sludge hopper sample isolation valves are closed.
12. Check to be sure all tank drain valves are closed for all SSTs (i.e., not just those to be taken out of service).
13. Open the applicable SST drain valve(s).
14. Activate the SST drain pump, as discussed in Section 4.4.2.2.7.
15. Wash down the interior of the SST(s) as the tank(s) are draining.
16. After the SST(s) have drained (visually inspect), shut down the SST drain pump, as indicated in Section 4.4.3.2.7.
17. When the tank is empty (visually inspect), close the SST drain valve(s).
18. Flush the tank drain according to the following procedures:
 - a. Connect a hose from the nearest non-potable water (NPW) supply connection to the 2-inch flushing connection
 - b. Open the flushing connection and turn on the NPW supply.
 - c. Turn off the NPW flow after a few minutes.
 - d. Close the flushing connection, and replace the hose.
 - e. Open the plug valve from tank drain to the SST Effluent Gallery sump to empty tank drain line.

SST drain lines should be flushed and emptied after each use and sludge sampling procedure. Only minimal amounts of RAS should be allowed to the SST Effluent Gallery sumps, as the sludge pumps are not designed to accommodate sludge.

19. If all of the SSTs are to be taken out of service, ensure that the RAS chlorination facilities are shut down, as indicated in Section 4.4.3.2.6.

4.4.3.2 Individual Equipment Shutdown Procedures

4.4.3.2.1 Sludge Collectors

Non-metallic chain and flight type collectors are designed for continuous 24 hour operation. When the equipment remains inactive for a significant period of time, special precautions must be taken to avoid excessive accumulation of solids at the bottom of the tank. Generally, if the equipment is turned off for a period of more than one hour, influent flow should be terminated to avoid excessive accumulation of solids.

Shut down the sludge collection system according to the following procedure:

1. If the associated SST is to be drained for out of service condition, grease sprockets at eight (8) locations while cycling the collector prior to shutdown.
2. Turn the respective on/off selector switch collectors to be shut down to the "Off" position.
3. Visually verify that the collector has stopped.
4. Lock the appropriate ROT switch.
5. If the collector is to be out of service for an extended period of time, disconnect the power source.

Note that the collectors will also automatically shut down on shear pin breakage or motor overload.

4.4.3.2.2 Return Activated Sludge (RAS) Pumping

Shut down both the variable and constant speed RAS pumps according to the following procedure:

1. Turn the ROT switch at for the pump to be shut down to the "Off" position.
2. Visually verify that the pump is stopped.
3. Turn the HOA selector switch to the "Off" position.
4. Lock the appropriate ROT switch.

5. If the pump is to be out of service for an extended period of time, disconnect the power source and close the isolation valves on pump suction and discharge piping.

Note that the pumps will also automatically shut down under conditions of low flow, motor overload, or loss of seal water.

4.4.3.2.3 Waste Activated Sludge (RAS) Pumping

Shut down the WAS pumps according to the following procedure:

1. Turn the ROT switch at for the pump to be shut down to the "Off" position.
2. Visually verify that the pump is stopped.
3. Turn the on/off selector switch to the "Off" position.
4. Lock the ROT switch.
5. If the pump is to be out of service for an extended period of time, disconnect the power source and close the isolation valves on pump suction and discharge piping.

Note that the pumps will also automatically shut down under conditions of low flow or motor overload.

4.4.3.2.4 Surface Skimmers

Shut down the SST rotary skimmers according to the following procedure:

1. Turn the ROL switch to the "Off" position.
2. Lock the ROL switch.
3. Ensure that the skimmer is in the upward position such that no flow is entering.

Note that the skimmers will also automatically shut down upon failure to tilt or return upright, or motor overload. Skimmer operation is also inhibited when a skimmings pump is running, when the skimmings wet well is full or inhibited, or when the skimmings system is in the separation cycle.

4.4.3.2.5 Skimmings Pump Station

Secondary Skimmings Pumps

Shut down the secondary skimmings pumps according to the following procedure:

1. Turn the HOA switch at for the pumps to be shut down to the "Off" position.
2. Visually verify that the pump is stopped.
3. Lock the ROT switch.
4. Turn off the seal water supplied to the pump.
5. If the pump is to be out of service for an extended period of time, disconnect power source and close the isolation valves on pump suction and discharge piping, as well as the isolation valves on the associated circulation flow lines.
6. If the entire Pump Station is to be out of service:
 - a. Ensure that the ROL switches on all of the rrotary skimmers are in the "Off" position and tilted upward.
 - b. Close each the three flow control valves and turn each valve's respective LOS switch to the "Lock-Out" position.

Note that the pumps will also automatically shut down on loss of flow, motor overload, loss of seal water, or low Secondary Skimmings Wet W ell level.

Secondary Skimmings Pump Station Sump Pumps

Shut down the Secondary Skimmings Pump Station sump pumps according to the following procedure:

1. Place the HOA switch in the "Off" position.
2. Visually verify the pump has stopped.
3. If pump is to be out of service for an extended period of time, disconnect the power source and close isolation valves.

Note that the sump pumps will also automatically shut down on low water level or high winding temperature.

4.4.2.2.6 RAS Chlorination

Shut down procedures for the RAS chlorination facilities are discussed in Section 4.5.3.2.2.

4.4.2.2.7 Tank Drainage Facilities

Tank Drain Pump

Shut down the SST drain pump according to the following procedure:

1. Activate the lockout-stop switch.
2. Visually verify that the pump has stopped.

SST Effluent Gallery Sump Pumps

Shut down the SST Effluent Gallery sump pumps according to the following procedure:

1. Place the HOA switch in the “Off” position and lock the switch.
2. Visually verify that the pump has stopped.
3. If pump to be out of service for an extended period of time, disconnect the power source and close the isolation valves.

Note that the sump pumps will also automatically shut down on motor overload, loss of flow, high winding temperature, or low water level.

4.4.4 Alarms, Indicators, and Status Alerts

4.4.4.1 Sludge Collectors

Alarm/Status

Display Location

Sludge Collector 1 Run Status
Sludge Collector 2 Run Status
Sludge Collector 3 Run Status
Sludge Collector 4 Run Status
Sludge Collector 5 Run Status

SCADA System
SCADA System
SCADA System
SCADA System
SCADA System

Sludge Collector 6 Run Status	SCADA System
Sludge Collector 7 Run Status	SCADA System
Sludge Collector 8 Run Status	SCADA System
Sludge Collector 9 Run Status	SCADA System
Sludge Collector 10 Run Status	SCADA System
Sludge Collector 1 Drive Failure	SCADA System
Sludge Collector 2 Drive Failure	SCADA System
Sludge Collector 3 Drive Failure	SCADA System
Sludge Collector 4 Drive Failure	SCADA System
Sludge Collector 5 Drive Failure	SCADA System
Sludge Collector 6 Drive Failure	SCADA System
Sludge Collector 7 Drive Failure	SCADA System
Sludge Collector 8 Drive Failure	SCADA System
Sludge Collector 9 Drive Failure	SCADA System
Sludge Collector 10 Drive Failure	SCADA System\
Sludge Collector 1 Motor Overload	SCADA System
Sludge Collector 2 Motor Overload	SCADA System
Sludge Collector 3 Motor Overload	SCADA System
Sludge Collector 4 Motor Overload	SCADA System
Sludge Collector 5 Motor Overload	SCADA System
Sludge Collector 6 Motor Overload	SCADA System
Sludge Collector 7 Motor Overload	SCADA System
Sludge Collector 8 Motor Overload	SCADA System
Sludge Collector 9 Motor Overload	SCADA System
Sludge Collector 10 Motor Overload	SCADA System

4.4.4.2 Return Activated Sludge (RAS) Pumping

<u>Alarm/Status</u>	<u>Display Location</u>
RAS Pump 1A Run / Motor Status	SCADA System
RAS Pump 1B Run / Motor Status	SCADA System
RAS Pump 1C Run / Motor Status	SCADA System
RAS Pump 1D Run / Motor Status	SCADA System
RAS Pump 1E Run / Motor Status	SCADA System
RAS Pump 1F Run / Motor Status	SCADA System
RAS Pump 1A Motor Overload	SCADA System
RAS Pump 1B Motor Overload	SCADA System
RAS Pump 1C Motor Overload	SCADA System
RAS Pump 1D Motor Overload	SCADA System
RAS Pump 1E Motor Overload	SCADA System
RAS Pump 1F Motor Overload	SCADA System
RAS Pump 1A Failure / Loss of Flow	SCADA System
RAS Pump 1B Failure / Loss of Flow	SCADA System
RAS Pump 1C Failure / Loss of Flow	SCADA System
RAS Pump 1D Failure / Loss of Flow	SCADA System
RAS Pump 1E Failure / Loss of Flow	SCADA System
RAS Pump 1F Failure / Loss of Flow	SCADA System
RAS Pump Station Seal Water Failure / Loss of Flow	SCADA System

4.4.4.3 Waste Activated Sludge (WAS) Pumping

<u>Alarm/Status</u>	<u>Display Location</u>
WAS Pump 1A Run / Motor Status	SCADA System
WAS Pump 1B Run / Motor Status	SCADA System
WAS Pump 1A Motor Overload	SCADA System
WAS Pump 1B Motor Overload	SCADA System
WAS Pump 1A Failure / Loss of Flow	SCADA System and LCP-SST1
WAS Pump 1B Failure / Loss of Flow	SCADA System and LCP-SST1

4.4.4.4 Surface Skimmers

<u>Alarm/Status</u>	<u>Display Location</u>
Rotary Skimmer 1 Run / Drive Status	SCADA System
Rotary Skimmer 2 Run / Drive Status	SCADA System
Rotary Skimmer 3 Run / Drive Status	SCADA System
Rotary Skimmer 4 Run / Drive Status	SCADA System
Rotary Skimmer 5 Run / Drive Status	SCADA System
Rotary Skimmer 6 Run / Drive Status	SCADA System
Rotary Skimmer 7 Run / Drive Status	SCADA System
Rotary Skimmer 8 Run / Drive Status	SCADA System
Rotary Skimmer 9 Run / Drive Status	SCADA System
Rotary Skimmer 10 Run / Drive Status	SCADA System
Rotary Skimmer 1 Drive Failure	SCADA System
Rotary Skimmer 2 Drive Failure	SCADA System
Rotary Skimmer 3 Drive Failure	SCADA System
Rotary Skimmer 4 Drive Failure	SCADA System
Rotary Skimmer 5 Drive Failure	SCADA System
Rotary Skimmer 6 Drive Failure	SCADA System
Rotary Skimmer 7 Drive Failure	SCADA System
Rotary Skimmer 8 Drive Failure	SCADA System
Rotary Skimmer 9 Drive Failure	SCADA System
Rotary Skimmer 10 Drive Failure	SCADA System
Skimmers Disabled / Skimmings Cycle Abort	SCADA System
Secondary Skimmings Wet Well (and Skimmers) Inhibited	SCADA System

4.4.4.5 Skimmings Pump Station

<u>Alarm/Status</u>	<u>Display Location</u>
Secondary Skimmings Wet Well Level Indicator	SCADA System
Secondary Skimmings Wet Well Level High	SCADA System
Secondary Skimmings Wet Well Level Low	SCADA System
Secondary Skimmings Wet Well Level Indicator Failure	SCADA System
Secondary Skimmings Pump Station Communication Failure	SCADA System
Secondary Skimmings Pump 1A Run Fast	SCADA System
Secondary Skimmings Pump 1B Run Fast	SCADA System
Secondary Skimmings Pump 1A Run Slow	SCADA System
Secondary Skimmings Pump 1B Run Slow	SCADA System
Secondary Skimmings Pump 1A Loss of Flow	SCADA System
Secondary Skimmings Pump 1B Loss of Flow	SCADA System
Secondary Skimmings Pump 1A Motor Failure	SCADA System
Secondary Skimmings Pump 1B Motor Failure	SCADA System
Secondary Skimmings Pump Seal Water Loss of Flow	SCADA System
Secondary Skimmings Recirculation Valve Auto Mode	SCADA System
Secondary Skimmings Recirculation Valve Failure	SCADA System
Secondary Skimmings Discharge Valve Auto Mode	SCADA System
Secondary Skimmings Discharge Valve Failure	SCADA System
Secondary Skimmings Subnatant Return Valve Auto Mode	SCADA System
Secondary Skimmings Subnatant Return Valve Failure	SCADA System
Secondary Skimmings Sump Pump 1A Moisture Detection	SCADA System and LCP-SSKSP1
Secondary Skimmings Sump Pump 1B Moisture Detection	SCADA System and LCP-SSKSP1
Secondary Skimmings Sump Pump 1A Winding High Temp.	SCADA System
Secondary Skimmings Sump Pump 1B Winding High Temp.	SCADA System
Secondary Skimmings Sump Pump 1A Failure	SCADA System
Secondary Skimmings Sump Pump 1B Failure	SCADA System
Secondary Skimmings Sump High High Level	SCADA System

4.4.4.6 RAS Chlorination

Alarms, indicators, and status alerts for the RAS chlorination facilities are discussed in Section 4.5.4.1.

4.4.4.7 Tank Drainage Facilities

<u>Alarm/Status</u>	<u>Display Location</u>
SST Drain Pump 1 Run / Motor Status	SCADA System
SST Drain Pump 1 Run Failure / Loss of Flow	SCADA System
SST Drain Pump 1 Run Motor Overload	SCADA System
SST Effluent Gallery Sump Pump 1 Winding High Temp.	SCADA System
SST Effluent Gallery Sump Pump 2 Winding High Temp.	SCADA System
SST Effluent Gallery Sump Pump 3 Winding High Temp.	SCADA System
SST Effluent Gallery Sump Pump 1 Motor Overload	SCADA System
SST Effluent Gallery Sump Pump 2 Motor Overload	SCADA System
SST Effluent Gallery Sump Pump 3 Motor Overload	SCADA System
SST Effluent Gallery Sump 1 High High Level	SCADA System
SST Effluent Gallery Sump 2 High High Level	SCADA System
SST Effluent Gallery Sump 3 High High Level	SCADA System

4.4.5 Daily Operational Checks

4.4.5.1 General

1. Refer to the general daily operation check requirements described in Section 4.0.5.
2. Consult Sections 4.4.5.2. through 4.4.5.8 and the appropriate manufacturer's operation and maintenance manuals for specific operational monitoring requirements.

4.4.5.2 Secondary Sedimentation Tanks

1. Visually check each SST and associated piping and connections for cracking and any signs of liquid leaks.

2. Check the turbulence in the influent to ensure proper mixing is occurring.
3. Check for any foam accumulated in the SST Influent Channel near the entrance to each SST. If foam accumulation is significant, open the 18-inch sluice gate to allow the foam to enter the SST.
4. Check the positions of the inlet knife gates and manually operated valves for each element of the facilities to confirm the requirements of your Operations Supervisor.
5. Check water levels in the SSTs and influent channels to confirm the requirements of your Operations Supervisor. Ensure even flow to all the tanks that are in service and adjust the inlet knife gates as required.
6. Check for algae growth and debris on the launders and hose down as needed to keep algae growth to a minimum.

4.4.5.3 Sludge Collectors

1. Check the sludge removal equipment for any damaged or broken elements, or excessive wear.
2. Inspect the operation of the collector for a jerking motion or for flights not riding perpendicular to the guide rails. If either occurs, it is necessary to adjust the tension on the chain.
3. Check the drive chain and sprockets for wear and elongation of the chain. Chain length and tension must remain equal on both sides of the mechanism.
4. Inspect the shear pin and replace, if necessary, with one of the same size and material as specified in the original drawings.
5. Check the collector drive assembly for excessive noise, leaks, and excessive temperature (hand touch).
6. Check the control settings of the collector locally to confirm the requirements of your Operations Supervisor.
7. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the sludge and skimmings collector equipment:

Sludge Collector O&M Manual For the South Bay International Wastewater Treatment Plant. Prepared by Taset, Inc, 2010.

4.4.5.4 Return Activated Sludge (RAS) Pumping

The following operational check procedure is applicable to both the constant and variable speed pumps:

1. Check the operation of the pumps to ensure that they are operating smoothly and quietly.
2. Check the pump drives for leaks, unusual noise, and excessive temperature (hand touch). If leakage at the packing is excessive, tighten bolts on gland follower or re-pack gland (see manufacturer's Operation and Maintenance manual). Wear chemical safety goggles when making gland adjustments.
3. Check the control settings of the pumps to confirm the requirements of your Operations Supervisor.
4. Check the seal water system for proper operation, including the presence of leaks and sufficient flow (see manufacturer's Operation and Maintenance manual).
5. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manuals should be consulted for the RAS pumps:

Installation, Operation, and Maintenance Manual for the South Bay International Wastewater Treatment Plant – RAS Pump. Prepared by Fairbanks Morse, 2010.

4.4.5.5 Waste Activated Sludge (WAS) Pumping

1. Check the operation of the pumps to ensure that they are operating smoothly and quietly.
2. Check the pump drives for leaks, unusual noise, and excessive temperature (hand touch). If excessive leaks occur, check the spring tension and seal surfaces. Replace the mechanical seal, if necessary (see manufacturer's Operation and Maintenance manual). Wear chemical safety goggles and other appropriate safety precautions when replacing the seal.
3. Check the control settings of the pumps to confirm the requirements of your Operations Supervisor.

4. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manuals should be consulted for the WAS pumps:

Operation & Maintenance Manual for the South Bay International Wastewater Treatment Plant – Progressive Cavity (WAS) Pumps. Prepared by Netzsch, Inc., 2010.

4.4.5.6 Surface Skimmers

1. Visually observe the operation of one or two skimmers and check for proper skimmer travel, effectiveness of removing accumulated skimmings, and proper operation of the surface spray system.
2. Check for algae and scrape off any accumulation, which can cause a build-up of solids in the skimmers pipe. If necessary for algae control, increase the frequency of sluicing and cleaning the pipe, as well as the frequency of skimmings removal.
3. Check the operation of each skimmer to see that it is operating smoothly and quietly.
4. Check the actuators for leaks, unusual noise, and excessive temperature (hand touch).
5. Check the control settings of the skimmers to confirm the requirements of your Operations Supervisor.
6. Check for wear on the rotary skimmer worm gears.

4.4.5.7 Skimmings Pump Station

1. Check seal water flow to each pump. Adjust as necessary.
2. Check the drives of each pump and motor-operated valve for leaks, unusual noise, and excessive temperature (hand touch).
3. Check the pumps to ensure that they are operating smoothly and quietly.
4. Check control settings of each skimmings pump and motor-operated valve to confirm the requirements of your Operations Supervisor.

5. Check that the lever weighted check valves on all operating pumps are open. If an operating pump has a check valve that is closed, then check and open the discharge and suction isolation valves. If both discharge and suction isolation valves are open, and the associated check valve is in the closed position, then the respective pump should be taken out of service by locking the ROT switch in the "Off" position.
6. Check the level in the Secondary Skimming Pump Station sump.
7. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manuals should be consulted for the Secondary Skimming Pump Station:

Installation, Operation, and Maintenance Manual for the South Bay International Wastewater Treatment Plant – Recessed Impeller Pumps Prepared by TwinPumps, 2010.

4.4.5.8 RAS Chlorination

A description of the daily operational checks associated with the RAS chlorination is provided in Section 4.5.5.2.

4.4.6 Training Record

The following resources should be used to ensure a complete understanding of the Secondary Sedimentation Facilities.

4.4.6.1 Reading Assignment

1. Operation of Wastewater Treatment Plants – MOP 11 (6th Ed.), Chapters 8, 12, 16, and 24. Water Environment Federation, 2008.
2. Operation of Wastewater Treatment Plants – A Field Study Training Program (7th Ed.). Chapter 5 - Maintenance. California State San Marcos, Sacramento, 2007.

4.4.6.2 Field Instruction

The operator should know the location and purpose of each of the following items:

<u>Item</u>	<u>Operator Initials</u>
General / Common Facilities	
LCP-SST1	_____
Secondary Sedimentation Tanks	
Influent Channel	_____
Coarse Bubble Diffusers	_____
Diffuser Assemblies (24-inch Tees)	_____
Sluice Gate	_____
Launder and Aluminum Covers	_____
Weir Plates	_____
Secondary Sludge Collection	
Sludge Collectors	_____
Collection Drives	_____
Sample Ports	_____
RAS Pumping	
RAS Pumps	_____
Variable Frequency Drives	_____
Magnetic Flow Meters	_____
Seal Water System	_____
LCP-RAS1	_____
WAS Pumping	
WAS Pumps	_____
Magnetic Flow Meters	_____
LCP-WAS1	_____

<u>Item</u>	<u>Operator Initials</u>
Surface Skimmers	
Rotary Skimmers	_____
Surface Spray Nozzles	_____
Secondary Skimmings Pumping	
Secondary Skimmings Pumps	_____
Motorized Control Valves	_____
Seal Water System	_____
Sump Pumps	_____
LCP-SSKSP1	_____
Tank Drainage Facilities	
Tank Drain Pump	_____
Sump Pump	_____
LCP-SSTSP1	_____

4.5 CHLORINATION, DECHLORINATION AND NON-POTABLE WATER

4.5.1 Description of Controls and Operation

4.5.1.1 General

For a general description of controls and operation, refer to the general control and operational philosophy presented in Section 4.0.1.

Remote controls, status indication, and alarm indication for all chlorination/de-chlorination pumping and storage equipment and for Non-Potable Water (NPW) Pump Station No. 1 are housed in the Sodium Hypochlorite Local Control Center (NaOCl-LCC). The NaOCl-LCC contains local control panels for Chlorination Facilities, Dechlorination Facilities, and NPW Pump Station No. 1 Facilities. The NaOCl-LCC also houses the Motor Control Center (MCC) for the NPW Pump Station No. 1 Facilities and for the Chemical Metering Pumps. Remote controls, status indication and alarm indication for NPW Pump Station No. 2 are located in the SCADA system.

A schematic of the Chlorination Facilities is presented in Figure 3.5-1 and Figure 3.5-2. A schematic of the De-chlorination Facilities is presented in Figure 3.5-3. NPW Pump Station No. 1 facility schematic is presented in Figure 3.5-4; and a schematic of NPW Pump Station No. 2 facilities is presented in Figure 3.5-5.

4.5.1.2 Chlorination Facilities

The Chlorination Facilities include the six (6) sodium hypochlorite metering pumps and two (2) sodium hypochlorite storage tanks.

- Pre-chlorination Pump No. 1 provides intermittent pre-chlorination at the Headworks Inlet Structure and sodium hypochlorite to the primary sludge line in the PST Gallery.
- Effluent Chlorination Pump No. 1 and No. 2 act as lead and standby for providing sodium hypochlorite to disinfect the plant's effluent.
- The RAS Chlorination Pump supplies sodium hypochlorite to the combined RAS flow to help control sludge bulking. The RAS Chlorination Pump can also be used for intermittent pre-chlorination at the Canyon Collector/Tank Drain Joint Structure.

- NPW Pump Station No. 2 (NPWPS2) Chlorination Pumps No. 1 and No. 2 are provided to deliver sodium hypochlorite for disinfection of the plant's non-potable water system.

Sodium Hypochlorite (NaOCl) Metering Pumps

Pre-chlorination Pump No. 1 is provided with a stroke length adjustment. The stroke is automatically varied based on an input signal from the influent flow meter to inject a maximum of 10 mg/l of chlorine to the Headworks Junction Structure.

Pre-Chlorination Pump No. 1 can also be used to add sodium hypochlorite to the primary sludge line by manually opening a valve in the vault located west of the Primary Sedimentation Chemical Addition Area, and by running the pre-chlorination pump at a manually set stroke and speed.

Effluent Chlorination Pumps No.1 and No. 2 are provided with both stroke and speed adjustments. The stroke adjustment is automatically varied based on an input signal from the plant effluent flow meter. Speed adjustment is automatically varied based on an input signal from the plant effluent chlorine residual analyzer. Each set of metering pumps is provided with a Lead Pump selector switch at the LCP-NaOCl located in the NaOCl-LCC.

RAS Chlorination Pump is provided with a stroke length adjustment. The stroke adjustment is varied based on the combined RAS flow to the AST tanks and is designed to dose a maximum of 0.2 pounds of chlorine per 100 pounds of RAS suspended solids. The RAS Chlorination Pump delivers sodium hypochlorite to the RAS Chlorination Vault. The 4-inch sodium hypochlorite line to the RAS Chlorination Vault splits to feed the sodium hypochlorite line connected to the Canyon Collector/Tank Drainage and Structure and the sodium hypochlorite line connected to the 42" RAS line. Each leg of the split is provided with a diaphragm valve and local indication flow rotometer.

Sodium hypochlorite can be added to the Canyon Collector/Tank Drainage Structure by manually opening the diaphragm valve to the 2-inch line and by running the RAS Chlorination Pump at a manually set stroke and speed.

NPW Pump Station No. 2 Chlorination Pump No. 1 and No. 2 are provided with stroke length adjustments. The stroke adjustment is automatically varied based on an input signal from the NPWPS2 discharge flow meter. The NPW Pump Station No. 2 sodium hypochlorite metering pumps are provided with a Lead/Standby selector switch at the LCP-NaOCl which provides discrete digital inputs to the existing PLC-NaOCl.

Each of the sodium hypochlorite metering pumps are provided with a Hand/Off/Auto (HOA) switch, a run light, and pump failure, motor failure and diaphragm rupture alarms at LCP-NaOCl. Pump failure is as detected by limit switches in the individual pump's discharge piping and by a conductivity probe in an intermediate chamber between the pump's two diaphragms. Each pump is supplied with a field mounted Remote/Off/Test (ROT) switch, with a lockable off position, and a discharge pressure gauge, as well as with Run/Off lights and a running time meter on the face of the MCC.

With the ROT switch in the "Test" position, the motor starts momentarily and spring returns to the "Off" position when released. The "Test" position of the ROT switch overrides the "Off" position of the HOA switch. The "Off" position of the ROT switch is lockable and overrides all other switches. The chlorination pumps operate as follows: with the ROT switch in the "Remote" position, a pump is operated by the HOA switch in LCP-NaOCl. With the HOA switch in the "Hand" position, a pump runs continuously at the speed and stroke settings selected locally (at the pump and at the field mounted controller). In the "Off" position, the pump does not run. In the "Auto" position, the pump motor is operated by a discrete digital output logic signal from existing PLC-NaOCl located in existing NaOCl-LCC. When the set of effluent chlorination pumps and NPWPS2 chlorination pumps are in "Auto" mode, should the operating pump fail, the standby pump automatically take its place. The signal initiates a

pump failure at LCP-NaOCl and is included in the common alarm NaOCl System Failure. Once a pump has been shut down for a failure condition of any kind, it cannot be restarted until the condition is corrected and a reset button at LCP-NaOCl is used.

The pumps also shut down automatically if a low low level signal from the sodium hypochlorite storage system is received while the pump running.

Sodium Hypochlorite Storage

Storage is provided by two equally sized tanks, each manifolded together to provide separate suction lines for the three sets of NaOCl pumps (Pre-Chlorination, RAS Chlorination, Effluent Chlorination, and NPWPS2 Chlorination).

Each tank is provided with a sight glass for local tank level indication, and with a pressure transducer type level sensor and transmitter for sending a 4-20 mA signal to LCP-NaOCl. Signal corresponds to 21.5 ft. A level indicator at LCP-NaOCl provides a level readout for each tank in feet. In addition, a signal equal to a tank level of 19.7 ft. triggers a “HIGH LEVEL” alarm at both LCP-NaOCl and at a field located tank fill station. The field located fill station contains a horn which sounds on high NaOCl level. Manual valving allows the operator to fill either tank individually or both tanks at the same time.

A tank level of 2.7 ft. sends a signal to LCP-NaOCl to a “LOW LEVEL” alarm light. The operator is required to manually switch over the tanks by valving on the tank outlets. A tank level of 0.5 ft. triggers a “LOW LOW LEVEL” alarm at LCP-NaOCl, and shuts down any operating NaOCl pumps.

At the fill station panel, a high level alarm indicator light and an alarm horn receive a signal from the PLC to indicate high level in the respective bulk storage tank. An acknowledge pushbutton is provided at the fill station panel to silence the alarm horn. The alarm indicator light will be illuminated until the tank level is lowered.

The tanks are located in a containment area for collection of spilled sodium hypochlorite in the event of tank failure. The containment area is provided with a float switch which sends an alarm signal to LCP-NaOCl in the event of collection of liquid in the containment area. The float switch is placed approximately 3-inch above the sump floor. The containment area is drained by use of a sump pump, to allow stormwater

drainage to be directed to a plant drain line while allowing spilled NaOCl to be pumped either to a tanker truck for removal or to the Headworks at a controlled rate through the plant drain system. The sump pump is permanently installed, but is provided with no automatic controls.

To drain the area, the operator manually opens and closes the appropriate discharge isolation valves, then manually starts the pump control power. The control power On/Off selector switch and Start and Stop pushbuttons are provided at the Sump Pump Control Panel located at the pump. The Pump Start pushbutton, when pressed, operates the sump pump until a low level is signaled by the float switch. A Stop Pump pushbutton is provided to manually stop the pump.

Chlorine ORP Residual Analyzer – Primary Effluent

UNDER NORMAL OPERATION THE PRIMARY EFFLUENT ANALYZER WILL NO LONGER BE USED.

An analog signal proportional to chlorine residual in the primary effluent bypass line is input to LCP-NaOCl for control of pre-chlorination pumps indication and recording. An adjustable Low Level switch is used to annunciate on “LOW PRIMARY EFFLUENT RESIDUAL.” The primary analog chlorine residual signal is also input to the PCC for indication and logging.

The Chlorine ORP Residual Analyzer System is located at the Primary Effluent Bypass Structure and includes a pH sensor and controller with a primary effluent residual sample pump. The sample pump is provided with an HOA switch, a run light, and a pump failure alarm. Pump failure is as detected in the sample pump discharge piping.

Chlorine Residual Analyzer – Plant Effluent

An analog signal proportional to chlorine residual in the plant effluent line is input to LCP-NaOCl for control of effluent chlorination pumps indication and recording. An adjustable Low Level switch is used to annunciate on “PLANT EFFLUENT CHLORINE RESIDUAL LOW.” The plant effluent analog chlorine residual signal is also input to the PCC for indication and logging.

The Chlorine Residual Analyzer System is located at the Effluent Metering Structure and includes a pH sensor and controller with a plant effluent residual sample pump. The sample pump is provided with an ROT switch, a run light, and a pump failure alarm. Pump failure is as detected in the sample pump discharge piping.

4.5.1.3 Dechlorination Facilities

De-chlorination facilities consist of two (2) sodium bisulfite metering pumps and two (2) sodium bisulfite tanks. Two sodium bisulfite metering pumps act as lead and standby for providing sodium bisulfite to de-chlorinate the primary effluent. THE DE-CHLORINATION FACILITY WILL NO LONGER USED UNDER NORMAL OPERATING CONDITIONS.

Sodium Bisulfite (NaHSO₃) Metering Pumps

Each pump is provided with automatic dosage control (stroke length adjustment) and automatically proportioned speed control by a direct current drive and SCR. Signals from a chlorine residual analyzer located at the Effluent Metering Structure (EMS) are used to control pump speed. Signals from the plant effluent flow meter control the pump stroke. The controller varies the frequency of the stroke to maintain an excess of 0.5 mg/L of sodium bisulfite above the dosage required for complete neutralization of the chlorine residual read by the residual analyzer.

The EMS chlorine residual analyzer also monitors the plant effluent chlorine residual.

The metering pumps are provided with a Lead Pump selector switch at the LCP-NaHSO₃. Each of the two pumps is provided with an HOA switch, a run light, and pump and motor failure alarms at LCP-NaHSO₃ (part of LCP-NaOCl) located in the NaOCl-

LCC. Pump failure is as detected by flow switches in the individual pump's discharge piping and by a conductivity probe in an intermediate chamber between the pump's two diaphragms. Each pump is supplied with a field-mounted ROT switch, with a lockable off position, and a discharge pressure gauge, as well as with Run/Off lights and a running time meter on the face of the MCC.

The pumps operate as follows: with the ROT in the "Remote" position, the pumps are operated by the HOA switches. In the "Hand" mode, pumps run at the speed and stroke settings selected locally. In the "Off" position, a pump does not run. In the "Auto" position, the pump selected as lead runs off the flow and residual signals. In the "Auto" mode, should the operating pump fail, the standby pump automatically takes its place.

The pumps also shut down automatically if a low low level signal from the sodium bisulfite storage system is received.

Once a pump has been shut down for a failure condition of any kind, it cannot be restarted until the condition is corrected and a reset button at LCP-NaHSO₃ is used.

Sodium Bisulfite Storage Facilities

Storage is provided by two equally sized tanks, each manifolded together to provide suction for the dechlorination pumps.

Each tank is provided with a sight glass for local tank level indication, and with a pressure transducer level sensor and transmitter for sending a 4-20 mA signal to LCP-NaHSO₃. Signal corresponds to 15.0 ft. A level indicator at LCP-NaHSO₃ provides a level readout for each tank in feet. In addition, a signal equal to a tank level of 13.5 ft. triggers a “HIGH LEVEL” alarm at both LCP-NaHSO₃ and at a field located tank fill station. Field located alarm contains a horn which sounds on high NaHSO₃ level. Manual valving allows the operator to fill either tank individually or both tanks at the same time.

A tank level of 1.0 ft sends a signal to a “LOW LEVEL” alarm in the LCP-NaHSO₃. The operator is required to manually switch over tanks by use of valving on tank outlet piping. A tank level of 0.5 ft. triggers a “LOW LOW LEVEL” alarm at LCP-NaHSO₃, and shuts down any operating pumps.

At the fill station panel, a high level alarm indicator light and an alarm horn receive a signal from the PLC to indicate high level in the respective bulk storage tank. An acknowledge pushbutton is provided at the fill station panel to silence the alarm horn. The alarm indicator light will be illuminated until the tank level is lowered.

The tanks are located in a containment area for collection of spilled sodium bisulfite in the event of tank failure. The containment area is provided with a float switch which sends an alarm signal to LCP-NaHSO₃ in the event of collection of liquid in the containment area. The float switch is placed approximately 3-inch above the containment floor. The containment area is drained by use of a sump pump, to allow stormwater drainage to be directed to a plant drain line, while allowing spilled NaHSO₃ to be pumped either to a tanker truck for removal or to the Headworks at a controlled rate through the plant drain system. The sump pump is permanently installed, but is provided with no automatic controls. To drain the area, the operator manually opens and closes the appropriate discharge isolation valves, then manually starts the pump control power. The control power On/Off selector switch and Start and Stop pushbuttons are provided at the

Sump Pump Control Panel located at the pump. The Pump Start pushbutton, when pressed, operates the sump pump until a low level is signaled by the float switch. A Stop Pump pushbutton is provided to manually stop the pump.

Total Chlorine Residual Analyzer

An analog signal proportional to the total chlorine residual is input to LCP-NaHSO₃ from the EMS chlorine residual analyzer located downstream of the sodium bisulfite injection point for control of the effluent chlorination pumps and for indication and recording. Adjustable high and low level settings are used to indicate high and low chlorine residual alarms in SCADA. The analog chlorine residual signal is input to the PCC for indication and logging. The Total Chlorine Residual Analyzer System includes a primary effluent residual sample pump. The sample pump is provided with an HOA switch, a run light, and a pump failure alarm. Pump failure is as detected in the sample pump discharge piping.

4.5.1.4 Non-Potable Water Pump Station No. 1 (NPW PS1)

The non-potable water facilities consist of an air-gap potable water connection, a hydro-pneumatic tank and two (2) air fill compressors with receivers, and four (4) vertical turbine non-potable water pumps. UNDER NORMAL OPERATIONS NPWP1 WILL NO LONGER BE USED.

Hydro-pneumatic Tank and Appurtenant Equipment

The Hydro-pneumatic Tank System consists of the hydro-pneumatic tank itself and of two air fill compressors with an air receiver tank. The hydro-pneumatic tank is initially pressurized by the air compressors then operates to serve minor plant water demands. The air compressors and receiver replace air absorbed into the water.

The hydro-pneumatic tank is provided with a Low Pressure switch which triggers a failure alarm at LCP-NPW1 (part of LCP-NaOC1) if hydro-pneumatic tank pressure drops below 70 psi.

Electrode level sensors in the tank are used to detect water level in the hydro-pneumatic tank. Detection of a tank level at 7.67 ft. above the concrete pad sends a

signal to open a solenoid valve on the air inlet into the top of the hydro-pneumatic tank and allow air from the compressor/receiver system into the tank. Detection of a tank level at 6.67 ft. above the concrete pad sends a signal to close the valve.

Upon detection of tank level at 8.5 ft. above the top of concrete pad, a “HIGH HIGH LEVEL” alarm is transmitted to LCP-NPW1 and to the PCC for alarm indication. Detection of a tank level at 4.33 ft. above the top of concrete pad transmits a “LOW LOW LEVEL” alarm to LCP-NPW1 and to the PCC for alarm indication.

Thy hydro-pneumatic tank is provided with a Low Pressure switch which triggers an alarm at LCP-NPW1 and at the PCC upon detection of a pressure of 70 psi in the tank. The tank is also provided with a pressure gauge and with a safety relief valve which is set to vent to atmosphere at a tank pressure of 93 psi.

The air receiver is a pre-pressurized unit which provides air to the hydro-pneumatic tank when signals from hydro-pneumatic tank level probes open the solenoid valve on the air inlet to the hydro-pneumatic tank. The receiver is provided with a Low Pressure switch, which is set at 90 psi and which starts the lead compressor in the automatic mode, and a High Pressure switch, which is set at 100 psi and which stops the lead compressor in either the automatic mode or the hand mode, and a Low Low Pressure switch, which transmits a receiver “LOW LOW PRESSURE” alarm signal to LCP-NPW1 and to the PCC when a pressure of 70 psi is detected. A pressure gauge is mounted on the hydro-pneumatic tank air fill piping. A pressure relief valve set at 110 psi is mounted on the air receiver.

The compressors are provided with a Lead Compressor selector switch at LCP-NPW1. Each compressor is provided with an HOA switch, a run light, a compressor fail alarm, and a motor fail alarm at LCP-NPW1. Compressor failure is detected by pressure switches in each compressor’s discharge piping. Each compressor is provided with a field mounted ROT switch with a lockable off position, and with Run/Off lights and a running time meter on the face of the MCC.

The compressors operate as follows: with the ROT in the “Remote” position, the compressors are operated by the HOA switches. In the “Hand” mode, compressors run continuously until shut down by the hydro-pneumatic tank High Pressure switch. In the “Off” position, a compressor does not run. In the “Auto” position, the compressor

selected as lead runs off the high and low pressure signals. In the “Auto” mode, should the operating compressor fail, the standby compressor will automatically take its place.

Once a compressor has been shut down for a failure condition of any kind, it cannot be restarted until the condition is corrected and a reset button at LCP-NPW1 is depressed.

Non-Potable Water Pumping Facilities

The NPW pumps are controlled by pressure signals from a pressure sensor/transmitter in the NPW discharge header. The sensor/transmitter is provided with a local indicator, and sends an analog signal to LCP-NPW1. A pressure indicator and “LOW SYSTEM PRESSURE” and “HIGH SYSTEM PRESSURE” alarms are provided at LCP-NPW1. The high and low pressure alarms are input to a common “NPW SYSTEM FAILURE” alarm at the PCC.

The lead vertical turbine NPW pump is selected by use of a four-position Lead/Lag1/Lag2/Stand-By selector switch at LCP-NPW1.

Each of the NPW pumps is provided with an HOA switch, a run light, and pump fail and motor fail alarms at LCP-NPW1. The pump fail signal is based on a limit switch on each pump’s discharge check valve. Each pump is furnished with a field-mounted ROT switch with a lockable off position, and a pressure gauge on the individual pump discharge line.

The pumps operate as follows: with the ROT in the “Remote” position, the pumps are operated by the HOA switches. In the “Hand” mode, pumps run continuously. In the “Off” position, a pump does not run. In the “Auto” position, the four position lead pump selector switch at LCP-NPW1 provides four discrete digital inputs to PLC-NaOC1. Based on the operator’s selection of the lead pump, the PLC-NaOC1 logic selects the lead pump as either NPW Pump 1, 2, 3, or 4 with the lag 1, lag 2, and stand-by pumps following in order. The lag 1 and lag 2 pumps are initiated by PLC-NaOC1 based on the system pressure derived from the pressure transmitter in the discharge piping. If flow is not detected by a discrete digital input from a check valve position switch located in the pump discharge piping within a preset operator adjustable time, the PLC-NaOC1 logic

initiates the stand-by pump. The PLC-NaOC1 logic also shuts down and locks out the pump with reset of the logic by a pushbutton.

In the “Auto” position of the HOA switch the pump motor is called to operate by a discrete digital PLC-NaOC1 logic output signal to the pump motor starter. With no pumps operating, upon receipt at LCP-NPW1 of a pressure signal equal to an operator adjustable 70 psi (indicating inability of hydropneumatic tank to maintain low flow demand), the pump selected as lead starts and meets the demand while simultaneously refilling the hydropneumatic tank. If pressure drops back to an operator adjustable 70 psi (indicating inability of hydropneumatic tank and the lead pump to maintain flow demand), the lag 1 pump starts. The lag 2 pump is initiated by the same logic. When high system pressure, at an operator adjustable 90 psi, is encountered with the lead, lag 1, and lag 2 pumps operating or a combination of these operating, the PLC-NaOC1 logic shuts down the last pump that was placed in operation. This sequence of shutting down pumps continues until the system pressure is operating between an operator adjustable 70 psi and 90 psi or until all pumps are shut down. At this point, hydropneumatic tank maintains the low flow demand.

The pumps also shut down automatically if a low low level signal is received from the NPW wetwell when any pumps are running.

Once a pump has been shut down for a failure condition of any kind, it cannot be restarted until the condition is corrected and a reset button at LCP-NaOC1 is used.

NPW system flow is monitored and indicated locally, and is indicated and totalized at LCP-NPW1.

Non-Potable Water Supply and Storage

Non-potable water is supplied through an air-gap connection to the City of San Diego water/reclaimed water supplies. The air-gap connection consists of a mechanically actuated float valve which allows water into the NPW wetwell, with a motor actuated valve located upstream of the float valve. The float valve is a hydraulically operated diaphragm valve with the pilot control and float mechanism mounted on the cover of the main valve. The float positions the pilot control to close the valve when the float

contacts the upper stop. The float valve opens at 9.17 ft., and closes at 7.5 ft. below the top of wetwell.

The wetwell is supplied with two float-type level switches. One switch is set at 1.78 ft. below the top of wetwell, and is used to close the motor actuated valve and shut off flow to the wetwell in the event of float valve failure. The second switch is set at 10.08 ft. below the top of wetwell, and sends a signal to shut down the pumps when a low wetwell level is sensed. Both float switches send level alarms to LCP-NPW1. Both level alarms are included in a common “NPW PS1 FAILURE” alarm at the PCC.

In the “Local” position of the motor operated valve’s Local/Auto selector switch, open and close pushbuttons operate the motor operated valve. Valve position is determined by position switches.

In “Auto” position of the Local/Auto selector switch, the valve is permitted to close by a discrete digital output signal from PLC-NaOC1 based on the high level float switch.

PLC logic allows the valve to reopen on low wetwell level.

A valve motor failure switch provides a discrete digital input to an alarm located at LCP-NPW1. The alarm is transmitted to the PCC and included in a common “NPW PS1FAILURE” alarm.

4.5.1.5 Non-Potable Water Pump Station No. 2 (NPW PS2)

NPWPS2 consists of five open line shaft vertical turbine pumps; three main pumps (two operating and one standby) and two jockey pumps (one operating and one standby). NPW Pump Station No. 2 is located adjacent to the secondary effluent channel. A slide gate with pedestal operator allows secondary effluent to flow from the secondary effluent channel to the wet well for non-potable water supply.

Non-Potable Water Pumping Facilities

The NPWPS2 pumps are controlled by pressure signals from a pressure sensor/transmitter in the NPW discharge header. The sensor/transmitter is provided with a local indicator and sends an analog signal to the PLC via SCADA. The PLC logic provides operator adjustable set-points for the operation of the non-potable water pumps discussed in this section. “NPW2 LOW-LOW” and “NPW2 HIGH-HIGH” alarms are displayed and logged in the SCADA.

The lead pump (main and jockey) pumps are selected for use by a three-position P1/P2/P3 selector switch provided in the SCADA System. Based upon the operator’s selection of the main “Lead” pump, the PLC logic will assign the main LEAD pump (NPWPS2 P-1, 2 or 3 as selected) with “Lag” and “Standby” main pumps assigned by SCADA to following in order.

Based upon the operator’s selection of the jockey “Lead” pump, the PLC logic will assign the jockey LEAD pump (NPWPS2 P-4 or 5 as selected) with other jockey pump assigned by SCADA as the “Standby”.

Each of the NPW pumps is provided with a HAND-OFF-AUTO (HOA) selector switch, a speed indicator, reset hand switch, and a run, motor fail, and pump fail light located in the SCADA system. The pump fail and motor fail signal is based on a discrete digital input from the limit switch on each pump’s discharge line. Each pump is furnished with a field-mounted REMOTE-OFF-TEST (ROT) selector switch with a lockable off position at the pump location and a pressure indicator gauge on the individual pump discharge line. In addition, each of the pumps is installed with a variable frequency drive motor and temperature switch.

With the ROT in the “Remote” position, the pumps are operated by the HOA selector switch. The “Test” position of the ROT allows local operation of the pumps with spring return to the “Off” position. The “Off” position of the ROT selector switch is lockable and will override all other switches.

In the “Hand” position of the HOA selector switch, the pump motor runs continuously at the speed set at the VFD. In the “Off” positions, the pump does not run. However, the “Test” position of the ROT selector switch at the pump will override the “Off” position of the HOA selector switch. In the “Auto” position of the HOA switch,

control (start/stop/speed) of the pump is dictated by the proportional-integral-derivative (PID) type logic in the PLC. The pump motor is called to operate by a discrete digital output signal to the pump motor starter.

The sequence of operation for the NPWPS2 jockey and main pumps is as follows:

- When the NPW system pressure falls to the “LOW” pressure set-point (operator adjustable 70 to 75 psi), “Lead” jockey will start-up to meet the NPW demands and will attempt to maintain the operating pressure set-point (80 psi). If the “Lead” jockey pump fails to start when called to do so as detected by check valve limit switch, the “Standby” jockey pump shall be called to operate by SCADA and SCADA will lock out the “Lead” jockey pump.
- If the pressure rises to the “HIGH” pressure set-point (90 psi), the in-service jockey pump will stop.
- If the pressure falls below the LOW pressure set-point with the in-service jockey pump operating, The “Lead” main pump will start and the jockey pump will be shut down by SCADA. The “Lead” main pump will adjust speed to meet the operating set-point pressure requirement of 80 psi.
- If the pressure falls to the “LOW” pressure set-point (75 psi), with the “Lead” main pump running, the “Lag” main pump shall start and operate in conjunction with the lead pump to maintain the operating pressure set-point pressure requirement of 80psi.
- If the pressure falls to “LOW” pressure set-point (75 psi) with the “Lead” and “Lag” main pumps running, the “Standby” main pump shall start and operate in conjunction with the lead and lag pump to maintain the operating pressure set-point.
- If the pressure rises to “HIGH” (90 psi) with the “Lead”, “Lag” and “Standby” main pumps operating, the “Standby” main pump will stop.
- If the pressure raises to “HIGH” with the “Lead” and “Lag” main pumps operating, the “Lag” pump will stop.

- If the pressure rises to “HIGH” with only the “Lead” main pump operating, the “Lead” jockey pump will start and the “Lead” main pump will stop.

If flow is not detected by a discrete digital input from the check valve position switch located in the pump discharge piping for any pump when called to operate an alarm will be annunciated on SCADA.

All operating pumps will shutdown automatically if a wet well low level alarm is detected by the PLC. Once a pump has been shut down for a failure of any kind, it cannot be restarted until the condition is corrected and the reset button is used.

NPW system flow is monitored and indicated locally and is displayed and totaled in the SCADA.

Non-Potable Water Storage

The NPW Pump Station No. 2 wet well receives water from the secondary sedimentation effluent channel for plant use. A level switch provides a discrete digital input to the PLC when the level in the wet well falls below the set elevation (minimum water service elevation 6 ft from the bottom of the wet well). PLC logic will shutdown the non-potable water pumps when the pumps are in “Hand” or “Auto” mode on a low level condition. The NPWPS2 “WETWELL LOW LEVEL” alarm is displayed and logged in the SCADA.

A pressure sensor/transmitter mounted in the discharge head continuously monitors, locally indicates and provides an analog input signal to the PLC. PLC logic provides alarms “NPW2 LOW-LOW PRESSURE” set at an operator adjustable set-point of 70 psi and “NPW2 HIGH-HIGH PRESSURE” set at an operator adjustable set-point of 100 psi. Both alarms are displayed and logged in the SCADA System.

A propeller type flow sensor/indicator/transmitter mounted in the discharge header continuously monitors, locally indicates and provides an analog output signal to FY-1299 at LCP-SST1. FY-1299 converts the pulsed signal for input to PLC. The SCADA displays the FI-1299 and totalizer FQI-1299.

4.5.2 Step by Step Start-Up Procedures

4.5.2.1 Chlorination Facilities

4.5.2.1.1 General System Start-Up Procedures

The Chlorination Facilities should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Visually inspect each tank and all piping for any signs of damage or improper installation.
3. Ensure that control panel LCP-NaOC1 in the NaOC1-LCC is energized.
4. Ensure that the appropriate circuit breakers in MCC-NaOC1 are energized.
5. Ensure that all isolation valves on tank outlet lines and on pump station and discharge lines are closed.
6. Start-up the individual equipment according to the procedures established in Section 4.5.2.1.2, in the following order:
 - a. NaOC1 Storage Tanks
 - b. Effluent Residual Sample Pump (Refer to Section 4.10.2.2.3)
 - c. Chlorination Dilution Water Pumps (Refer to Section 4.10.2.2.3)
 - d. Effluent Chlorination Pumps
 - e. RAS Chlorination Pump
 - f. Prechlorination Pump No. 1
 - g. NPWPS No. 2 Chlorination Pumps
7. The optimum setpoints and configurations should be selected by the Operations Supervisor and adjusted based on operating experience.

4.5.2.1.2 Individual Equipment Start-Up Procedures

Sodium Hypochlorite (NaOCl) Tanks

Start up the sodium hypochlorite tanks according to the procedures listed below:

1. Verify that there is sufficient sodium hypochlorite in the tank (50% of full, minimum). If there is not, arrange for chemical delivery of 12.5% of sodium hypochlorite solution.
2. Verify that there is no debris in the tank. Close and tighten all access way ports and all nozzles.

3. Verify that there are no restrictions for the air vent pipe and the tank overflow pipe.
4. Close all tank outlet valves.
5. Utilize the chemical delivery truck to fill the tank through the two-inch tank fill line, if required.
6. Open the appropriate isolation valves on the outlet lines.

Effluent Chlorination Pumps

Start up the effluent chlorination pumps according to the procedures listed below:

1. Verify that the back pressure valve at the chlorine discharge point is operational.
2. Verify that diaphragm valves are pressurized and that diaphragm valve drain lines are closed. Open isolation valves between diaphragm valves and product piping.
3. Verify that pressure relief valves are operational. Open isolation valves between pressure relief valves and product piping.
4. Isolate calibration columns from the system by closing isolation valves between calibration columns and product piping.
5. Open all isolation ball valves on suction lines between the two pumps and the two tanks, and on the pump's individual discharge lines.
6. Select the effluent chlorination pump that will be in service by use of the lead selector switch at LCP-NaOCl and SCADA.
7. Turn the pump's field mounted ROT switch to the "Test" position to verify that the unit is operating and that the motor's direction of rotation is correct.
8. With the HOA switch in the "Off" position, place the ROT switch for each effluent chlorination pump in the "Remote" position.
9. Verify that effluent flow signals and effluent chlorine residual signals are input to the PLC-NaOCl and output to the SCR drive and the stroke controller.
10. Verify that the chlorine residual setpoint programmed in the PLC-NaOCl is approved by your Operations Supervisor.

11. Place each SCR drives Local/Remote switch in the “Remote” position.
12. Place the pumps in operation as follows:

Automatic Mode of Operation:

- a. Place the HOA switch at LCP-NaOCl in the “Auto” position.
- b. The pump will start in 0 to 180 seconds. The motor will run at the speed called for by the chlorine residual analyzer signal. The stroke will respond to the effluent flow signal.

Manual Mode of Operation:

- a. Place the HOA switch at LCP-NaOCl in the “Hand” position.
 - b. After a 0 to 180 second delay, the pump will start.
 - c. Set the stroke manually at the pump by the potentiometer, to meet your Operations Supervisor’s requirements.
 - d. Set the speed manually by using the potentiometer at the SCR drive, to meet your Operations Supervisor’s requirements.
13. Visually verify that the pump is operating.
 14. Observe the discharge pressure of the pump. It should be approximately 45 psi.

RAS Chlorination Pump

Start up the RAS Chlorination Pump according to the procedures listed below:

1. Verify that the back pressure valve at the chlorine discharge point is operational.
2. Verify that diaphragm valves are pressurized and that diaphragm valve drain lines are closed. Open isolation valves between diaphragm valves and product piping.
3. Verify that pressure relief valves are operational. Open isolation valves between pressure relief valves and product piping.
4. Isolate calibration columns from the system by closing isolation valves between calibration columns and product piping.
5. Open the isolation ball valve on suction line between the pump and the two tanks, and on the pump’s individual discharge line.

6. Turn the pump's field mounted ROT switch to the "Test" position to verify that the unit is operating and that the motor's direction of rotation is correct.
7. With the HOA switch in the "Off" position, place the ROT switch for the RAS Chlorination Pump in the "Remote" position.
8. Verify that influent flow signal is input to the PLC-NaOCl and output of the stroke controller.
9. Verify that the chlorine residual setpoint programmed in PLC-NaOCl is approved by your Operations Supervisor.
10. Place the pump in operation as follows:

Automatic Mode of Operation:

- a. Place the HOA switch at LCP-NaOCl in the "Auto" position.
- b. The pump will start in 0 to 180 seconds. The stroke will respond to the influent flow signal.

Manual Mode of Operation:

- a. Place the HOA switch at LCP-NaOCl in the "Hand" position.
 - b. After a 0 to 180 second delay, the pump will start.
 - c. Set the stroke manually at the pump by the potentiometer, to meet your Operations Supervisor's requirements.
12. Visually verify that the pump is operating.
 13. Observe the discharge pressure of the pump. It should be approximately 45 psi.

Pre-Chlorination Pump

Start up the pre-chlorination pump according to the procedures listed below:

1. Verify that the back pressure valve at the chlorine discharge point is operational. Verify that the check valve and ball valve at the Primary Sludge Chemical Addition Vault are operational.
2. Verify that diaphragm valves are pressurized and that diaphragm valve drain lines are closed. Open isolation valves between diaphragm valves and product piping.

3. Verify that pressure relief valves are operational. Open isolation valves between pressure relief valves and product piping.
4. Isolate calibration columns from the system by closing isolation valves between calibration columns and product piping.
5. Open all isolation ball valves on suction lines between the pump and the two tanks, and on the pump's individual discharge lines.
6. Turn the pump's field mounted ROT switch to the "Test" position to verify that the unit is operating and that the motor's direction of rotation is correct.
7. With the HOA switch in the "Off" position, place the ROT switch for the pre-chlorination pump in the "Remote" position.
8. Verify that influent flow signal is input to the PLC-NaOCl and output of the stroke controller.
9. Verify that the chlorine residual setpoint programmed in PLC-NaOCl is approved by your Operations Supervisor.
10. Place the pump in operation as follows:

Automatic Mode of Operation:

- a. Place the HOA switch at LCP-NaOCl in the "Auto" position.
- b. The pump will start in 0 to 180 seconds. The stroke will respond to the influent flow signal.

Manual Mode of Operation:

- a. Place the HOA switch at LCP-NaOCl in the "Hand" position.
 - b. After a 0 to 180 second delay, the pump will start.
 - c. Set the stroke manually at the pump by the potentiometer, to meet your Operations Supervisor's requirements.
12. Visually verify that the pump is operating.
 13. Observe the discharge pressure of the pump. It should be approximately 45 psi.

Non-Potable Water Pump Station No. 2 Chlorination Pumps

Start up the NPW Pump Station No. 2 chlorination pumps according to the procedures listed below:

1. Verify that the back pressure valve at the chlorine discharge point is operational.
2. Verify that diaphragm valves are pressurized and that diaphragm valve drain lines are closed. Open isolation valves between diaphragm valves and product piping.
3. Verify that pressure relief valves are operational. Open isolation valves between pressure relief valves and product piping.
4. Isolate calibration columns from the system by closing isolation valves between calibration columns and product piping.
5. Open the isolation ball valve on suction line between the pump and the two tanks, and on the pump's individual discharge line.
6. Turn the pump's field mounted ROT switch to the "Test" position to verify that the unit is operating and that the motor's direction of rotation is correct.
7. With the HOA switch in the "Off" position, place the ROT switch for the RAS Chlorination Pump in the "Remote" position.
8. Verify that influent flow signal is input to the PLC-NaOCl and output of the stroke controller.
9. Verify that the chlorine residual setpoint programmed in PLC-NaOCl is approved by your Operations Supervisor.
10. Place the pump in operation as follows:

Automatic Mode of Operation:

- a. Place the HOA switch at LCP-NaOCl in the "Auto" position.
- b. The pump will start in 0 to 180 seconds. The stroke will respond to the influent flow signal.

Manual Mode of Operation:

- a. Place the HOA switch at LCP-NaOCl in the “Hand” position.
 - b. After a 0 to 180 second delay, the pump will start.
 - c. Set the stroke manually at the pump by the potentiometer, to meet your Operations Supervisor’s requirements.
12. Visually verify that the pump is operating.
 13. Observe the discharge pressure of the pump. It should be approximately 45 psi.

Sodium Hypochlorite Containment Area Sump Pump

Start the sump pump according to the procedures listed below:

1. Assess what liquid is in the sump (water or chemical).

If the liquid is water:

- a. Open the isolation valve to the tank drain.

If the liquid is chemical:

- a. Arrange for a hazardous waste truck to be called onto the site.
 - b. Connect the quickconnect from the sump pump discharge line to the hazardous waste truck.
 - c. Open the isolation valve to the quickconnect line. Ensure the isolation valve to the tank drain is closed.
2. Place the appropriate On/Off switch in the “On” position.
 3. Place the Control On/Off switch in the “On” position. The control power light will illuminate.
 4. Release the depressed stop button with the appropriate key.
 5. Press the Pump Start pushbutton.
 6. After a 0 to 180 second delay the pump motor starts and pump operates until a low level is signaled by a float switch.
 7. Visually verify pump is running.

4.5.2.2 Dechlorination Facilities (NO LONGER IN USE UNDER NORMAL OPERATION)

4.5.2.2.1 General System Start-Up Procedures

Under normal operating conditions, the dechlorination facilities are not utilized. If the dechlorination facilities are to be used, the facility should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Visually inspect each tank and all piping for any signs of damage or improper installation.
3. Ensure that control panel LCP-NaHSO₃ in the NaOCl-LCC is energized.
4. Ensure that the appropriate circuit breakers in MCC-NaOCl are energized.
5. Ensure that all isolation valves on tank outlet lines and on pump suction and discharge lines are closed.
6. Start up the individual equipment according to the procedures established in Section 4.5.2.2.2, in the following order:
 - a. NaHSO₃ Storage Tanks
 - b. Plant Effluent Residual Sample Pump (Refer to Section 4.11.2.2)
 - c. Primary Bisulfite Dilution Water Pump (Refer to Section 4.11.2.2)
 - d. Dechlorination Pumps
7. The optimum setpoints and configurations should be selected by your Operations Supervisor and adjusted based on operating experience.

4.5.2.2.2 Individual Equipment Start-Up Procedures

Sodium Bisulfite (NaHSO₃) Tanks

Start up the sodium bisulfite tanks according to the procedures listed below:

1. Verify that there is sufficient sodium hypochlorite in the tanks (50% of full, minimum). If there is not, arrange for chemical delivery of 25% sodium bisulfite solution.
2. Verify that there is no debris in the tank. Close and tighten all access way ports and all nozzles.

3. Verify that there are no restrictions for the air vent pipe and the tank overflow pipe.
4. Close all tank outlet valves.
5. Utilize the chemical delivery truck to fill the tank through the two-inch tank fill line, if required.
6. Open the appropriate isolation valves on the outlet lines.
7. Turn on power for the field-mounted control panel for heat tracing system.

Dechlorination Pumps

Start up the dechlorination pumps according to the procedures listed below:

1. Verify that the backpressure valve at the sodium bisulfite discharge point is operational.
2. Verify that diaphragm valves are pressurized and that diaphragm valve drain lines are closed. Open isolation valves between diaphragm valves and product piping.
3. Verify that pressure relief valves are operational. Open isolation valves between pressure relief valves and product piping.
4. Isolate calibration columns from the system by closing isolation valves between calibration columns and product piping.
5. Open all isolation ball valves on suction lines between the two pumps and the two tanks, and on the pump's individual discharge lines.
6. Select the dechlorination pump that will be in service by use of the lead selector switch at LCP-NaHSO₃.
7. Turn the pump's field mounted ROT switch to the "Test" position to verify that the unit is operating and that the motor's direction of rotation is correct.
8. With the HOA switch in the "Off" position, place the ROT switch for each dechlorination pump in the "Remote" position.
9. Verify that effluent flow signals and plant effluent chlorine residual signals are input to the PLC-NaOC1 and output to the SCR drive and the stroke controller.

10. Verify that the chlorine residual setpoint programmed in PLC-NaOC1 is approved by your Operations Supervisor.
11. Place each SCR drives Local/Remote switch in the “Remote” position.
12. Place the pumps in operation as follows:

Automatic Mode of Operation:

- a. Place the HOA switch at LCP-NaHSO₃ in the “Auto” position.
- b. The pump will start in 0 to 180 seconds. The motor will run at the speed called for by the chlorine residual analyzer signal. The stroke will respond to the plant effluent flow signal.

Manual Mode of Operation:

- a. Place the HOA switch at LCP-NaHSO₃ in the “Hand” position.
 - b. After a 0 to 180 second delay, the pump will start.
 - c. Set the stroke manually at the pump by the potentiometer, to meet your Operations Supervisor’s requirements.
 - d. Set the speed manually by using the potentiometer at the SCR drive, to meet your Operations Supervisor’s requirements.
13. Visually verify that the pump is operating.
 14. Observe the discharge pressure of the pump. It should be approximately 45 psi.

Sodium Bisulfite Containment Area Sump Pump

Start the sump pump according to the procedures listed below:

1. Assess what liquid is in the sump (water or chemical).

If the liquid is water:

- a. Open the isolation valve to the tank drain.

If the liquid is chemical:

- a. Arrange for a hazardous waste truck to be called onto the site.
- b. Connect the quickconnect from the sump pump discharge line to the hazardous waste truck.
- c. Open the isolation valve to the quickconnect line. Ensure the isolation valve to the tank drain is closed.

2. Place the appropriate On/Off switch in the “On” position.
3. Place the Control On/Off switch in the “On” position. The control power light will illuminate.
4. Release the depressed stop button with the appropriate key.
5. Press the Pump Start pushbutton.
6. After a 0 to 180 second delay the pump motor starts and pump operates until a low level is signaled by a float switch.
7. Visually verify pump is running.

4.5.2.3 Non-Potable Water Pump Station No. 1 Start-Up Procedures (NO LONGER IN USE UNDER NORMAL OPERATION)

4.5.2.3.1 General System Start-Up Procedures

Non-Potable Water Pump Station No. 1 should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Visually inspect all facilities for any signs of damage or improper installation.
3. Ensure that control panel LCP-NPW1 in the NaOCl-LCC is energized.
4. Ensure that the appropriate circuit breakers in MCC-NaOCl are energized.
5. If the entire system has been out of service, start the system in accordance with the following procedures:
 - a. Fill the NPW Pump Station wetwell as described in Section 4.5.2.3.2.
 - b. Verify that all branches and services off the NPW system are valved off. Close all NPW system valves.
 - c. In sequence, turn each NPW pump’s field-mounted ROT switch to the “Test” position briefly to verify that the unit is operating, and that the motor’s direction of rotation is correct.
 - d. With the HOA switch at LCP-NPW1 in the “Off” position, place each pump’s ROT switch in the “Remote” position.

- e. Verify that the air release valve on each NPW pump's discharge is operable. Open the isolation valve between the air release valve and the discharge pipe.
- f. Open the gate valve on the discharge of NPW Pump 1. Verify that the gate valves on the discharge of NPW Pumps 2, 3, and 4 are closed.
- g. Close the gate valve between the hydropneumatic tank and the NPW discharge header.
- h. Verify that the NPW pressure sensor/transmitter and flow meter are operational.
- i. One operator should place the HOA switch for NPW Pump 1 in the "Hand" position, while a second operator manually closes NPW Pump 1 outlet gate valve to the extent required to induce head and prevent pump cavitation.
- j. When the reading on the flow indicator at LCP-NPW1 drops to zero, and the pressure indicator at LCP-NPW1 rises to 5 psi, place the pump in the "Off" position. Wait five minutes to allow the system to stabilize. If the pressure drops to 0 psi, repeat steps (i) and (j) until the pressure reading remains at 5 psi.
- k. Verify that air compressors are operational. Place the ROT switch for each in the "Test" position momentarily to verify proper operation and to verify correct direction of rotation of motors.
- l. With the HOA switches in LCP-NPW1 in the "Off" position, place each compressor's ROT switch in the "Remote" position.
- m. Close the isolation valve on the air fill line to the hydropneumatic tank, and manually open the solenoid valve on the air fill line.
- n. Open the gate valve between the hydropneumatic tank and the NPW discharge header. Allow the system to stabilize.
- o. Place the HOA switch for one air compressor in the "Hand" position while monitoring the level in the hydropneumatic tank. Open the air fill line ball valve simultaneously. When the tank level drops to 5.5 ft. above the concrete pad, close the air fill isolation ball valve, then turn off the air compressor.
- p. Place the HOA switch for NPW Pump 1 in the "Hand" position, while simultaneously monitoring hydropneumatic tank level. When the tank level reaches 7.5 ft. above the concrete pad, place the pump in the "Off" position.
- q. Repeat steps (o) and (p) until the system pressure reaches 85 psi.
- r. Select an air compressor as lead compressor. Place both compressors in the "Auto" position.
- s. Place the solenoid valve in automatic operation.
- t. Select an NPW pump as lead pump. Place all four pumps in the "Auto" position.
- u. Create an NPW system demand to verify proper operation of the pressure-based NPW pump station controls.

4.5.2.3.2 Individual Equipment Start-Up Procedures

NPW Wetwell

1. Verify that there is no debris in the NPW wetwell.
2. Close the isolation valve on the NPW wetwell drain line.
3. Verify that the two wetwell float switches are energized and are operational.
4. Verify that the float valve on the inlet line to the NPW wetwell is operational, and is set to open at 9.17 ft and to close at 7.5 ft below the top of wetwell.
5. Open the motor-operated inlet valve to the NPW wetwell, and place it in the “Auto” position.
6. Verify that the float valve closes at 7.5 ft. below the top of wetwell.

Hydro-pneumatic Tank

1. Verify that air compressors are operational.
2. With the HOA switches in LCP-NPW1 in the “Off” position, place each compressor’s ROT switch in the “Remote” position.
3. Close the isolation valve on the air fill line to the hydropneumatic tank, and manually open the solenoid valve on the air fill line.
4. Open the gate valve between the hydropneumatic tank and the NPW discharge header. Allow the system to stabilize.
5. Place the HOA switch for one air compressor in the “Hand” position while monitoring the level in the hydropneumatic tank. Open the air fill line ball valve simultaneously. When the tank level drops to 5.5 ft. above the concrete pad, close the air fill isolation ball valve, then turn off the air compressor.
6. Place the HOA switch for NPW Pump 1 in the “Hand” position, while simultaneously monitoring hydropneumatic tank level. When the tank level reaches 7.5 ft. above the concrete pad, place the pump in the “Off” position.
7. Repeat steps 5 and 6 until the system pressure reaches 85 psi.

Air Compressors

Start up the air compressors according to the procedures listed below:

1. Select the compressor that will be in service.
2. Verify that the valving is in the proper orientation.
3. Place the respective ROT switch in the “Remote” position.
4. Place the compressor into operation as follows:

Automatic Mode of Operation:

- a. Place the appropriate HOA switch at LCP-NPW1 in the “Auto” position to start the selected compressor.
- b. The selected compressor will automatically start and stop based on a signal equal to low pressure in the air receiver.

Manual Mode of Operation:

- a. Place the appropriate HOA switch at LCP-NPW1 in the “Hand” position to start the selected compressor.
 - b. After a 0 to 180 second delay, the compressor motor starts and the compressor will run continuously.
5. Visually verify that the compressor is operating.

Vertical Turbine NPW Pumps

Start up the NPW pumps according to the procedures listed below:

1. Select the pump that will serve as lead pump.
2. Verify the pump inlet and outlet valves are in the proper orientation.
3. Place each pump’s ROT switch in the “Remote” position.
4. Place the pump into operation as follows:

Automatic Mode of Operation:

- a. Place the appropriate HOA switch at LCP-NPW1 in the “Auto” position to start the selected pump.
- b. The pump will automatically start and stop based on system pressure.

Manual Mode of Operation:

- a. Place the appropriate HOA switch at LCP-NPW1 in the “Hand” position to start the selected pump.
 - b. After a 0 to 180 second delay, the pump starts and pump will operate continuously.
5. Visually verify that the pump is operating.
 6. Monitor the pump’s pressure gauge. The pressure should range from 70 to 90 psi.

4.5.2.4 Non-Potable Water Pump Station No. 2 Start-Up Procedures

4.5.2.4.1 General System Start-Up Procedures

Non-Potable Water Pump Station No. 2 should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Visually inspect all facilities for any signs of damage or improper installation.
3. Ensure that control panel LCP-SST1 in the SST-LCC-1 is energized.
4. Ensure that the appropriate circuit breakers in MCC-SST1 are energized.
5. If the entire system has been out of service, start the system in accordance with the following procedures:
 - a. Fill the NPW Pump Station No. 2 wetwell as described in Section 4.5.2.4.2.
 - b. Verify that all branches and services off the NPW system are valved properly.
 - c. In sequence, turn each NPW pump’s field-mounted ROT switch to the “Test” position briefly to verify that the unit is operating, and that the motor’s direction of rotation is correct.

- d. With the HOA switch at the SCADA in the “Off” position, place each pump’s ROT switch in the “Remote” position.
- e. Verify that the air release valve on each NPW pump’s discharge is operable. Open the isolation valve between the air release valve and the discharge pipe.
- f. Open the valves on the discharge of NPW2 - Pump 1, 2, 3, 4 and 5.
- g. Verify that the NPW pressure sensor/transmitter and flow meter are operational.
- h. Select via SCADA the “Lead”, “Lag” and “Standby” main pumps and the “Lead” and “Standby” jockey pumps.
- i. Create an NPW system demand to verify proper operation of the pressure-based NPW pump station controls.

4.5.2.4.2 Individual Equipment Start-Up Procedures

NPW Wetwell

- 1. Verify that there is no debris in the NPW wetwell.
- 2. Verify that the wetwell float switch is energized and operational.
- 3. Verify that the wetwell low alarm is set at a minimum water surface elevation of 49.00 ft.
- 4. Manually open the weir gate between the NPW wetwell and the SST effluent channel.

Vertical Turbine NPW Pumps

Start up the NPW pumps according to the procedures listed below:

- 1. Select the pumps that will serve as “Lead”, “Lag” and “Standby” main pumps and the “Lead” and “Standby” jockey pumps.
- 2. Verify the all pump inlet and outlet valves are in the proper orientation.
- 3. Place each pump’s ROT switch in the “Remote” position.
- 4. Place the pump into operation as follows:

Automatic Mode of Operation:

- a. Place the appropriate HOA switch at the SCADA in the “Auto” position for all in-service pumps.
- b. The pumps will automatically start and stop based on system pressure.

Manual Mode of Operation:

- a. Place the appropriate HOA switch at SCADA in the “Hand” position to start the selected pump.
 - b. After a 0 to 180 second delay, the pump starts and pump will operate continuously.
5. Visually verify that the pump is operating.
 6. Monitor the pump’s pressure gauge. The pressure should range from 75 to 90 psi.

4.5.3 Step by Step Shutdown Procedures

4.5.3.1 Chlorination Facilities

4.5.3.1.1 General System Shutdown Procedures

The Chlorination Facilities should be shut down according to the procedures listed below:

1. Refer to the General Shutdown Procedures in Section 4.0.3.
2. Shut down the Chlorine Dilution Water Pump as described in Section 4.10.3.
3. Shut down the individual equipment as described in Section 4.5.3.1.2 in the following order:
 - a. Sodium Hypochlorite Storage Tanks
 - b. Effluent Chlorination Pumps
 - c. RAS Chlorination Pump
 - d. Pre-Chlorination Pump No. 1
 - e. NPW Pump Station No. 2 Chlorination Pumps

4.5.3.1.2 Individual Equipment Shutdown Procedures

Sodium Hypochlorite Storage Tanks

Shut down the sodium hypochlorite storage tanks according to the procedures listed below:

1. This service, preferably, should be done by a contractor specialized in draining of chemical facilities and hauling and disposal of hazardous materials. Arrange for a vacuum truck or chemical tanker to be at the facility.
2. If a vacuum truck is not available, remove the existing sump pump from the sodium hypochlorite storage area. This pump is not designed for immersion in sodium hypochlorite.
3. Place a temporary sump pump in the NaOCl area sump. The materials of construction of the pump must be compatible with 12.5 % sodium hypochlorite.

WARNING: PROTECTIVE CLOTHING SHALL BE USED AT ALL TIMES WHEN PERFORMING THIS SERVICE. ALL SAFETY PROCEDURES MUST BE FOLLOWED AS PER U.S. ARMY CORPS OF ENGINEERS, SAFETY AND HEALTH REQUIREMENTS, MANUAL EM 385-1-1 (1996) OR ITS UPDATE AND O.S.H.A. GENERAL INDUSTRY STANDARDS 1910.146 (1991) OR ITS UPDATE. PROPER SAFETY REQUIREMENTS DUE TO THE CONTENTS OF THE CHEMICAL TANKS SHOULD BE OBSERVED.

4. The sodium hypochlorite tank drain piping terminates at the NaOCl area sump. Open the drain valve on each tank drain in sequence, and allow the tank contents to drain to the sump at a controlled rate, while the sump pump or vacuum truck delivers the drained sodium hypochlorite to the tanker truck or vacuum truck. Close each drain valve once tank is empty. A sump pump delivering 150 gallons per minute will completely drain one tank to the high water level in approximately 3.0 hours.
5. Set the remote back pressure valves at the Inlet Junction Structure, RAS line, Effluent Blending Structure and NPW Pump Station No. 2 at 0 psi. Allow the lines to drain for 10.0 minutes, then reset the valves at 40 psi.
6. Using the NPW system, fill both NaOCl tanks to a level of 1.0 ft. above the pump suction line.

7. Set the stroke controller for Effluent Chlorination Pump No. 1 at the 100% stroke setting.
8. Set the SCR drive for Effluent Chlorination Pump No. 1 at the 100% speed setting, and place its local remote switch in the “Local” position.
9. Open the isolation valve connecting NaOCl Tank No. 1 with the effluent chlorination pumps.
10. With the proper valves open and appurtenances on line for pump operation (refer to Section 4.5.2.1), place the HOA switch for Effluent Chlorination Pump No. 1 in the “Hand” position. Pump the NaOCl tank down six inches, then turn the HOA switch to the “Off” position.
11. Repeat steps 7 through 10 for Effluent Chlorination Pump No. 2.
12. Valve off NaOCl Tank No. 1, and open the isolation valve connecting NaOCl Tank No. 2 with the RAS Chlorination Pump.
13. Repeat steps 9, 10, and 12 for the RAS Chlorination Pump.
14. Open the isolation valve connecting NaOCl Tank No. 2 with Prechlorination Pump No. 1.
15. Repeat steps 9, 10, and 12 for Prechlorination Pump No. 1.
16. Open the isolation valve connecting NaOCl Tank No. 2 with the NPW Pump Station No. 2 Chlorination Pumps.
17. Repeat steps 9, 10 and 12 for NPW Pump Station No. 2 Chlorination Pump No. 1.
18. Repeat steps 9, 10 and 12 for NPW Pump Station No. 2 Chlorination Pump No. 2.
19. Reset both back pressure valves to 0 psi.
20. Reinstall the NaOCl area sump pump, and place it in service. Open the sump pump outlet valve to the tank drain system.
21. Open the drain valves on NaOCl Tanks No. 1 and 2 and allow the tanks to drain at a controlled rate to the sump. Turn the sump pump on, and drain the liquid to the tank drain system. Close each drain valve once the tank is empty.
22. Disconnect the power to the level transmitter.

Effluent Chlorination Pumps

Shut down the effluent chlorination pumps according to the procedures listed below:

1. Turn the respective HOA switch at LCP-NaOCl for the pumps to the “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source and close the isolation valves.

Note: The pump will also automatically shut down on tank low level, on no flow condition as detected by a flow switch, or on failure as detected by a conductivity probe.

RAS Chlorination Pump

Shut down the RAS Chlorination Pump according to the procedures listed below:

1. Turn the HOA switch at LCP-NaOCl for the RAS Chlorination Pump to the “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source and close the isolation valves.

Note: The pump will also automatically shut down on tank low-low level or on no flow condition as detected by a flow switch

Pre- Chlorination Pump

Shut down Pre-chlorination Pump No. 1 according to the procedures listed below:

1. Turn the HOA switch at LCP-NaOCl for Pre-chlorination Pump No. 1 to the “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.

4. If the pump is to be out of service for an extended period of time, disconnect power source and close the isolation valves.

Note: The pump will also automatically shut down on tank low-low level or on no flow condition as detected by a flow switch.

NPW Pump Station No. 2 Pumps

Shut down the NPW Pump Station No. 2 pumps according to the procedures listed below:

1. Turn the respective HOA switch at LCP-NaOCl for the pumps to the “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source and close the isolation valves.

Note: The pump will also automatically shut down on tank low-low level or on no flow condition as detected by a flow switch.

Sodium Hypochlorite Containment Area Sump Pump

Shut down the sump pump according to the following procedures:

1. Press the Pump Stop pushbutton.

Note: A key is required to unlock the stop pushbutton when the sump pump needs to be started again.

2. Verify the pump has stopped.
3. Lock the appropriate lock switch.
4. If pump is to be out of service for an extended period of time, disconnect power source and close isolation valves.

Note: The sump pump will also automatically shut down on low liquid level or motor overload.

4.5.3.2 Dechlorination Facilities (NO LONGER USED UNDER NORMAL OPERATION)

4.5.3.2.1 General System Shutdown Procedures

The Dechlorination Facilities should be shut down according to the following procedures:

1. Refer to the General Shutdown Procedures presented in Section 4.0.3.
2. Shutdown the Primary Bisulfite Dilution Water Pump as described in Section 4.11.3.
3. Shut down individual equipment as described in Section 4.5.3.2.2 in the following order:
 - a. Sodium Bisulfite Storage Tanks
 - b. Dechlorination Pumps

4.5.3.2.2 Individual Equipment Shutdown Procedures

Sodium Bisulfite Storage Tanks

Shut down the sodium bisulfite storage tanks according to the procedures listed below:

1. This service, preferably, should be done by a contractor specialized in draining of chemical facilities and hauling and disposal of hazardous materials. Arrange for a vacuum truck or chemical tanker to be at the facility.
2. If a vacuum truck is not available, remove the existing sump pump from the sodium hypochlorite storage area. This pump is not designed for immersion in sodium hypochlorite.
3. Place a temporary sump pump in the NaHSO₃ area sump. The materials of construction of the pump must be compatible with sodium bisulfite.

WARNING: PROTECTIVE CLOTHING SHALL BE USED AT ALL TIMES WHEN PERFORMING THIS SERVICE. ALL SAFETY PROCEDURES MUST BE FOLLOWED AS PER U.S. ARMY CORPS OF ENGINEERS, SAFETY AND HEALTH REQUIREMENTS, MANUAL EM 385-1-1 (1996) OR ITS UPDATE AND O.S.H.A. GENERAL INDUSTRY STANDARDS 1910.146 (1991) OR ITS UPDATE. PROPER SAFETY REQUIREMENTS DUE TO THE CONTENTS OF THE CHEMICAL TANKS SHOULD BE OBSERVED.

4. The sodium bisulfite tank drain piping terminates at the NaHSO₃ area sump. Open the drain valves on each tank drain in sequence, and allow the tank contents to drain to the sump at a controlled rate, while the sump pump or vacuum tank delivers the drained sodium bisulfite to the tanker truck or vacuum truck. Close each drain valve once tank is empty. A sump pump delivering 150 gallons per minute will completely drain one tank to the high water level in approximately 1.5 hours.
5. Set the remote back pressure valve at the Effluent Blending Structure at 0 psi. Allow the line to drain for 10.0 minutes, then reset the valve at 40 psi.
6. Using the NPW system, fill both NaHSO₃ tanks to a level of one foot above the pump suction line.
7. Set the stroke controller for Dechlorination Pump No. 1 at the 100% stroke setting.
8. Set the SCR drive for Dechlorination Pump No. 1 at the 100% speed setting, and place its local remote switch in the "Local" position.
9. Open the isolation valves connecting both NaHSO₃ tanks with the dechlorination pumps.
10. With the proper valves open and appurtenances on line for pump operation (refer to Section 4.5.2.2), place the HOA switch for Dechlorination Pump No. 1 in the "Hand" position. Pump both tanks down 6-inch, then turn the HOA switch to the "Off" position.
11. Repeat steps 7 through 10 for Dechlorination Pump No. 2.
12. Reset both back pressure valves to 0 psi.
13. Re-install the NaHSO₃ area sump pump, and place it in service. Open the sump pump outlet valve to the tank drain system.
14. Open the drain valves on NaHSO₃ Tanks No. 1 and No. 2, and allow the tanks to drain at a controlled rate to the sump. Turn the sump pump on, and drain the liquid to the tank drain system. Close each drain valve once the tank is empty.
15. If the tank is to be out of service for an extended period of time, disconnect power source for the heat tracing system.
16. Shut down power for the field-mounted control panel for heat tracing system.

17. Disconnect the power to the level transmitter.

Dechlorination Pumps

Shut down the dechlorination pumps according to the procedures listed below:

1. Turn the respective On/Off switch at LCP-NaHSO₃ for the pumps to the “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source and close the isolation valves.

Note: The pump will also automatically shut down on tank low-low level, on no flow condition as detected by a flow switch, or on failure as detected by a conductivity probe.

Sodium Bisulfite Containment Area Sump Pump

Shut down the sump pump according to the following procedures:

1. Press the Pump Stop pushbutton.

Note: A key is required to unlock the stop pushbutton when the sump pump needs to be started again.
2. Verify the pump has stopped.
3. Lock the appropriate lock switch.
4. If pump is to be out of service for an extended period of time, disconnect power source and close isolation valves.

Note: The sump pump will also automatically shut down on low liquid level or motor overload.

4.5.3.3 NPW Pump Station No. 1 (NO LONGER USED UNDER NORMAL OPERATION)

4.5.3.3.1 General System Shutdown Procedures

The NPW Pump Station No. 1 should be shut down according to the following procedures:

1. Refer to the General Shutdown Procedures described in Section 4.0.3.
2. Shut down individual equipment as described in Section 4.5.3.3.2, in the following order:
 - a. Hydropneumatic Tank Air Compressors
 - b. NPW Pumps
 - c. NPW Wetwell
 - d. Hydropneumatic Tank

4.5.3.3.2 Individual Equipment Shutdown Procedures

Hydropneumatic Tank Air Compressors

1. Turn the respective HOA switch at LCP-NPW1 for the compressors to the “Off” position.
2. Verify the compressor has stopped.
3. Lock the appropriate ROT switch.
4. If the compressor is to be out of service for an extended period of time, disconnect power source and close the isolation valves.

Note: The compressor will also automatically shut down on low discharge pressure as detected by a pressure switch, or on motor failure.

NPW Pumps

1. Turn the respective HOA switch at LCP-NPW1 for the pumps to be “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source and close the isolation valves.

Note: The pump will also automatically shut down on pump failure as detected by a limit switch on the pump's discharge check valve, and on motor failure.

NPW Wetwell

1. Place the inlet motor-operated field-mounted Local/Auto switch in the "Local" position.
2. Close the motor-operated valve by use of the valve's field-mounted "Close" pushbutton.
3. Open the isolation plug valve on the wetwell's drain line, and allow the wetwell to drain to the tank drain system.

Hydropneumatic Tank

1. Verify that the hydropneumatic tank air compressors have been shut down.
2. Close the isolation valve connecting the hydropneumatic tank with the NPW distribution system.
3. Open the drain valve on the bottom of the tank, and allow the tank to drain to the tank drain system.

4.5.3.4 NPW Pump Station No. 2

4.5.3.4.1 General System Shutdown Procedures

The NPW Pump Station No. 2 should be shut down according to the following procedures:

1. Refer to the General Shutdown Procedures described in Section 4.0.3.
2. Shut down individual equipment as described in Section 4.5.3.4.2, in the following order:
 - a. NPW Pumps
 - b. NPW Wetwell

4.5.3.4.2 Individual Equipment Shutdown Procedures

NPW Pumps

1. Turn the respective HOA switch at the SCADA for the pumps to the “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source and close the isolation valves.

Note: The pump will also automatically shut down on pump failure as detected by a limit switch on the pump’s discharge check valve, and on motor failure.

4.5.4 Alarm and Status Annunciation

4.5.4.1 Chlorination Facilities

The following alarm annunciation and status indication components are associated with the chlorination facilities:

<u>Alarm/Status</u>	<u>Display Location</u>
General	
NaOCl Area Safety Shower Alarm Failure Annunciator	LCP-NaOCl and SCADA
Plant Effluent Chlorine Residual Low Failure Annunciator	LCP-NaOCl and SCADA
Plant Effluent Chlorine Residual High Failure Annunciator	LCP-NaOCl and SCADA
Primary Effluent Chlorine Residual Low	LCP-NaOCl and SCADA
PLC-NaOCl Primary Failure Annunciator	LCP-NaOCl and SCADA
PLC-NaOCl Secondary Failure Annunciator	LCP-NaOCl and SCADA
NaOCl Containment Sump High Level Failure Annunciator	LCP-NaOCl and SCADA
Plant Effluent Chlorine Residual Indicator/Recorder	LCP-NaOCl and SCADA

<u>Alarm/Status</u>	<u>Display Location</u>
Primary Effluent Chlorine Residual Indicator/Recorder	LCP-NaOCl and SCADA
Plant Effluent Chlorine Residual Indicator/Recorder	SCADA
Primary Effluent Chlorine Residual	SCADA
NaOCl Containment Sump High Level Failure Annunciator	SCADA
PLC NaOCl Failure Annunciator	SCADA
NaOCl System Failure Annunciator	SCADA
NaOCl Area Safety Shower Alarm Failure Annunciator	SCADA
Effluent Chlorination Pumps	
Effluent Chlorination Pump No. 1 Failure Annunciator	LCP-NaOCl and SCADA
Effluent Chlorination Pump No. 2 Failure Annunciator	LCP-NaOCl and SCADA
Effluent Chlorination Pump No. 1 Diaphragm Rupture	LCP-NaOCl and SCADA
Effluent Chlorination Pump No. 2 Diaphragm Rupture	LCP-NaOCl and SCADA
Effluent Chlorination Pump No. 1 Motor Failure Annunciator	LCP-NaOCl and SCADA
Effluent Chlorination Pump No. 2 Motor Failure Annunciator	LCP-NaOCl and SCADA
Effluent Chlorination Pump No. 1 Run Light	LCP-NaOCl and SCADA
Effluent Chlorination Pump No. 2 Run Light	LCP-NaOCl and SCADA
Effluent Chlorination Pump No. 1 Pressure Indicator	Field
Effluent Chlorination Pump No. 2 Pressure Indicator	Field
RAS Chlorination Pump	
RAS Chlorination Pump Failure Annunciator	LCP-NaOCl and SCADA
RAS Chlorination Pump Diaphragm Rupture	LCP-NaOCl and SCADA

<u>Alarm/Status</u>	<u>Display Location</u>
RAS Chlorination Pump Motor Failure Annunciator	LCP-NaOCl and SCADA
RAS Chlorination Pump Run Light	LCP-NaOCl and SCADA
RAS Chlorination Pump Pressure Indicator	Field
Pre-Chlorination Pump	
Prechlorination Pump Failure Annunciator	LCP-NaOCl and SCADA
Prechlorination Pump Diaphragm Rupture	LCP-NaOCl and SCADA
Prechlorination Pump Motor Failure Annunciator	LCP-NaOCl and SCADA
Prechlorination Pump Run Light	LCP-NaOCl and SCADA
Prechlorination Pump Pressure Indicator	Field
NPW Pump Station No. 2 Chlorination Pumps	
NPWPS2 Chlorination Pump No. 1 Failure Annunciator	LCP-NaOCl and SCADA
NPWPS2 Chlorination Pump No. 2 Failure Annunciator	LCP-NaOCl and SCADA
NPWPS2 Chlorination Pump No. 1 Diaphragm Rupture	LCP-NaOCl and SCADA
NPWPS2 Chlorination Pump No. 2 Diaphragm Rupture	LCP-NaOCl and SCADA
NPWPS2 Chlorination Pump No. 1 Motor Failure Annunciator	LCP-NaOCl and SCADA
NPWPS2 Chlorination Pump No. 2 Motor Failure Annunciator	LCP-NaOCl and SCADA
NPWPS2 Chlorination Pump No. 1 Run Light	LCP-NaOCl and SCADA
NPWPS2 Chlorination Pump No. 2 Run Light	LCP-NaOCl and SCADA
NPWPS2 Chlorination Pump No. 1 Pressure Indicator	Field
NPWPS2 Chlorination Pump No. 2 Pressure Indicator	Field
Sodium Hypochlorite Storage Tanks	
Sodium Hypochlorite Tank No. 1 High Level Annunciator	LCP-NaOCl and SCADA

<u>Alarm/Status</u>	<u>Display Location</u>
Sodium Hypochlorite Tank No. 2 High Level Annunciator	LCP-NaOCl and SCADA
Sodium Hypochlorite Tank No. 1 Low Level Annunciator	LCP-NaOCl and SCADA
Sodium Hypochlorite Tank No. 2 Low Level Annunciator	LCP-NaOCl and SCADA
Sodium Hypochlorite Tank No. 1 Low Low Level Annunciator	LCP-NaOCl and SCADA
Sodium Hypochlorite Tank No. 2 Low Low Level Annunciator	LCP-NaOCl and SCADA

4.5.4.2 Dechlorination Facility

The following alarm annunciation and status indication components are associated with the dechlorination facilities:

<u>Alarm/Status</u>	<u>Display Location</u>
General	
NaHSO ₃ Area Safety Shower Alarm	LCP-NaHSO ₃ and SCADA
Plant Effluent Low Residual Cl ₂	LCP-NaHSO ₃ and SCADA
NaHSO ₃ Containment Sump High Level	LCP-NaHSO ₃ and SCADA
NaHSO ₃ Containment Sump High Level	SCADA
NaHSO ₃ System Failure	SCADA
NaHSO ₃ Area Safety Shower Alarm	SCADA
Plant Effluent Chlorine Residual Indicator/Recorder	LCP-NaOCl and SCADA
Plant Effluent Chlorine Residual Indicator/Recorder	SCADA
Dechlorination Pumps	
Dechlorination Pump No. 1 Failure Annunciator	LCP-NaOCl and SCADA

<u>Alarm/Status</u>	<u>Display Location</u>
Dechlorination Pump No. 2 Failure Annunciator	LCP-NaOC1 and SCADA
Dechlorination Pump No. 1 Motor Failure Annunciator	LCP-NaOC1 and SCADA
Dechlorination Pump No. 2 Motor Failure Annunciator	LCP-NaOC1 and SCADA
Dechlorination Pump No. 1 Diaphragm Rupture	LCP-NaOC1 and SCADA
Dechlorination Pump No. 2 Diaphragm Rupture	LCP-NaOC1 and SCADA
Dechlorination Pump No. 1 Run Light	LCP-NaOC1 and SCADA
Dechlorination Pump No. 2 Run Light	LCP-NaOC1 and SCADA
Sodium Bisulfite Storage Tanks	
Sodium Bisulfite Tank No. 1 High Level Annunciator	LCP-NaHSO ₃ and SCADA
Sodium Bisulfite Tank No. 2 High Level Annunciator	LCP-NaHSO ₃ and SCADA
Sodium Bisulfite Tank No. 1 Low Level Annunciator	LCP-NaHSO ₃ and SCADA
Sodium Bisulfite Tank No. 2 Low Level Annunciator	LCP-NaHSO ₃ and SCADA
Sodium Bisulfite Tank No. 1 Low Low Level Annunciator	LCP-NaHSO ₃ and SCADA
Sodium Bisulfite Tank No. 2 Low Low Level Annunciator	LCP-NaHSO ₃ and SCADA

4.5.4.3 Non-Potable Water Pump Station No. 1

The following alarm annunciation and status indication components are associated with the Non-Potable Water Pump Station No. 1:

<u>Alarm/Status</u>	<u>Display Location</u>
General	
NPW System Flow Indicator	LCP-NPW1 and SCADA
NPW System Flow Totalizer	LCP-NPW1 and SCADA
NPW System Pressure Indicator	LCP-NPW1 and SCADA
NPW System Flow Indicator	Field
NPW System Pressure Indicator	Field
NPW System High Pressure	LCP-NPW1 and SCADA
NPW System Low Pressure	LCP-NPW1 and SCADA
NPW System Failure	SCADA
Hydropneumatic Tank	
Hydropneumatic Tank Low Low Pressure Annunciator	LCP-NPW1 and SCADA
Hydropneumatic Tank Low Low Level Annunciator	LCP-NPW1 and SCADA
Hydropneumatic Tank High High Level Annunciator	LCP-NPW1 and SCADA
Hydropneumatic Tank Air Compressors/Air Receiver	
Air Receiver Low Low Pressure	LCP-NPW1 and SCADA
Air Compressor No. 1 Failure	LCP-NPW1 and SCADA

<u>Alarm/Status</u>	<u>Display Location</u>
Air Compressor No. 2 Failure	LCP-NPW1 and SCADA
Air Compressor No. 1 Motor Failure	LCP-NPW1 and SCADA
Air Compressor No. 2 Motor Failure	LCP-NPW1 and SCADA
Air Compressor No. 1 Run Light	LCP-NPW1 and SCADA
Air Compressor No. 2 Run Light	LCP-NPW1 and SCADA
Air Compressor No. 1 Run/Off Lights	MCC-NaOC1
Air Compressor No. 2 Run/Off Lights	MCC-NaOC1
NPW Pump No. 1 Failure Annunciator	LCP-NPW1 and SCADA
NPW Pump No. 2 Failure Annunciator	LCP-NPW1 and SCADA
NPW Pump No. 3 Failure Annunciator	LCP-NPW1 and SCADA
NPW Pump No. 4 Failure Annunciator	LCP-NPW1 and SCADA
NPW Pump No. 1 Motor Failure Annunciator	LCP-NPW1 and SCADA
NPW Pump No. 2 Motor Failure Annunciator	LCP-NPW1 and SCADA
NPW Pump No. 3 Motor Failure Annunciator	LCP-NPW1 and SCADA
NPW Pump No. 4 Motor Failure Annunciator	LCP-NPW1 and SCADA

<u>Alarm/Status</u>	<u>Display Location</u>
NPW Pump No. 1 Run Light	LCP-NPW1 and SCADA
NPW Pump No. 2 Run Light	LCP-NPW1
NPW Pump No. 3 Run Light	LCP-NPW1 and SCADA
NPW Pump No. 4 Run Light	LCP-NPW1 and SCADA
NPW Pump No. 1 Run/Off Lights	MCC-NaOC1
NPW Pump No. 2 Run/Off Lights	MCC-NaOC1
NPW Pump No. 3 Run/Off Lights	MCC-NaOC1
NPW Pump No. 4 Run/Off Lights	MCC-NaOC1
NPW Wetwell	
NPW Wetwell High Level Annunciator	LCP-NPW1 and SCADA
NPW Wetwell Low Level Annunciator	LCP-NPW1 and SCADA
NPW Wetwell Low Level Annunciator	PCC

4.5.4.4 Non-Potable Water Pump Station No. 2

The following alarm annunciation and status indication components are associated with the Non-Potable Water Pump Station No. 2:

<u>Alarm/Status</u>	<u>Display Location</u>
General	
NPW2 System Flow Indicator	SCADA
NPW2 System Flow Totalizer	SCADA
NPW2 System Pressure Indicator	SCADA
NPW2 System Flow Indicator	Field

<u>Alarm/Status</u>	<u>Display Location</u>
NPW2 System Pressure Indicator	Field
NPW2 System High-High Pressure	LCP-SST1
NPW2 System Low-Low Pressure	LCP-SST1
NPW2 Pump	
NPW2 Pump No. 1 Failure Annunciator	SCADA
NPW2 Pump No. 2 Failure Annunciator	SCADA
NPW2 Pump No. 3 Failure Annunciator	SCADA
NPW2 Pump No. 4 Failure Annunciator	SCADA
NPW2 Pump No. 5 Failure Annunciator	SCADA
NPW2 Pump No. 1 Motor Failure Annunciator	SCADA
NPW2 Pump No. 2 Motor Failure Annunciator	SCADA
NPW2 Pump No. 3 Motor Failure Annunciator	SCADA
NPW2 Pump No. 4 Motor Failure Annunciator	SCADA
NPW2 Pump No. 5 Motor Failure Annunciator	SCADA
NPW2 Pump No. 1 Run Light	SCADA
NPW2 Pump No. 2 Run Light	SCADA
NPW2 Pump No. 3 Run Light	SCADA
NPW2 Pump No. 4 Run Light	SCADA
NPW2 Pump No. 5 Run Light	SCADA
NPW2 Pump No. 1 Speed Indicator	SCADA
NPW2 Pump No. 2 Speed Indicator	SCADA
NPW2 Pump No. 3 Speed Indicator	SCADA
NPW2 Pump No. 4 Speed Indicator	SCADA
NPW2 Pump No. 5 Speed Indicator	SCADA
NPW2 Pump No. 1 Pressure Indicator	Field
NPW2 Pump No. 2 Pressure Indicator	Field

<u>Alarm/Status</u>	<u>Display Location</u>
NPW2 Pump No. 3 Pressure Indicator	Field
NPW2 Pump No. 4 Pressure Indicator	Field
NPW2 Pump No. 5 Pressure Indicator	Field
NPW2 Wetwell	
NPW2 Wetwell Low Level Alarm	SCADA

4.5.5 Daily Operational Checks

4.5.5.1 General

1. Refer to the general daily operation checks described in Section 4.0.5.
2. Consult the subsections below and the appropriate manufacturer's operation and maintenance instructions for specific monitoring requirements.

4.5.5.2 Chlorination Facility

1. Visually observe each tank and all piping and connections for cracking, any signs of leaks, and any other unusual problems.
2. Visually observe all pipes, valves, and appurtenances for any signs of damage or improper installation. All nozzles and manways should be properly closed and tightened as directed by your Operations Supervisor.
3. Check and record the level in each tank.
4. Check the positions of the manually-operated valves, and verify that they are properly positioned for the selected mode of operation of the facility and to accommodate the selected operating pumps.
5. Check and record the percent of stroke readout on any operating pump.
6. Check and record the percent of speed readout of the SCR drive for the operating effluent chlorination pumps.
7. Check the operation of all pumps to see that they are operating smoothly and quietly. Record run time for each pump.

8. Check the pumps for leaks, excessive noise, and temperature (hand touch).
9. Verify the integrity of the anchor bolts holding each pump to its mounting pad.
10. Check the level of the area sump, and drain the sump by use of the sump pump's On/Off switch if necessary.
11. Check the pressure in each pulsation dampener, and recharge the dampener if the pressure has dropped below an acceptable limit.
12. Check the discharge and suction pressure reading on the pump pressure gauges.
13. Check control settings of all chlorination pumps locally and at LCP-NaOC1 to confirm the requirements of your Operations Supervisor.
14. Check level in the sump in containment area.
15. Record run time of the sump pumps.
16. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the Chlorination Facility:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Diaphragm Chemical Metering Pumps (Section 11018). Prepared by Pulsafeeder, Inc. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Fiberglass Reinforced Plastic Tanks (Section 11030). Prepared by Belco Manufacturing Company. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sump Pumps (Section 11016). Prepared by Multi W Systems, Inc. 1997.

4.5.5.3 Dechlorination Facility (NO LONGER IN USE UNDER NORMAL OPERATION)

1. Visually observe each tank and all piping and connections for cracking, any signs of leaks, and any other unusual problems.
2. Visually observe all pipes, valves, and appurtenances for any signs of damage or improper installation. All nozzles and manways should be properly closed and tightened as directed by your Operations Supervisor.

3. Check and record the level in each tank.
4. Check the position of the manually-operated valves, and verify that they are properly positioned for the selected mode of operation of the facility and to accommodate the selected operating pump.
5. Check and record the percent of stroke readout on the operating pump.
6. Check and record the percent of speed readout of the SCR drive for the operating pump.
7. Check the operation of the pump to see that it is operating smoothly and quietly. Record run time for each pump.
8. Check the operations pump for leaks, excessive noise, and temperature (hand touch).
9. Verify the integrity of the anchor bolts holding each pump to its mounting pad.
10. Check the level of the area sump, and drain the sump by use of the sump pump's On/Off switch if necessary.
11. Check the pressure in each pulsation dampener, and recharge the dampener if the pressure has dropped below an acceptable limit.
12. Check the discharge and suction pressure reading on the pump pressure gauges.
13. Check control settings of all dechlorination pumps locally and at LCP-NaHSO₃ to confirm the requirements of your Operations Supervisor.
14. Check level in the sump in containment area.
15. Record run time of the sump pumps.
16. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the Dechlorination Facility:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Diaphragm Chemical Metering Pumps (Section 11018). Prepared by Pulsafeeder, Inc. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Fiberglass Reinforced Plastic Tanks (Section 11030). Prepared by Belco Manufacturing Company. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sump Pumps (Section 11016). Prepared by Multi W Systems, Inc. 1997.

4.5.5.4 Non-Potable Water Pump Station No. 1 Facilities (NO LONGER IN USE UNDER NORMAL OPERATION)

1. Visually observe the hydropneumatic tank and all piping and connections for cracking, any signs of leaks, and any other unusual problems.
2. Visually observe all pipes, valves, and appurtenances for any signs of damage or improper installation.
3. Check the level of the NPW wetwell, and verify that it is within the set range of the float valve.
4. Check and record the level in the hydropneumatic tank.
5. Check and record the pressure in the air receiver tank, the hydropneumatic tank, and on the outlet of each operating pump.
6. Verify that the valving on the compressor/air receiver system is properly set for the selected mode of operation.
7. Check the operation of the NPW pumps to verify that they are operating smoothly and quietly. Record run time for each pump.
8. Check each operating NPW pump for leaks, excessive noise, and temperature (hand touch).
9. Check control settings for the system and its components locally and at LCP-NPW1 to confirm the requirements of your Operations Supervisor.
10. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for NPW Pump Station No. 1:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Vertical Turbine Pumps (Section 11013). Prepared by Floway Pumps. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Hydropneumatic Tank (Section 11014). Prepared by Fluid Kinetics. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Hydropneumatic Tank Air Compressors (Section 11015). Prepared by Fluid Kinetics. 1997.

4.5.5.5 Non-Potable Water Pump Station No. 2 Facilities

1. Visually observe all pipes, valves, and appurtenances for any signs of damage or improper installation.
2. Check that weir gate is operating smoothly and does not show signs of excess leakage.
3. Check the level of the NPW wetwell, and verify that it is above the low level of the float switch.
4. Check and record the pressure at the discharge header and at the outlet of each operating pump.
5. Check the operation of the NPW2 pumps to verify that they are operating smoothly and quietly. Record run time for each pump.
6. Check each operating NPW2 pump for leaks, excessive noise, driver lubrication levels and flow, packing box leakage and temperature (hand touch).
7. Check control settings for the system and its components locally and at LCP-SST1 to confirm the requirements of your Operations Supervisor.
8. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for NPW Pump Station No. 2:

Operations and Maintenance Manual for South Bay International Wastewater Treatment Plant - Main Pumps (Section 11.82.04). Prepared by Fairbanks Morse Pump 2010.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant – Jockey Pumps (Section 11.82.04). Prepared by Fairbanks Morse Pump 2010.

4.5.6 Training Record

The following record should be used by the Operator to ensure a complete understanding of the facilities described in this subsection.

4.5.6.1 Reading Assignment

1. Chapters 8, 9, 23, Operation of Wastewater Treatment Plants - MOP 11. Water Environment Federation, 1990.
2. Chapter 10, Operation of Wastewater Treatment Plants - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1993.

4.5.6.2 Field Instruction

The operator should review and know the location and purpose of each of the following items:

<u>Item</u>	<u>Operator Initials</u>
Chlorination Facility	
Sodium Hypochlorite Storage Tanks	_____
Pre-Chlorination Pump	_____
RAS Chlorination Pump	_____
NPWPS2 Chlorination Pump No. 1	_____
NPWPS2 Chlorination Pump No. 2	_____
Effluent Chlorination Pump No. 1 & 2	_____
Calibration Columns	_____
Pulsation Dampeners	_____
Pressure Relief Valves	_____

<u>Item</u>	<u>Operator Initials</u>
Back Pressure Valves	_____
Tank Fill Station	_____
Sump Pump	_____
Air Release Valve	_____
Stroke Controllers (all chlorination pumps)	_____
SCR Drives (Effluent Chlorination Pumps)	_____
Conductivity Probe Assembly (all chlorination pumps)	_____
Isolation Valves	_____
Emergency Eyewash	_____
Tank Level Sensors	_____
LCP-NaOCl Controls and Alarms	_____
PCC Alarms	_____
Dechlorination Facility	
Sodium Bisulfite Storage Tanks	_____
Dechlorination Pumps	_____
Calibration Columns	_____
Pulsation Dampeners	_____
Pressure Relief Valves	_____
Back Pressure Valves	_____
Tank Fill Station	_____
Sump Pump	_____
Air Release Valve	_____

<u>Item</u>	<u>Operator Initials</u>
Stroke Controllers	_____
SCR Drives	_____
Heat Trace System	_____
Conductivity Probe Assembly	_____
Isolation Valves	_____
Emergency Eyewash	_____
Tank Level Sensors	_____
LCP-NaHSO ₃ Controls and Alarms	_____
PCC Alarms	_____
NPW Pump Station No. 1	
Air Compressors	_____
Air Receiver	_____
Air Fill Solenoid Valve	_____
Hydropneumatic Tank	_____
Tank Level Probes	_____
Tank Pressure Sensor	_____
NPW Inlet Float Valve	_____
NPW Inlet Motor Operated Valve	_____
NPW Wetwell Float Switches	_____
NPW Pumps	_____
NPW Flow Meter	_____
NPW Pressure Sensor	_____
Check Valves	_____

<u>Item</u>	<u>Operator Initials</u>
Isolation Valves	_____
Air Release Valves	_____
Local Controls	_____
LCP-NPW1 Controls and Alarms	_____
PCC Alarms	_____
NPW Pump Station No. 2	
NPW Pump Station No. 2 Weir Gate	_____
NPW Pump Station No. 2 Wetwell Float Switch	_____
NPW Pump Station No. 2 Main Pumps	_____
NPW Pump Station No. 2 Jockey Pumps	_____
NPW Pump Station No. 2 Flow Meter	_____
NPW Pump Station No. 2 Pressure Sensors	_____
Check Valves	_____
Butterfly Valves	_____
Air Release Valves	_____
Local Controls	_____
SCADA Controls and Alarms	_____

4.6 WASTE ACTIVATED SLUDGE THICKENING FACILITIES

4.6.1 Description of Controls and Operation

4.6.1.1 General

Refer to the general control and operational philosophy presented in Section 4.0.1.

The waste activated sludge thickening facilities process schematic is presented in Figure 3.6-1.

The controls for the WAS thickening facilities consist of field controls and local control panels (LCPs) located in the field or in the DAF Local Control Center (DAF-LCC). The main local control panel (LCP-DAF), located in the DAF-LCC, contains most of the LCPs for the WAS thickening systems. The DAF-LCC, located in the DAF Control Structure provided for CC-3 facilities, also houses switchboards, motor control centers (MCCs) and variable frequency drives (VFDs).

4.6.1.2 Dissolved Air Floatation (DAF) Tanks

Flow of the waste activated sludge to each DAF unit is measured by the individual magnetic WAS flow meters/transmitters. WAS flow meters/transmitters provide measurement as well as local and remote indication of the appropriate flow rates and transmit the signals to individual non-resettable WAS indicators/totalizers located at the DAF System local control panel (LCP-DAF) in local control center DAF-LCC.

The upper and lower sludge collector arms in each DAF unit are driven by a manually adjustable variable speed gear motor with roller chain and sprockets. Speed is controlled by a speed control hand wheel at the drive.

Each collector drive is equipped with a Remote-Off-Test (ROT) switch to lockout the drive, enable SCADA controls, and momentarily test the drive. When in remote position, a discrete digital input to the PLC will enable operation of the drive by an ON/OFF selector switch (OO) in the SCADA System. When the ROT switch is in the REMOTE position and the OO is in the ON position, the drive runs continuously by sending a start command to MCC-DAF. The TEST position starts the motor and spring returns to OFF when released. The OFF position overrides all controls and is lockable.

Two integral limit switches are provided with each drive unit: one switch is set at the prescribed limit for high torque and the other switch is set at the prescribed limit for low torque. If torque exceeds the range set by the switches, one of the limit switches activate either a low torque or high torque alarm in the SCADA System and the drive unit shuts down. MCC-DAF also provides a discrete digital input to the PLC if a motor failure occurs, which is displayed and logged in the SCADA System.

TWAS level in the float box of each DAF is controlled by a dedicated bubbler control panel located on top of the DAF units. Each bubbler control panel activates operation of the appropriate TWAS pump on high float box level, and disables the pump on low float box level.

Each bubbler panel consists of two compressors (duty/standby), and pressure switches to sense lead compressor failure, to automatically start the stand-by compressor, and to sense a low air flow system failure.

Each compressor has individual selector switches, as well as a hand switch to select operation of either compressor continuously, or AUTO operation, which automatically alternates the duty and standby compressors.

Four adjustable bubbler level control set points (for each bubbler control panel) are provided:

- Low level set point provides a signal to stop the appropriate TWAS pump when it is in automatic mode (1.0 feet).
- High level set point provides a signal to start the appropriate TWAS pump when it is in automatic mode (2.5 feet).
- High-high level set point will initiate float box high-high level alarm (one for each unit) in the SCADA System.
- Low-low level set point will initiate float box low-low level alarm (one for each unit) in the SCADA System.

4.6.1.3 Pressurization and Air Injection System

The pressurization system is manually operated. The air injection system is semi-automatically operated. An 8-inch, hand wheel operated, backpressure control valve is

manually adjusted to create the backpressure required to pressurize the pressurization tank.

A pressurization pump of each pressurization system recirculates DAF unit underflow at a constant rate. The pressurization pump operates against the pressurization tank pressure. Each pressurization pump is equipped with a Remote-Off-Test (ROT) switch at the motor location and an On/Off selector switch (OO) in the SCADA System. When in remote position, the OO at SCADA determines if the pump is operating or not; when in the ON position remotely, the pump runs continuously.

The discharge check valve of each pressurization pump is equipped with a limit switch located on the lever of the check valve. This switch indicates a "no flow" condition when the pump is called to operate, activates the loss of flow alarm at SCADA, and shuts down the pump. Pressure gauges are also provided on the discharge piping of the pump to locally indicate discharge pressure.

The pressurization pump Run/Off indicator lights are displayed in the SCADA System, and running time meters for each pump are displayed at MCC-DAF.

A common seal water supply manifold to the pressurization pumps is provided with a flow switch. A signal from the flow switch is transmitted to the LCP-DAF to annunciate on "no flow" conditions for the seal water manifold if one of the pumps is called to start.

A pressure gauge and the high and low pressure switches are located on the discharge of each pressurization tank. Set points of the high and low pressure switches are adjustable. The signals from high and low pressure switches activate individual pressurization tank high or low pressure alarms in the SCADA System. The pressurization tanks are equipped with pop safety valves, air release valves, and blow-down lines which discharge pressurized underflow to the effluent channels of the DAF units. Each pressurization tank is also equipped with a liquid level sight gauge, and with high-high level, high level, low-low level, and low level alarms. The high-high level switches and low-low level switches activate pressurization tank high-high level and low-low level individual alarms in the SCADA System. The low level switch closes the solenoid valve and the high level switch opens the solenoid valve located at the air control panel of each DAF system.

Compressed air is supplied to the pressurization tank by the two air compressors located in the Compressor Room of the DAF Control Structure. One compressor is normally in service and one is on standby mode.

Each air compressor is equipped with a Remote-Off-Test (ROT) switch and a Hand-Off-Auto (HOA) switch in the SCADA system to select the mode of operation. Manufacturer furnished low discharge pressure and high discharge pressure switches are installed at each compressor to provide automatic startup of the compressor on low discharge pressure condition, and to shutdown the compressor on high discharge pressure condition when the compressor is placed in the AUTO mode of operation. In order to select the duty/standby air compressor, a "Compressor 1-Compressor 2" (Duty-Standby) selector switch is provided. In the AUTO mode of operation, the duty compressor operates as called for by signals from the low discharge pressure and high discharge pressure switches. The standby air compressor, in the AUTO mode of operation, automatically starts if the duty compressor fails.

When the HOA switch is placed in the HAND position, each compressor will start when the receiver tank pressure falls to the low pressure set point and will stop when the receiver tank pressure rises to the high pressure set point for a manually adjustable 1-10 second time delay.

The air supply controls are mounted on an air control panel adjacent to each pressurization tank. The controls include the following items: heavy duty pressure regulator, needle valve, rotameter, pressure gauges, and a solenoid valve.

The flow of air is controlled by a manual rotameter. The solenoid valve is automatically closed on low liquid level signal (from the low liquid level switch in the pressurization tank) and is automatically opened on high liquid level signal (from the high liquid level switch in the pressurization tank). The solenoid valve is also automatically closed on signal from high and low pressure switches located on the discharge of each pressurization tank.

A bypass line and valve is provided at each air control panel to allow the operator to bypass the rotameter and the solenoid valve.

4.6.1.4 TWAS Pumping and Metering System

Pumping of the float box via the TWAS pump will normally operate in automatic mode, based on the bubbler control panel level control. When operated in the automatic mode, each TWAS pump is controlled by the appropriate bubbler control panel located on top of the DAF unit. The pump is started on a high level signal from the bubbler control panel and is stopped on a low level signal.

Each TWAS pump is equipped with a Remote-Off-Test (ROT) switch at the motor location to lock out the drive, to enable SCADA controls, and to provide momentary test of the pump. A Hand-Off-Auto (HOA) selector switch is also provided in the SCADA System. The ROT, when in remote position, will provide input to the PLC and enable operation of the HOA. The OFF position of the ROT is lockable and overrides all other switches. The TEST position of the ROT overrides the OFF position of the HOA.

When the HOA is in the HAND position, the pump operates on a continuous basis subject to low level in the float box, or a high pressure discharge signal. The OFF position of the HOA stops the operation of the pump.

The MCC-DAF outputs a discrete digital signal to the PLC when the motor is operating, and the SCADA System displays MOTOR RUN. MCC-DAF provides a discrete digital input to the PLC if a motor failure condition occurs, and MOTOR FAILURE is displayed and logged in the SCADA System.

The discharge check valve of each TWAS pump is equipped with a limit switch located on the lever of the check valve. This switch indicates a "no flow" condition when the pump is called to operate but the limit switch contact is not made, and it activates the pump failure alarm locally and a loss of flow alarm at SCADA, and shuts down and locks out the pump. Resetting the lockout logic is accomplished by pressing the RESET button at MCC-DAF. Low flow disables the pump in HAND and AUTO modes.

The piping of each pump is also equipped with a pressure gauge on both the suction and pressure sides, and a high pressure switch on the discharge side. The high pressure switch activates the pump failure alarm locally and a high pressure alarm at SCADA, and shuts down the pump after an adjustable 0-10 second time delay.

A common seal water supply manifold to the TWAS pumps is provided with a flow switch and rotameter. A signal from the flow switch provides a discrete digital input to the PLC indicating a no flow condition. PLC logic compares the call to start either of the pumps to the presence of seal water flow from the flow switch, and will activate SEAL WATER FAILURE alarm in the SCADA System if seal water is not present. The pumps shut down and lockout until reset in the SCADA System.

The common TWAS manifold is equipped with a magnetic flow meter/transmitter to measure and indicate the combined TWAS flow from DAF Units No. 1 and No. 2. The flow indicator and totalizer are displayed in the SCADA System; an analog input from the flow element to the PLC is provided.

4.6.1.5 DAF Polymer Addition System

The DAF polymer addition system is a semi-automatic system and requires routine and daily operator attention to transfer, mix, and deliver polymer to the DAF units.

Polymer Bulk Storage

Pressure/level sensors are provided in the bulk polymer storage tank to indicate a high and low bulk polymer supply to each tank, to prevent polymer spillage and to protect the bulk polymer transfer pump from running dry. PLC logic provides an operator adjustable digital output to alarm BULK POLYMER STORAGE TANK LOW LEVEL in the SCADA System; this is indication to order polymer. PLC logic also provides an operator adjustable alarm BULK POLYMER STORAGE TANK LOW-LOW LEVEL, which shuts down the bulk polymer transfer pump. The high level alarm indicator light HIGH LEVEL and fill panel alarm horn each receive a discrete digital output from the PLC to indicate a high level in the bulk polymer storage tank. An ACKNOWLEDGE pushbutton is provided to silence the alarm horn but maintain the HIGH LEVEL indicator light until the tank level is lowered. During refilling of the storage tank, PLC logic provides an operator adjustable alarm to indicate BULK POLYMER STORAGE TANK HIGH-HIGH LEVEL in the SCADA System.

The bulk polymer storage area is provided with a drainage sump equipped with a sump pump. The sump pump is manually operated. An On/Off switch, Run light, Fail light and disconnect switch is located on the vendor supplied pump panel located above the drainage sump. The operator is responsible for assessing the situation (polymer spillage or water) to open the appropriate isolation valve (to the special collection truck or to the drainage system), and to start the pump by positioning the On/Off switch. The pump is automatically shut down on low level condition in the drainage sump or on motor overload.

The drainage sump is provided with high level and low level switches. A signal from the high level switch is transmitted to the SCADA System to indicate DAF POLYMER CONTAINMENT SUMP HIGH LEVEL. The containment area is then drained by use of the manually operated sump pump. To drain the containment area, the operator manually opens and closes the appropriate isolation valves, then manually starts the pump. The On/Off selector switch, located at the field panel LCP-DAFSP, when placed in the ON position turns on the pump, until a signal from the low level switch shuts down the sump pump.

Bulk Polymer Transfer Pump

The DAF Bulk Polymer Transfer Pump is used to transfer bulk polymer from the Bulk Polymer Storage Tank to the Polymer Mix Tank. The motor for the bulk polymer transfer pump is coupled to a hand switch, variable speed drive and indicator light. A Remote-Off-Test (ROT) switch is located at the motor. A Hand-Off-Auto (HOA) switch is located in the SCADA System. Located at the transfer pump is a variable speed drive controller providing localized adjustment of the bulk polymer feed rate. Each speed controller is equipped with a potentiometer for speed control. Auxiliary SCR contacts supply a discrete digital input to the PLC, and POLYMER TRANDER PUMP RUN is displayed in the SCADA System.

In the AUTO position of the HOA switch, the pump operates as called for by the level signals from the polymer mix tank. The pump starts on a low level signal and stops on high level signals, and if upon failure of the high level, stops on high-high level.

In the HAND position of the HOA switch, the low level and high level set points are disabled and the pump operates continuously until the polymer solution level reaches high-high level conditions. The pump automatically shuts down on high-high level conditions, regardless of the position of the HOA switch.

A high/low pressure switch is installed on the discharge side of the pump to indicate motor failure, pump failure, loss of flow and blocked discharge. Failure of the transfer pump to deliver polymer when called for de-energizes the motor and is displayed and logged in the SCADA System. PLC logic determines that if a low or high pressure signal is detected after a preset operator adjustable time duration, the pump shuts down and locks out. Reset of the lockout logic is accomplished by pressing the RESET pushbutton in the SCADA System.

In addition, the pump is provided with a pressure gauge on the discharge piping for local indication of the discharge pressure.

A common seal water supply manifold to the polymer transfer pump and polymer feed pumps is equipped with a common flow switch and a pressure gauge. The seal water flow switch activates a common POLYMER PUMP SEAL WATER FAILURE alarm in the SCADA System on "no seal water flow" conditions and shuts down the pumps. To restart the pumps, resetting the PLC logic is required by actuating the RESET pushbutton in the SCADA System. The pressure gauge on the seal water manifold is provided to indicate the pressure in the seal water.

Polymer Mix Tank

One polymer mix tank and mixer is provided for mixing the diluted polymer before it is fed to each DAF units via its dedicated DAF polymer feed pump. The polymer mix tank receives bulk polymer from the bulk storage tank via the polymer transfer pump, and dilution water in specified amounts by means of a continuous makeup program, based on level set points in the PLC.

The mix tank is equipped with a pressure/level sensor to indicate the various operator adjustable level set points programmed into the PLC. The level is displayed in the SCADA System. The low level is set at a tank capacity of approximately 280 gallons

and transmits a signal to the bulk polymer transfer pump and make-up water solenoid valve to add polymer and water to the mix tank. The low-low level set point is located 3 inches above the polymer feed pump suction piping. A low-low level alarm from the tank is displayed in the SCADA System and shuts down any and all polymer feed pumps in the AUTO mode.

The high level set point is set at 12 inches below the top of the tank, and transmits a signal to the dedicated polymer transfer pump to shut down, and to the make-up water solenoid valve to close. The high-high level alarm set point is set at 6 inches below the top of the tank and is also transmitted to the dedicated polymer transfer pump to shut down, to the make-up water solenoid valve to close, and to the SCADA System. Resetting of the make-up water solenoid valve is done automatically.

The normally closed, make-up water solenoid valve operates automatically as called for by the level signals from the dedicated polymer mix tank. The valve opens on a low level signal and closes on high or high-high level signals. Failure of the solenoid valve when makeup water is called for activates a POLYMER MIX TANK MAKEUP WATER FAIL alarm in the SCADA System.

Auxiliary motor starter contacts for the mixer supply a discrete digital input to the PLC, and POLYMER MIX TANK MIXER RUN is displayed in the SCADA System. The mixer motor is provided with a Remote-Off-Test (ROT) switch located at the motor and an On-Off (OO) switch located in the SCADA System. The TEST position of the ROT starts the motor and is spring returned to the OFF position when released. The OFF position of the ROT is lockable and overrides all other switches; however, the TEST position of the ROT overrides the OFF position of the OO. The OO provides an input to the motor starter at MCC-DAF to operate the mixer continuously in the ON position and shutdown the mixer in the OFF position. Failure of the mixer is displayed in the SCADA System, and is reset at MCC-DAF.

Polymer Feed Pumps

One polymer feed pump is provided for each DAF unit. When in operation, the speed of each feed pump is controlled within the SCADA System by a SCR direct current drive unit. The pump motor is furnished with a field tachometer/generator which

provides 0-5V analog feedback signal to the speed of the motor, and is displayed in the SCADA System.

The motors for each of the polymer feed pumps are coupled to two hand switches; a Remote-Off-Test (ROT) switch located at the motor and an On-Off (OO) switch displayed in the SCADA System. When the ROT is in the REMOTE position, a discrete digital input to the PLC is provided and operation of the feed pump as selected by the OO is enabled. The TEST position of the selector switch starts the motor, and is spring returned to the OFF position when released. The OFF position of the ROT is lockable and overrides all other switches; however, the TEST position of the ROT overrides the OFF position of the OO. The OO provides an input to the motor SCR drive to operate the pump continuously in the ON position and shutdown the pump in the OFF position. When the pump is in operation, the SCR drive sends a discrete digital input to the PLC, and confirms the pump is operating by displaying a run light indicator in the SCADA System.

Flow switches are installed on the discharge piping of each pump to indicate motor failure, pump failure, and blocked discharge. The switch provides a discrete digital input signal to the PLC, which in conjunction with an operator adjustable software timer and a run confirm signal, initiates a POLYMER FEED PUMP LOSS OF FLOW alarm in the SCADA System. The SCR provides a discrete digital input to the PLC if a failure condition (overload or SCR internal failure) occurs; POLYMER FEED PUMP FAIL is displayed and logged in the SCADA System.

In addition, each pump is provided with a pressure indicator located on the discharge piping for local pressure measurement.

A common seal water supply manifold to the polymer transfer pump and polymer feed pumps is equipped with a common flow switch and a pressure gauge. The seal water flow switch activates a common POLYMER PUMP SEAL WATER FAILURE alarm in the SCADA System on "no seal water flow" conditions and shuts down the pumps. To restart the pumps, resetting the PLC logic is required by actuating the RESET pushbutton in the SCADA System. A pressure gauge on the seal water manifold is provided to indicate the pressure in the seal water. Rotameters are provided on each seal water feed line to its respective DAF polymer feed pump to indicate flow.

The polymer feed area is provided with a DAF Area Shower Station. The station is equipped with a flow switch to detect flow due to activation of the eyewash/shower. Activation of the eyewash/shower station is displayed and logged in the SCADA System to indicate DAF AREA SHOWER ALARM.

4.6.2 Step by Step Start-Up Procedures

4.6.2.1 General Start-Up Procedures

Routine Mode of Operation

The WAS Thickening Facilities should be started according to the following procedures for routine mode of operation:

1. Refer to General Start-up Procedures in Section 4.0.2.
2. Visually inspect tanks, pumps, and collectors and skimmers for any signs of damage or improper installation. The area should be cleaned of all installation or maintenance equipment and other articles which are not part of the system.
3. Ensure all ROT switches are in the “Off” position.
4. Ensure that Local Control Panel LCP-DAF at the DAF-LCC is energized.
5. Ensure that Distribution panels are energized.
6. Ensure that the circuit breakers at Motor Control Center MCC-DAF, located in DAF-LCC, is energized for all equipment to be operated. Also ensure local On/Off disconnect boxes are energized.
7. Ensure that all tank drain plug valves are closed in each DAF tank that is to come online.
8. Ensure unstabilized storage tank facilities are online and operational.
9. Start the Polymer Addition Facilities in the following order:

- a. DAF Polymer Containment Area Sump Pump
 - b. DAF Polymer Storage Tank
 - c. DAF Polymer Transfer Pump
 - d. DAF Polymer Mixer
 - e. DAF Polymer Feed Pumps
10. Start up the sludge and skimming collectors in the DAF tank being placed in service.
11. Start the pressurization system for the DAF tank being placed in service. Verify that the air compressors are operating and air at 70 psi is available at the air control panel.
12. Open isolation valves to allow flow into the DAF tanks.
13. Verify that TWAS pumps are on and ready to operate in automatic mode. The TWAS pumps will operate based on flow once high level in the DAF tank has been reached.

4.6.2.2 Individual Equipment Start-Up Procedures

4.6.2.2.1 Dissolved Air Floatation (DAF) Tanks

DAF Unit Sludge Collectors

Start up the sludge and skimming collectors in each DAF tank according to the procedures listed below:

1. Select the collector that will be in service.
2. Check the tank to be sure there are no tools, loose part covers, etc. in the tank.
3. Ensure that all plug valves in floor are closed.
4. Check position of valves that control the hydraulics of the unit (drain valves, etc.)

5. Check the position of the weirs. On initial startup, they should be set at maximum height, so that after the tank is filled they can be evenly adjusted to the designed head. Tighten down the weir bolts after making this adjustment.
6. Check oil level in all reducers, note its condition, make sure that it is the correct viscosity for anticipated ambient temperatures in which the reducers will operate. Grease all fittings.
7. Place the respective ROT switch in the “Remote” position.
8. Ensure torque gauge indicator is set at zero.
9. Set On/Off switch in the SCADA system in the “On” position. The collector will start and operate continuously.
10. When the collector has rotated several times without any basin contact or binding, proceed to fill the basin (see DAF Tank procedure below).
11. Check operation of drive for noise, vibration, or excessive load on the drive chain.
12. If the DAF tank has been allowed to remain full for an extended period of time due to mechanism inactivity, ensure that there is not an excessive “sludge blanket” covering the bottom of the tank. If this cannot be accomplished visually, a “sludge judge” should be used.

DAF Tanks

Start up the DAF tank according to the procedures listed below:

1. After the mechanical clearances have been properly checked, and the collector is running freely without binding, the operator may fill the basin.
2. Open the control device and allow fluid to start entering the tank. The collector can be rotating during the operation.

3. As the tank fills, note motion of corner sweep and other rotating components; they should continue to operate the same way as during the dry tank check.
4. Once the fluid has reached the operating level, observe the action of the surface skimmer. Scum should have moved toward the pivoting skimmer blade. The skimmer blade should smoothly wipe the scum beach and carry it into the scum trough. As the scum blade enters, passes over, and leaves the scum trough, there should be no tendency to hang up at any position, if it is properly adjusted.

When the tank is completely full, note and record the torque gauge indicator reading. A normal pattern of readings can be established so that the overload condition can be anticipated and corrected.

It should be noted that it is normal for the collector to run at a very low operating torque, even with the basin full of fluid and/or sludge.

4.6.2.2.2 Pressurization and Air Injection System

DAF Air Compressors

Startup the air compressors according to the procedures listed below:

1. Verify proper selection of duty and standby compressors at the Compressor 1-Compressor 2 selector switch located in the Local Control Panel (LCP-DAFCOM) at the DAF-LCC.
2. Verify the operational status of both DAF air compressors by checking the maintenance log and verifying at the compressor ROT switches that neither compressor is locked in the "Off" position.
3. Place each air compressor's ROT switch to the "Test" position to verify proper start of each compressor.
4. Place each air compressor's ROT switch in the "Remote" position.
5. Place the compressors into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-DAFCOM in the “Auto” position.
- b. The duty compressor will operate as coordinated with the adjustable pressure switches, and the standby compressor will be automatically enabled if the duty compressor fails.
- c. Visually verify operation of the compressor.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch for a compressor in the “Hand” position at the LCP-DAFCOM.
- b. The compressor will operate continuously, as coordinated with the adjustable pressure switches, subject to high high pressure detection by the discharge pressure switch. Automatic startup of the standby compressor is deactivated in the "Hand" mode of operation.
- c. Verify operation of the compressor.

DAF Pressurization System

Startup the Pressurization and Air Injection System according to the procedures listed below:

1. Verify that the air compressors are operating and adequate amount of air (70 psi) is available at the air control panel. The air supply pressure must be higher than the operating pressure in the vessel. The operating pressure can vary and will be determined by the plant operator (65psi is recommended by the manufacturer for adequate air dissolution to occur).
2. Verify that the back-pressure valve at the DAF tank is in the open position by turning at least three turns from the closed position.

3. Open all air control valves and the rotameter so air flow starts immediately when the pressurization pump is turned on.
4. Start feeding flow to the unit until the weir overflow occurs and the launder area feeding the pressurization pump is full of water up to the effluent overflow plate.
5. Open the feed and discharge valves servicing the pressurization pumps and release all entrained air from the pump housing by opening the upper plug, loosening the pump suction flange, or opening the air-lock vent valve, so that the pump impeller cavity is full of water. This priming phase will enable the operator to quickly obtain the required head and operating range.
6. Check that all valves on the air control panel are in the open position, and air is ready to be fed into the top of the air dissolving tank.
7. The back pressure valve should be in its open position, which initially will allow the air pressure to quickly fill the upper section of the air pressurization tank.
8. The pressurization pump may now be started, the pressurization tank will start to fill up and flow will start entering the DAF unit.
9. Slowly close the back-pressure valve using the screw jack handwheel until the pressure starts to register on the gauge located adjacent to the valve.
10. Move the hand wheel slowly since the pressure will rise rapidly once the valve starts to constrict the flow.
11. As the pressure increases, the water will start to rise inside of the pressurization tank, and then become visible in the sight glass.
12. When the water level reaches the high level float switch, the solenoid valve at the air control panel will open and air flow will commence. The air pressure

will start pushing the fluid back down until the low level float switch is reached and the cycle repeats. When the low level is reached and air flow is stopped.

13. Verify that milky white dissolved air solution can be seen at the center of the float cell, and float formation is occurring in the WAS.

14. If the air pressure is stronger than the water pressure, it will push the water level down and out of the sight glass. If this occurs, the air pressure must be gradually reduced until the system stabilizes.

Note: Cavitation and line vibration often occurs during startup, but should end once the design pressure is reached and the system stabilizes.

4.6.2.2.3 TWAS Pumping and Metering System

TWAS Pumps

Start-up the TWAS pumps according to the procedures below:

1. Verify pump housing and suction piping are filled with medium.
2. If necessary, prime the pump to lubricate the stator.
3. Place TWAS Pump ROT switch in the “Test” position and test pump to verify direction of rotation.
4. Place TWAS Pump ROT switch in the “Remote” position.
5. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-DAF in the “Auto” position.
- b. The pump(s) will operate as called for by the RIO-DAF as described in detail in Section 4.6.1.4. The pumps operate based on level control via the bubbler control panel at the DAF tanks.

- c. Visually verify the pump(s) operating.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-DAF in the “Hand” position.
- b. The pump will operate continuously, subject to a low level in the float box or a high pressure discharge signal.
- c. Verify the pump is operating.

4.6.2.2.4 DAF Polymer Addition System

Startup the Polymer Addition Facilities by starting up the specific equipment in the order listed below.

Polymer Containment Area Sump Pump

1. Assess what liquid is in the sump (water or chemical)

If the liquid is water:

- a. Open the isolation valve to the tank drain

If the liquid is chemical:

- a. Arrange for a hazardous waste truck to be called onsite.
- b. Connect the quickconnect from the sump pump discharge line to the hazardous waste truck.
- c. Open the isolation valve to the quickconnect line. Ensure the isolation valve to the tank is closed.

2. Place the sump pump disconnect On/Off switch in the “On” position.

3. Place the Control On/Off switch in the “On” position. The control power light will illuminate.

4. Release the depressed stop button with the appropriate key
5. Press the Pump Start pushbutton.
6. After a 0 to 180 second delay, verify that the pump motor starts and pump operates until a low level is signaled by a float switch.

DAF Bulk Polymer Storage Tank

1. Fill bulk storage tank according to the following procedures:
 - a. Energize the fill panel.
 - b. Attach chemical supply truck hose to the quickconnect of the fill pipe for the tank to be filled.
 - c. Open the isolation valve.
 - d. Pump the ordered amount of chemical into the chemical storage tank carefully watching the sight glass on the side of the tank so as not to overfill the tank.
 - e. When pumping is completed purge the feed pipe with air. Close the isolation valve. Disconnect the supply hose and cap the fill pipe.

WARNING: In case the high level alarm horn sounds, stop chemical pumping immediately. A high level alarm is designed to activate before the tank overflows. Silence the alarm by pressing the Acknowledge pushbutton on the fill panel. Alarm light will stay illuminated until the chemical level in the tank is below the high level.

DAF Bulk Polymer Transfer Pump

Start-up the polymer transfer pump according to the procedures below:

1. Verify pump housing and suction piping are filled with medium.
2. If necessary, prime the pump to lubricate the stator.

3. Place polymer transfer pump ROT switch at the motor in the “Test” position and test pump to verify direction of rotation.
4. Place polymer transfer pump ROT switch in the “Remote” position.
5. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch in the SCADA system in the “Auto” position.
- b. The pump will operate as called for by the PLC as described in detail in Section 4.6.1.5. The pump operates based on levels in the polymer mix tank.
- c. Visually verify the pump is operating.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch in the SCADA system in the “Hand” position.
- b. The pump will operate continuously, subject to the polymer mix tank high-high level shutdown provided from PLC logic.
- c. Verify the pump is operating.

DAF Polymer Mixer

Startup the mixer in the mixing tank according to the procedures below:

1. Verify the mixer is free from interferences and properly mounted.
2. Verify the propeller of the mixer is below the water surface by at least 12 inches.
3. Place the ROT switch in the “Remote” position.

4. Place the On/Off switch in the SCADA system in the “On” position. The mixer will operate continuously.
5. Visually verify the mixer is operating.

DAF Polymer Feed Pumps

Start-up the polymer transfer pumps according to the procedures below:

1. Verify housing and suction piping for pumps are filled with medium.
2. If necessary, prime the pumps to lubricate the stator.
3. Place polymer feed pumps ROT switch in the “Test” position and test pump to verify direction of rotation.
4. Place polymer feed pumps ROT switch in the “Remote” position.
5. Place the pumps into operation as follows:

Automatic Mode of Operation

- a. Place the On/Off switch in the SCADA system in the “On” position.
- b. The pump(s) will operate as called for by the PLC as described in detail in Section 4.6.1.5. The pumps operate based on need for polymer at their dedicated DAF Unit.
- c. Visually verify the pump(s) operating.

4.6.3 Step by Step Shutdown Procedures

4.6.3.1 General Shutdown Procedures

The WAS Thickening Facilities should be shut down according to the following procedures:

1. Refer to General Shutdown Procedures in Section 4.0.3.
2. Close appropriate valves for the tank(s) to be taken out of service.

3. Turn off the polymer feed pump(s) for the tank to be taken out of service. Flush out of service polymer line(s) with non-potable water.
4. Drain the basin down. Allow the sludge collecting unit to continue running to collect any remaining sludge.
5. Continue thickened WAS pumping cycle as determined by your Operations Supervisor to remove residual thickened WAS.
6. Shutdown the TWAS Pump for the respective DAF Tank being taken out of service.
7. Shutdown the sludge collecting unit.
8. Open and close appropriate isolation valves to drain liquid for DAF tank.
9. Wash down the interior of the tank taken out of service.
10. When the tank is empty (visually inspect), close the tank drain.

4.6.3.2 Individual Equipment Shutdown Procedures

4.6.3.2.1 Dissolved Air Floatation (DAF) Tanks

DAF Unit Sludge Collectors

Non-metallic chain and flight type collectors are designed for continuous 24 hour operation. When the equipment remains inactive for a significant period of time, special precautions must be taken to avoid excessive accumulation of solids at the bottom of the DAF tank.

Generally, if the equipment is turned off for a period of more than one hour, influent flow should be terminated to avoid excessive accumulation of solids.

Shut down on the sludge collection system according to the procedures below:

1. If the tank is to be drained for out of service condition, grease sprockets at eight locations while cycling collector prior to shutdown.

2. Turn the respective On/Off switch to the “Off” position at SCADA for the collectors to be shut down.
3. Verify the collector has stopped.
4. Lock the appropriate ROT switch.
5. If the collector is to be out of service for an extended period of time, disconnect power source.

Note: The collectors will also automatically shut down on shear pin breakage or motor overload.

DAF Tanks

When a prolonged non-operational period (greater than 2 months) is expected, shut down the DAF units according to the following procedure:

1. Drain the basin down.
2. Turn off and lockout the drive unit.
3. Hose down the entire tank and all submerged equipment items.
4. Inspect the collector for any missing parts. Fix and replace as needed. Contact the manufacturer for replacement components such as skimmer blades, squeegees, hardware, etc.
5. Fill drive components with winter type lubricant, close the vents, and grease all fittings and drives. Remove motor and store in a warm, dry place. Cover reducer “C” faced motor mount with a tarp. Motor shaft should be rotated by hand every 60 days.
6. If the tank floor is equipped with pressure relief plugs or valves, remove or open them, also open the tank drain. If not it should be sufficiently filled with water to prevent it from heaving.

4.6.3.2.2 Pressurization and Air Injection System

DAF Air Compressors

Shutdown the DAF air compressors according to the procedures below:

1. Place the Remote/Off/Test switch at each DAF air compressor motor in the "Off" position and lock-out.
2. Verify operation of the compressors stops.
3. Place the Hand-Off-Auto selector switch in the designated Local Control Panel (LCP-DAFCOM) in the "Off" position.
4. If the compressors are to be out of service for an extended period of time, disconnect from their power source.

Note: The compressors will also automatically shut down on high high discharge pressure, or compressor failure. Additionally, the compressors will automatically shut down as coordinated by the PLC operational logic (see Section 4.6.1.3 for detailed description).

DAF Pressurization System

Shutdown the DAF pressurization system according to the procedures below:

1. Place the Remote/Off/Test switch at the pressurization pump motors to the "Off" position and lock out.
2. Verify the pump operation stops.
3. Place the On/Off selector switches at panel LCP-DAF to the "Off" position.
4. If the pumps are to be out of service for an extended period of time, disconnect from their power source.

Note: The pumps will also automatically shut down on "no-flow" indication on the pump discharge, or motor failure. Additionally, the pumps will

automatically shut down as called for by the PLC operational logic (see Section 4.6.1.3 for detailed description).

4.6.3.2.3 TWAS Pumping and Metering System

TWAS Pumps

1. Place the Hand/Off/Auto switch for the pump to be shut down at the LCP-DAF in the “Off” position.
2. Verify the pump stops.
3. Lock the appropriate ROT switches and On/Off disconnect switches.
4. If the pump is to be out of service for an extended period of time, disconnect power source.
5. If the entire tank is to be out of service for an extended period of time, closes the isolation valves on pump suction and discharge sides.

Note: The pumps will also automatically shut down on low suction pressure, high discharge pressure, or motor overload. Additionally, the pumps will automatically shut down as called for by the PLC operational logic (see Section 4.6.1.4 for detailed description).

4.6.3.2.4 DAF Polymer Addition System

Polymer Containment Area Sump Pump

Shutdown the polymer containment area sump pump according to the following procedures:

1. Press the Pump Stop pushbutton,
Note: A key is required to unlock the stop pushbutton when the sump pump needs to be started again.
2. Verify that the pump has stopped.
3. Lock the appropriate lock switch.

4. If pump is to be out of service for an extended period of time, disconnect power source and close isolation valves.

Note: The sump pump will automatically shut down on low liquid level or motor overload.

DAF Bulk Polymer Storage Tank

Shutdown the DAF polymer bulk storage tank according to the procedures below:

1. Continue to operate the respective transfer pump and to transfer polymer to the mixing tank.
2. Monitor polymer level in the bulk tank.
3. After polymer level in the tank reaches the low low setting, shut down the polymer transfer pump according to the procedures described in the next section.
4. Materials that do not drain from the storage tank must be diluted, pumped out using a portable submersible pump, and safely disposed. Follow the procedures similar to those described in Section 4.6.3.1.

DAF Bulk Polymer Transfer Pump

Shut down the polymer transfer pump according to the procedure listed below:

1. Turn the respective HOA switch in the SCADA system to the “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, flush all chemical lines with non-potable water and disconnect power source.
5. If the bulk storage tank is to be out of service for an extended period of time, closes the isolation valves on pump suction and discharge sides.

Note: The pumps will also automatically shut down on low or high discharge pressure, on low low storage tank level, or on motor failure. Additionally, if the DAF Polymer Mix Tank Mixer has experienced an overload failure, the PLC will prevent the pump from transferring polymer in the AUTO mode (see Section 4.6.1.5 for detailed description).

DAF Polymer Mixing Tank and Mixer

Shut down the polymer mixing tank according to the procedure below:

1. Close the respective isolation valves on the feed lines to the mixing tank.
2. Continue to operate the polymer feed pumps.
3. Monitor the polymer solution level in the mixing tank.
4. When the level in the mixing tank is below the low level, turn off the mixer by turning the ROT switch to the “Off” position and lock it out. Do not operate the mixer when the polymer level is below the low setting to prevent excessive splashing and mixer vibration.
5. After polymer level in the tank reaches the low low level setting, shut down the polymer feed pumps according to the procedures in the next section.
6. Materials that do not drain from the mixing tank must be diluted, pumped out using a portable submersible pump, and safely disposed.

Note: The mixer will also automatically shut down on motor overload.

DAF Polymer Feed Pumps

Shut down the polymer feed pumps according to the procedure listed below:

1. Turn the respective On/Off switch at the SCADA system for the pump(s) to be shut down to the “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.

4. If the pump is to be out of service for an extended period of time, flush all chemical lines with non-potable water, disconnect power source, and close the isolation valves.

Note: The pump will also automatically shut down on polymer solution low level in the missing tank, on no flow condition as detected by the discharge check valve limit switch, or motor overload.

4.6.4 Alarm and Status Indication

The following sections list the alarms and status indicators associated with the WAS Thickening Facilities.

4.6.4.1 Dissolved Air Floatation (DAF) Tanks

DAF Unit Sludge Collectors

<u>Alarm/Status</u>	<u>Display Location</u>
Sludge Collector 1 Remote Status	SCADA, MCC-DAF
Sludge Collector 1 Run Light	SCADA, MCC-DAF
Sludge Collector 1 Motor Failure	SCADA
Alarm	
Sludge Collector 1 Drive Low	SCADA
Torque	
Sludge Collector 1 Drive High	SCADA
Torque	
Sludge Collector 2 Remote Status	SCADA, MCC-DAF
Sludge Collector 2 Run Light	SCADA, MCC-DAF
Sludge Collector 2 Motor Failure	SCADA
Alarm	
Sludge Collector 2 Drive Low	SCADA
Torque	
Sludge Collector 2 Drive High	SCADA
Torque	

DAF Unit Float Box Bubbler

<u>Alarm/Status</u>	<u>Display Location</u>
Float Box 1 High-High Level	SCADA
Float Box 1 Low-Low Level	SCADA
Float Box 2 High-High Level	SCADA
Float Box 2 Low-Low Level	SCADA

Other

<u>Alarm/Status</u>	<u>Display Location</u>
DAF Area Shower Alarm	SCADA

4.6.4.2 Pressurization and Air Injection System

DAF Air Compressors

<u>Alarm/Status</u>	<u>Display Location</u>
Compressor 1 Fail Alarm	SCADA
Compressor 2 Fail Alarm	SCADA

DAF Pressurization Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
Pressurization Pump 1 Remote Status	SCADA, MCC-DAF
Pressurization Pump 1 Test Status	MCC-DAF
Pressurization Pump 1 Loss of Flow Alarm	SCADA, MCC-DAF
Pressurization Pump 1 Failure Alarm	SCADA
Pressurization Pump 1 Run Light	SCADA, MCC-DAF
Pressurization Pump 2 Remote Status	SCADA, MCC-DAF
Pressurization Pump 2 Test Status	MCC-DAF

Pressurization Pump 2 Loss of Flow SCADA, MCC-DAF
Alarm

Pressurization Pump 2 Failure SCADA
Alarm

Pressurization Pump 2 Run Light SCADA, MCC-DAF

DAF Pressurization Tanks

<u>Alarm/Status</u>	<u>Display Location</u>
Pressurization Tank 1 Level	SCADA
Pressurization Tank 1 Pressure	SCADA
Pressurization Tank 1 High High Level Alarm	SCADA
Pressurization Tank 1 Low Low Level Alarm	SCADA
Pressurization Tank 1 High Pressure Alarm	SCADA
Pressurization Tank 1 Low Pressure Alarm	SCADA
Pressurization Tank 2 Level	SCADA
Pressurization Tank 2 Pressure	SCADA
Pressurization Tank 2 High High Level Alarm	SCADA
Pressurization Tank 2 Low Low Level Alarm	SCADA
Pressurization Tank 2 High Pressure Alarm	SCADA
Pressurization Tank 2 Low Pressure Alarm	SCADA

Pressurization Pumps and TWAS Pumps Seal Water Supply

<u>Alarm/Status</u>	<u>Display Location</u>
Seal Water Failure Alarm	SCADA

4.6.4.3 TWAS Pumping and Metering System

TWAS Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
TWAS Pump 1 Remote Status	SCADA, MCC-DAF
TWAS Pump 1 Test Status	MCC-DAF
TWAS Pump 1 Low Flow Alarm	SCADA, MCC-DAF
TWAS Pump 1 Failure Alarm	SCADA
TWAS Pump 1 Motor Failure Alarm	SCADA
TWAS Pump 1 Run Light	SCADA, MCC-DAF
TWAS Pump 1 High Pressure Alarm	SCADA, MCC-DAF
TWAS Pump 2 Remote Status	SCADA, MCC-DAF
TWAS Pump 2 Test Status	MCC-DAF
TWAS Pump 2 Low Flow Alarm	SCADA, MCC-DAF
TWAS Pump 2 Failure Alarm	SCADA
TWAS Pump 2 Motor Failure Alarm	SCADA
TWAS Pump 2 Run Light	SCADA, MCC-DAF
TWAS Pump 2 High Pressure Alarm	SCADA, MCC-DAF

Pressurization Pumps and TWAS Pumps Seal Water Supply

<u>Alarm/Status</u>	<u>Display Location</u>
Seal Water Failure Alarm	SCADA

4.6.4.4 DAF Polymer Addition System

DAF Bulk Polymer Storage Tank

<u>Alarm/Status</u>	<u>Display Location</u>
Bulk Storage Tank Low Level	SCADA
Bulk Storage Tank Low-Low Level	SCADA
Bulk Storage Tank High Level	Fill Panel
Alarm Indicator	
Bulk Storage Tank High Level	Fill Panel
Acknowledge	
Bulk Storage Tank High-High Level	SCADA

Polymer Pumps Common Seal Water System

<u>Alarm/Status</u>	<u>Display Location</u>
Polymer Pump Seal Water Failure	SCADA

DAF Bulk Polymer Transfer Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
Polymer Transfer Pump Run	SCADA
Polymer Transfer Pump Remote	SCADA
Status	
Polymer Transfer Pump Local	SCR Drive
Status	
Polymer Transfer Pump Flow	SCADA
Failure	
Polymer Transfer High Pressure	SCADA

DAF Polymer Mix Tank

<u>Alarm/Status</u>	<u>Display Location</u>
Polymer Mix Tank High-High Level	SCADA
Polymer Mix Tank Low-Low Level	SCADA
Polymer Mix Tank Make-up Water	SCADA

Fail

Polymer Mix Tank Mixer Run SCADA

Polymer Mix Tank Mixer Fail SCADA

DAF Polymer Feed Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
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Polymer Feed Pump 1 Run	SCADA
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Polymer Feed Pump 1 Fail	SCADA
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Polymer Feed Pump 1 Remote	SCADA
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Status

Polymer Feed Pump 1 Local Status SCR Drive

Polymer Feed Pump 1 Speed SCADA

Indication

Polymer Feed Pump 1 Loss of Flow SCADA

DAF Polymer Storage Containment Area

<u>Alarm/Status</u>	<u>Display Location</u>
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Containment Sump High Level	LCP-POL, SCADA
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Alarm

Containment Sump Low Level	LCP-DAFSP
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4.6.5 Daily Operational Checks

4.6.5.1 General

1. Refer to the general daily operation check requirements described in Section 4.0.5.
2. Consult Sections 4.6.5.2 through 4.6.5.5 and the appropriate manufacturer's operation and maintenance manuals for specific monitoring requirements.

4.6.5.2 Dissolved Air Floatation (DAF) Tanks

1. Visually check each DAF tank, all piping and connections for cracking and any signs of liquid leaks.
2. Check the positions of the valves for each element of the facilities to confirm the requirements of your Operations Supervisor. Ensure even flow to both DAF tanks.
3. Check water levels in the DAF tanks to confirm the requirements of your Operations Supervisor.
4. Check sludge and scum removal equipment for any damaged or broken elements, excessive wear.
5. Inspect the operation of the collector for a jerking motion. If motion occurs, it is necessary to adjust the tension of the chain.
6. Check drive chain and sprockets for wear and elongation of the chain. Chain length and tension must remain equal on both sides of the mechanism.
7. Inspect the shear pin and replace if necessary with the same size and material as specified in the original drawings.
8. Check the drives for leaks, unusual noise, and excessive temperature (hand touch).
9. Check and record bubbler readings at SCADA.
10. Consult the manufacturer's O&M Manual for troubleshooting.

4.6.5.3 Pressurization and Air Injection System

1. Visually observe each tank and all piping and connections for cracking, any signs of leaks, or any other unusual problems.
2. Check the pumps' operation to see they are operating smoothly and quietly.

3. Check and record the run times for each pressurization pump at the MCC-DAF.
4. Check that the lever weighted check valves on all operating pumps are open. This condition is alarmed at MCC-DAF, but visual check provides redundancy. If an operating pump has a check valve that is closed, then check and open the discharge and suction isolation valves. If both discharge and suction isolation valves are open, and the associated check valve is in the closed position, then the respective pump should be taken out of service by locking the ROT switch in the “Off” position.
5. Check seal water flow to each pump. Adjust as necessary.
6. Check and record the discharge pressures using the pump pressure gauges.
7. Consult the manufacturer’s O&M Manual for troubleshooting.

4.6.5.4 TWAS Pumping and Metering System

1. Visually observe all piping and connections for cracking, any signs of leaks, or any other unusual problems.
2. Check that the lever weighted check valves on all operating pumps are open. This condition is alarmed at MCC-DAF, but visual check provides redundancy. If an operating pump has a check valve that is closed, then check and open the discharge and suction isolation valves. If both discharge and suction isolation valves are open, and the associated check valve is in the closed position, then the respective pump should be taken out of service by locking the ROT switch in the “Off” position.
3. Check and record common flow meter/totalizer for WAS and TWAS.
4. Check seal water flow to each pump. Adjust as necessary.

5. Check and record the discharge pressures using the pump pressure gauges.
6. Consult the manufacturer's O&M Manual for troubleshooting. :

4.6.5.5 DAF Polymer Addition System

Polymer Bulk Storage Tank and Mixing Tank

1. Visually observe each tank and all piping and connections for cracking, any signs of leaks, or any other unusual problems.
2. Check the positions of the manually operated valves on the tanks and confirm the requirements of your Operations Supervisor.
3. Check and record level of polymer in bulk storage tank and mixing tank.
4. Check that the lever weighted check valves on all operating pumps are open.
5. Check level of the sump in the polymer containment area.
6. Consult the manufacturer's O&M Manual for troubleshooting.

Mixer

1. Check the drive for leaks, unusual noise, and excessive temperature (hand touch).
2. Visually inspect polymer level in tank and mixing quality. Adjust position of mixer to provide proper mixing. If vortexing is occurring, ensure mixer has not moved and low level setting of tank submerges the top propeller to a depth as recommended by manufacturer.
3. Consult the manufacturer's O&M Manual for troubleshooting.

Polymer Transfer and Feed Pumps

1. Check the positions of the manually operated valves on the pump suction, discharge and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check operation of each polymer transfer and addition pump to see that it is operating smoothly and quietly.
3. Check the drives for leaks, unusual noise, and excessive temperature (hand touch).
4. Check seal water flow to each pump. Adjust as necessary.
5. Check and record the discharge pressures using the pump pressure gauges.
6. Check and record NPW flow to mixing tanks when transfer pumps are in operation. Adjust as necessary to ensure correct flow.
7. Consult the manufacturer's O&M Manual for troubleshooting.

4.6.6 Training Record

The following record should be used by the Operator to assure a complete understanding of the WAS Thickening Facilities.

4.6.6.1 Reading Assignment

1. Operation of Wastewater Treatment Plants – MOP 11 (6th Ed.), Chapters 12, 14, 16, 24, and 29. Water Environment Federation, 2008.
2. Operation of Wastewater Treatment Plants – A Field Study Training Program (7th Ed.). Chapter 1 and Chapter 15. Sacramento: California State University Sacramento Foundation, 2007.

4.6.6.2 Field Instruction

The operator should review and know the location and purpose of the following items:

<u>Item</u>	<u>Operator Initials</u>
Dissolved Air Flotation Tanks	_____
WAS Flow Meters	_____
Sludge Collectors	_____
Collection Drives	_____
Float Boxes	_____
Bubbler Control Panels	_____
LCP-DAF	_____
SCADA Alarms	_____
MCC-DAF	_____
Pressurization System	_____
Air Compressors	_____
Air Control Panels	_____
Pressurization Pumps	_____
Pressurization Tanks	_____
Pressurization Pump Seal Water	_____
Back Pressure Valves	_____
Air Release Valves	_____
LCP-DAF	_____
SCADA Alarms	_____
MCC-DAF	_____
TWAS Pumping System	_____
TWAS Pumps	_____
TWAS Pump Seal Water	_____
TWAS Flow Meters	_____
TWAS Flow Totalizer	_____
LCP-DAF	_____
SCADA Alarms	_____

MCC-DAF	_____
Polymer Addition System	_____
DAF Bulk Polymer Storage Tank	_____
DAF Bulk Polymer Storage Tank Fill Panel	_____
DAF Bulk Polymer Transfer Pump	_____
DAF Bulk Polymer Transfer Pump Seal Water	_____
DAF Bulk Polymer Transfer Pump SCR Drive	_____
DAF Polymer Mix Tank	_____
DAF Polymer Mixer	_____
Polymer Mix Tank Makeup Water	_____
DAF Polymer Feed Pumps	_____
DAF Polymer Feed Pumps Seal Water	_____
DAF Polymer Feed Pumps SCR Drive	_____
LCP-DAF	_____
LCP-POL	_____
SCADA Alarms	_____
MCC-DAF	_____



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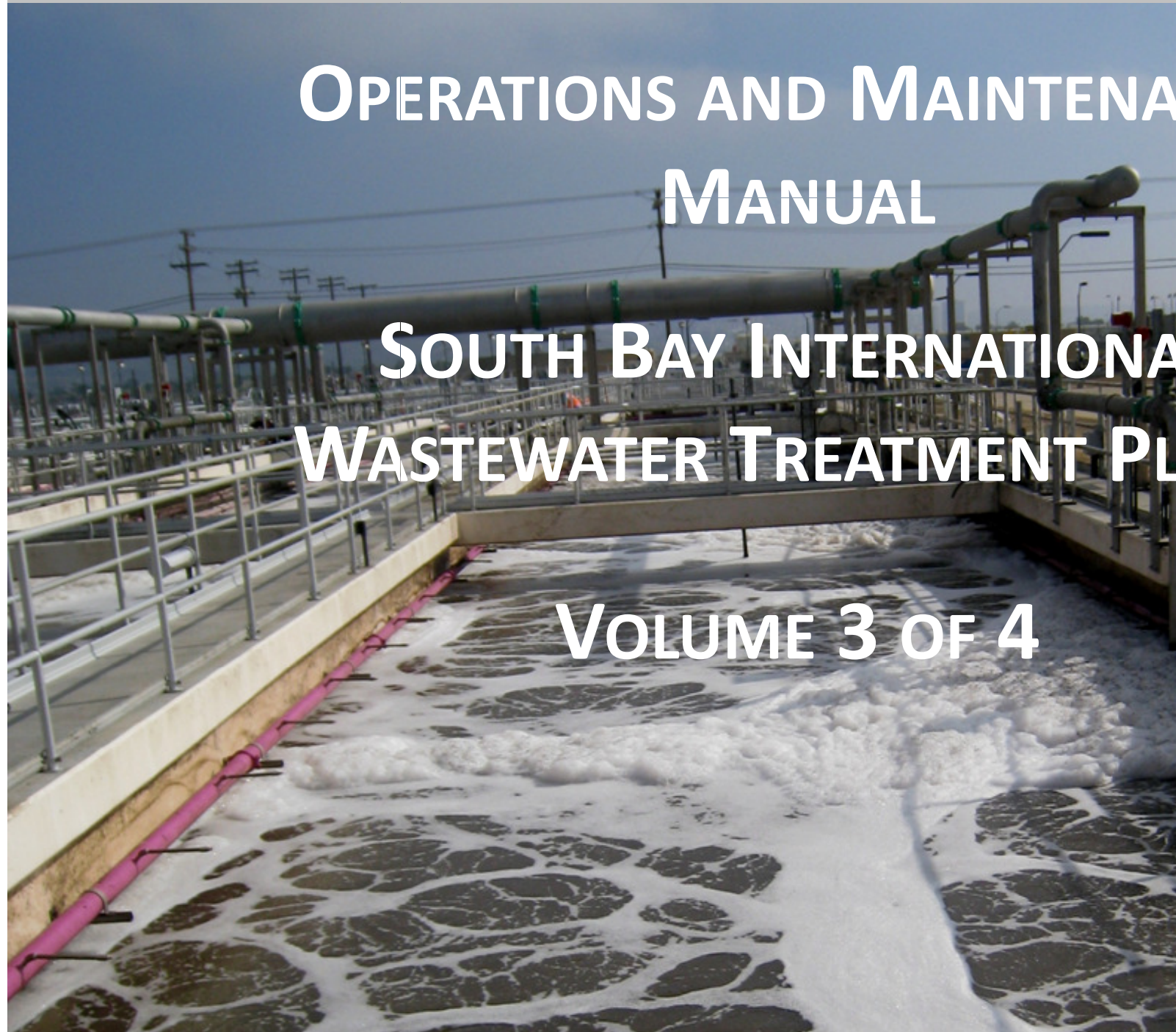
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Volume 3 of 4

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April 2011

4.7 UNSTABILIZED SLUDGE STORAGE FACILITIES

4.7.1 Description of Controls and Operation

4.7.1.1 General

Refer to the general control and operational philosophy description presented in Section 4.0.1.

The process schematic for the Unstabilized Sludge Storage Facilities which consists of two (2) unstabilized storage tanks (USST) is presented in Figure 3.7-1. The Unstabilized Sludge Storage Odor Reduction Station process schematic is presented in Figure 3.7-2.

The control, status and annunciation strategies for the Unstabilized Sludge Storage Facilities include the use of local control panel (LCP) located in the Sludge Dewatering Building, an annunciator in the Solids Processing Local Control Center (SP-LCC) and on SCADA at Plant Control Center (PCC) and the Operations Building Control Center (OBCC).

The LCP contains control switches, status lights, annunciators, essential recorders, and programmable logic controllers (PLC), as appropriate for sequencing of equipment operation and adjustment of process and/or equipment set points.

The SP-LCC contains switch boards, motor control centers (MCC) and variable frequency drives (VFD) and other equipment as given below.

4.7.1.2 Sludge Storage Tank Feed System

Separate primary sludge, primary skimmings, secondary skimmings, and thickened waste activated sludge (TWAS) inlets to each sludge storage tank are provided.

Each inlet is provided with a manually operated isolation plug valve, and a flanged spool connection downstream of the plug valve for future installation of individual magnetic flow meters and a meter bypass arrangement. Automatic alteration of inlet flows to the sludge storage tanks is not provided and selection/feeding of the in-service USST is a manual operation.

Ferric chloride addition is provided in the primary sludge transfer line by manually controlled ferric addition pumps located at the Primary Sedimentation Chemical Addition

Facilities as discussed in Section 4.2. Sodium hypochlorite addition the primary sludge line in the PST Gallery is provided as discussed in Section 4.5.

4.7.1.3 Sludge Storage Tanks

Each sludge storage tank is equipped with one (1) primary sludge feed pipe, one (1) primary skimmings feed line, one (1) secondary skimmings feed line, one (1) TWAS feed line, three (3) sludge draw-off pipes, three (3) circulation sludge suction pipes and six (6) circulation sludge injection pipes, two (2) scum removal pipes, one (1) overflow pipe, three (3) ventilation air inlet connections, one (1) foul air exhaust duct, and one (1) non-potable water line. A description of controls for the tank feed piping is presented in Section 4.7.1.2. A description of controls for the sludge draw-off, circulation sludge suction and injection piping, scum removal and overflow piping is provided in this section.

Each sludge draw-off pipe, circulation sludge suction and injection pipe is equipped with a manually operated isolation plug valve. A manually operated isolation plug valve is also provided on each of the flushing water connections to the sludge draw-off, circulation sludge suction and injection pipes.

In order to monitor the sludge level, each sludge storage tank is supplied with a pressure transducer mounted on the tank. This sensor/transmitter transmits an analog signal to a level indicator located at LCP-USS for Unstabilized Sludge Storage Tank 1 and at LCP-USS2 for Unstabilized Sludge Storage Tank 2 and provides analog input signals to PLC-SP and to SCADA to activate “HIGH LEVEL” (25.0’), “HIGH HIGH LEVEL” (27.0’), and “LOW LEVEL” (2.0’) alarms on SCADA, and initiates shutdown of the sludge mixing pumps on “LOW LEVEL” alarm. A “HIGH HIGH LEVEL” alarm is also annunciated at the SCADA System on high- high sludge level in the tank. “HIGH LEVEL” and “LOW LEVEL” are displayed and logged in the SCADA System at the PCC and at the OBCC.

Overflow outlet piping at 26.0 ft. above grade is provided. The overflow pipe is not valved and overflow flows by gravity back to the Headworks Facilities. Each overflow pipe is provided with a non-potable flushing water connection.

In addition, each tank is provided with two (2) scum removal pipes, each equipped with an isolation plug valve, and a non-potable flushing water connection.

The storage tank is completed with four (4) sample ports located on the tank cover.

Continuous monitoring, indication and analyses of the tank atmosphere to detect the presence of combustible gases or vapors to the lower explosive limit (LEL) is provided with a combustible gas sensor/analyzer. A high combustible gas level (25% LEL), “HIGH CG” alarm, is based on a discrete digital input from the combustible gas sensor/analyzer at existing LCP-SP and existing LCP-SP provides a discrete digital input to existing PLC-SP. “HIGH CG” alarm is displayed and logged in the SCADA system at the PCC and at the OBCC.

Any alarm conditions in the sludge storage tank are annunciated on SCADA as a common alarm “USS SYSTEM 1 FAILURE” for Unstabilized Sludge Storage Tank 1 and “USS SYSTEM 2 FAILURE” for Unstabilized Sludge Storage Tank 2.

4.7.1.4 Sludge Mixing System

The sludge mixing system for each storage tank consists of the three (3) sludge mixing pumps and their suction, discharge, and sludge injection piping.

The suction and discharge pipes of each pump are provided with a manually operated plug valve. A check valve is located on the discharge pipe of each pump. Each sludge mixing pump is also equipped with a limit switch located at the discharge check valve lever to indicate “no flow” condition when the unit is called to operate and to activate the unit “PUMP FAIL” alarm on SCADA and to shut down the pumps. In addition, the suction and discharge pipes have high pressure non-potable water connections, each equipped with a manually operated isolation plug valve.

Each of the six (6) sludge injection pipes is equipped with a manually operated isolation plug valve.

A common seal water supply manifold to the pumps is equipped with a flow switch, and a pressure gauge. The seal water flow switch activates a common “SEAL WATER FAILURE” on SCADA to annunciate “no seal water flow” conditions and shuts down the pumps. The pressure gauge on the seal water manifold is provided to indicate the pressure in the seal water.

The motor of each sludge mixing pump is equipped with a Remote-Off (lockable)-Test (ROT) hand switch as described in Section 4.0.1.1.

In addition, each pump is completed with a discharge and suction pressure gauges to display the unit discharge and suction pressures.

MCC-USST includes individual running time meters and indicating run-off lights for the sludge mixing pumps.

LCP-USS includes On/Off selector switches for sludge mixing pumps 1A, 1B and 1C and SCADA includes On/Off selector switches for sludge mixing pumps 2A, 2B and 2C to select the operating mode of the appropriate pump.

Any alarm conditions in the sludge mixing systems are annunciated in SCADA as a common alarm “USS SYSTEM 1 FAILURE” For Unstabilized Sludge Storage Tank No. 1 or “USS SYSTEM 2 FAILURE” for Unstabilized Storage Tank No. 2.

4.7.1.5 Ferric Chloride Addition System

A description of control, status and annunciation components for the Ferric Chloride Addition System is presented in Section 4.2.

4.7.1.6 Odor Reduction Station

The USS Odor Reduction Station is provided with a Local Control Panel LCP-ORUSS, with a NEMA 4X enclosure for control of the odor reduction system.

Odor Reduction Station Scrubber Exhaust Fans

The exhaust fans are furnished with a locally-mounted ROT switch and an HOA switch in LCP-ORUSS located at the odor reduction station. The “Remote” position of the ROT switch enables controls located at LCP-ORUSS. The “Off” position is lockable to prevent the exhaust fan from operating. The “Test” position is spring loaded, and can be used to test the operation of the exhaust fan with the HOA switch in the “Off” position. A flow switch is installed on the discharge side of the exhaust fan to indicate motor failure or blocked discharge. Failure of the exhaust fan de-energizes the motor and activates alarms at the LCP-ORUSS and on SCADA at the PCC and at the OBCC to annunciate “USS ODOR

REDUCTION STATION FAILURE”. Failure of both scrubber exhaust fans automatically shuts down the recirculation pumps.

Odor Reduction Station Scrubber

Differential pressure indicators are installed across both the mist eliminator and packed bed to provide indication of pressure loss across the scrubber for local identification only. Indicators are mounted on the scrubber, approximately 5' above the finished floor. A pressure transducer is installed on the scrubber sump. The low level set point is set to indicate six inches above the recirculation pump suction line and when tripped activates alarms at the LCP-ORUSS and a common “USS ODOR REDUCTION STATION FAILURE” on SCADA at the PCC and at the OBCC. If the sump level continues to drop to three inches above the recirculation pump suction, the recirculation pumps shut down.

Odor Reduction Station pH Controller

The pH analyzer is installed in the Odor Reduction Station recirculation pump bypass loop. The pH reading is displayed at the analyzer and at the pH controller mounted in LCP-ORUSS. The pH operating range shall be set between 10 and 11 with a target set point of 10.5 pH. The pH controller can be operated in either manual or automatic mode. In manual mode the controller displays the set point dialed in by the operator on front of the panel mounted controller. In automatic mode the controller tracks the actual pH. The pH setpoint is maintained through electric control of the stroke controller of the selected NaOH Metering Pump.

Low and high pH annunciate at the LCP-ORUSS and on SCADA at the PCC and at the OBCC.

Odor Reduction Station ORP Controller

An ORP analyzer AIT is installed in the odor reduction station recirculation pump bypass loop. The ORP operating range is set between 450 mv to 550 mv. The desired operating ORP is minimized by manually adjusting the stroke control potentiometer on the NaOC1 metering pumps.

Low and high ORP are annunciated at the LCP-ORUSS and on SCADA at the PCC and at the OBCC.

Odor Reduction Station Recirculation Pumps

Each recirculation pump is furnished with a locally-mounted ROT switch and an HOA switch in LCP-ORUSS. The “Remote” position of the ROT switch enables the controls at LCP-ORUSS. The “Off” position is lockable and prevents the recirculation pump from operating. The “Test” position is spring loaded, and is used to test operation of the exhaust fan with the HOA switch in the “Off” position. A duty/standby selector switch is provided at the LCP-ORUSS for the operator to select the in-service recirculation pump. Run/Off lights for each recirculation pump are provided at the MCC cabinet. Two pressure switches are installed on the discharge side of each recirculation pump to indicate motor failure or blocked discharge. Failure of either recirculation pump results in de-energizing the corresponding motor and activates alarms at the LCP-ORUSS and “USS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. In the “Auto” position, failure of the in-service pump starts the standby unit.

Seal water is provided to each recirculation pump. Failure of seal water supply activates alarms at LCP-ORUSS, and “USS ODOR REDUCTION STATION FAILURE” on SCADA at the PCC and at the OBCC, and shuts down both recirculation pumps.

Odor Reduction Station NaOH Metering Pumps

Each NaOH metering pump has locally-mounted ROT switch and an HOA switch in LCP-ORUSS. The “Remote” position of the ROT switch enables the controls located at the LCP-ORUSS. The “Off” position which is lockable prevents the NaOH metering pump from operating. The “Test” position is spring loaded, and is used to test the operation of the NaOH metering pump with the HOA switch in the “Off” position. A duty/standby selector switch is provided at LCP-ORUSS for the operator to select the in-service NaOH pump. Run/Off lights for each NaOH pump are provided at the MCC cabinet. A pressure relief valve is provided on the discharge side of each NaOH pump to bypass flow back to the storage tank. A conductivity meter is installed in each NaOH metering pump to indicate

diaphragm rupture. Failure of either NaOH pump de-energizes the motor and activates alarms at the LCP-ORUSS and “USS ODOR REDUCTION STATION FAILURE” on SCADA at the PCC and at the OBCC. In the “Auto” position, failure of the in-service pump automatically starts the standby unit.

Each NaOH metering pump is of variable stroke length and has an integral non-reversing electric stroke control motor for purposes of varying the pump stroke. Stroke control is the direct-acting type and mounted directly to the pump in a NEMA 4 enclosure. Each NaOH metering pump stroke controller is capable of capacity adjustment for 0-100% by changing piston stroke length based on a 4-20mA signal input from panel mounted pH controller.

Odor Reduction Station NaOCl Metering Pumps

Each NaOCl metering pump has a locally-mounted ROT switch and an HOA switch in LCP-ORUSS. The “Remote” position of the ROT switch enables the controls located at the LCP-ORUSS. The “Off” position which is lockable prevents the NaOCl feed pump from operating. The “Test” position is spring loaded, and used to test the operation of the NaOCl metering pump with the HOA switch in the “Off” position. A Duty/Standby selector switch is provided at LCP-ORUSS for the operator to select the in-service NaOCl pump. Run/Off lights for each NaOCl pump are provided at the MCC cabinet. A pressure relief valve is provided on the discharge side of each NaOCl pump to bypass flow back to the storage tank. A conductivity meter is provided at each NaOCl pump to detect a diaphragm rupture. Failure of either NaOCl pump results in de-energizing the corresponding motor and activates alarms at the LCP-ORUSS and “USS ODOR REDUCTION STATION FAILURE” on SCADA at the PCC and at the OBCC. In the “Auto” position, failure of the in-service pump automatically starts the standby unit.

Each NaOCl metering pump is of variable stroke length and equipped with an integral non-reversing electric stroke control motor for purposes of varying the pump stroke. The stroke control is the direct-acting type and mounted directly to the pump in a NEMA 4 enclosure. Each NaOCl metering pump stroke controller is capable of capacity adjustment for 0-100% by changing piston stroke length based on a 4-20mA signal input from panel mounted ORP controller.

Odor Reduction Station NaOH Storage Tank

There is no mechanical equipment within the NaOH bulk storage tank. A pressure transducer is installed on the side of the NaOH storage tank. The low level setpoint is set to indicate when only five days of NaOH is remaining and activates alarms at the LCP-ORUSS and “USS ODOR REDUCTION STATION FAILURE” and on SCADA at the PCC and at the OBCC. The low low level setpoint is set to indicate when NaOH is only three inches above the NaOH metering pump suction line and activates alarms at the LCP-ORUSS and “USS ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The high level setpoint is set to indicate 6 inches below tank overflow and activates an alarm at the LCP-ORUSS and the “USS ODOR REDUCTION STATION FAILURE” alarm on SCADA at the PCC and at the OBCC.

Odor Reduction Station NaOCl Storage Tank

A pressure transducer is installed on the side of the NaOCl storage tank. The low level setpoint is set to indicate when only five days of NaOCl is remaining and activates alarms at the LCP-ORUSS and “USS ODOR REDUCTION STATION FAILURE” on SCADA at the PCC and at the OBCC. The low low level setpoint is set to indicate when NaOCl is only three inches above the NaOCl metering pump suction line and activates alarms at the LCP-ORUSS and “USS ODOR REDUCTION STATION FAILURE” on SCADA at the PCC and at the OBCC. The high level setpoint is set to indicate 6 inches below tank overflow and activates an alarm at the LCP-ORUSS and the “USS ODOR REDUCTION STATION FAILURE” alarm on SCADA at the PCC and at the OBCC.

NaOH and NaOCl Containment Sump Pumps

Each of the containment areas is provided with a permanently installed sump pump with no automatic control. To drain the area, the operator manually opens and closes the appropriate discharge isolation valves, then manually starts the pump. The On/Off selector switch and Start and Stop pushbuttons are provided at the sump pump control panel located at the pump. The Pump Start pushbutton, when pressed, operates the sump pump until a low level is signaled by the float switch. A Stop Pump pushbutton is provided to manually stop the pump.

Odor Reduction Station Water Softening System

The water softener duplex systems are energized by a 240V circuit. A pressure switch is installed on the inlet side of the water softener to indicate failure of softened water supply. Failure of softened water supply activates an alarm at the LCP-ORUSS and the “USS ODOR REDUCTION STATION FAILURE” alarm on SCADA at the PCC and at the OBCC.

The water softener has local automatic controls which facilitate backwash/reconcentration/rinse cycles based on the volume of water treated. A calcium ion analyzer senses an overall failure in the softening system and activates an alarm at the LCP-ORUSS and the “USS ODOR REDUCTION STATION FAILURE” alarm on SCADA at the PCC and at the OBCC.

4.7.2 Step by Step Start-Up Procedures

4.7.2.1 General System Start-Up Procedures

The Unstabilized Sludge Storage Facilities should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Visually inspect the roof of each tank, air intake and exhaust piping, sampling wells and manholes for any signs of damage or improper installation. All sampling wells and manholes should be properly closed and tightened as directed by your Operations Supervisor.

3. Ensure that LCP-USS1 (part of LCP-SP) in SP-LCC, LCP-ORUSS at the USS Odor Reduction Station, and Distribution Panel DPC 6 and DPM 6 in the Maintenance Garage of the Personnel Building are energized.
4. Ensure that the circuit breakers at MCC-USST in SP-LCC and at MCC-SPPB in the Maintenance Garage of the Personnel Building are energized for all equipment to be operated.
5. Ensure that all isolation valves on sludge and skimmings feed lines, sludge circulation lines, sludge draw-off lines, and scum removal lines are close.
6. Start USS Odor Reduction Station according to the procedures described in Sections 4.7.2.2.4 in the following order:
 - a. Exhaust Fan
 - b. Water Softening System
 - c. Scrubber
 - d. Recirculation Pumps
 - e. pH and ORP Controllers
 - f. NaOCl Storage Tank
 - g. NaOCl Metering Pump
 - h. NaOH Storage Tank
 - i. NaOH Metering Pump
7. After normal operation of the Odor Reduction Station is established, start to feed the storage tank(s) with sludge and/or skimmings by opening the respective feed valves for the selected in-service USST(s).
8. Start Ferric Chloride Addition Station according to the procedures described in Section 4.2.2.2.5.2.
9. Sludge level and combustible gas concentration in the tank and pH and ORP of the odor control scrubber solution should be continuously monitored.
10. After 3-foot high level is established in the tank, the sludge mixing system should be started according to the procedures described in Section 4.7.2.2.2. Number of operating sludge mixing pumps and injection nozzles should be as required by your Operations Supervisor.
11. After steady-state sludge mixing is established, open sludge draw-off valve(s) initiating sludge transfer to the sludge dewatering facilities.
12. The optimum set-points (pressure, level, pH, ORP) and configuration of the sludge mixing and draw-off systems should be selected by your Operations Supervisor and adjusted based on operating experience.

4.7.2.2 Individual Equipment Start-Up Procedures

4.7.2.2.1 Sludge Storage Tanks

Start up the sludge storage tanks according to the procedures listed below:

1. Open the appropriate isolation valves on the sludge and skimmings feed lines. Verify that respective pumps are operational.
2. Open the appropriate isolation valves on the sludge circulation lines. Circulation line configuration and number of injection nozzles should be as required by your Operations Supervisor.
3. Determine the desired sludge withdrawal point. Open the appropriate isolation valves on the sludge draw-off valve station as required by your Operations Supervisor.
4. Monitor sludge level at the local level sensor and concentration of combustible gases at the local gas sensor. Sludge level and concentration of combustible gases should be as established by your Operations Supervisor.
5. Scum removal could be accomplished by establishing the sludge level at 10.5 ft. high above grade and opening the appropriate isolation valves on the scum removal pipes.

4.7.2.2.2 Sludge Mixing System

Start up the sludge mixing system according to the procedures listed below:

1. Select the sludge mixing pump(s) that will be in service.
2. Verify the sludge mixing pipe valving is in the proper orientation and selected pump discharge and suction valves are open.
3. Ensure that seal water is being supplied to the pump(s).
4. Place the respective ROT switch in the “Remote” position.
5. Place the appropriate On/Off switch at LCP-SP in the “On” position to start the selected pump.
6. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
7. Visually verify the pump is operating.

4.7.2.2.3 Ferric Chloride Addition System

Refer to the start-up procedures described in Section 4.2.2.2.5.2.

4.7.2.2.4 Odor Reduction Station

Odor Reduction Station Exhaust Fans

Start up the odor reduction station exhaust fans according to the procedures listed below:

1. Select the odor reduction fan that will be in service.
2. Verify that the odor reduction duct is in the proper orientation and that the selected fan inlet and discharge dampers are open.
3. Place the respective ROT switch in the “Remote” position.
4. Place the fan into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORUSS in the “Auto” position.
- b. In the automatic mode, the fan operates as called for by signals from PLC-ORUSS. Under normal conditions the selected fan will start after a 0 - 180 second delay and operate continuously.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORUSS in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and the fan will operate continuously.
5. Visually verify the fan is operating.

Odor Reduction Station Scrubber

Start-up the scrubber according to procedures listed below:

1. Ensure that the drain and sample valves are closed.
2. Open the appropriate isolation valves including the sodium hypochlorite feed line, sodium hydroxide feed line, and sump make up water line.

3. Ensure the sump is full of liquid, 3 ft. above the bottom of the sump.

Odor Reduction Station pH and ORP Controllers

Start-up the pH and ORP controllers according to the procedures listed below:

1. Throttle the upstream and downstream ball valves which isolate the pH and ORP inlet header (by-pass line) from the recirculation pump discharge and suction piping so as to maintain a pressure of 11 psi in the by-pass line.
2. Open the respective downstream ball valves which isolate the pH and ORP probes from the common outlet headers.
3. Adjust flow rates into the pH and ORP probes with the respective upstream needle valves so that 11 gpm flow through each analyzer.
4. Readjust the by-pass line pressure to maintain 11 psi.
5. Ensure that the ORP analyzer is energizing and displaying a millivolt reading.
6. Ensure that the pH analyzer is energized.
7. Verify and adjust as necessary the pH setpoint to the desired value (between 9.0 and 11.0 per air permit requirements).

Odor Reduction Station Recirculation Pumps

Start-up the recirculation pumps according to the procedures below:

1. Select the recirculation pump that will be in service.
2. Verify the recirculation pipe valving is in the proper orientation and the selected pump discharge and suction valves are open.
3. Ensure that the upstream needle valves and downstream ball valves which isolate the pH and ORP controllers from the recirculation pump suction and discharge piping are closed. Excessive pressures can damage the probes.
4. Ensure that seal water is being supplied to the pump.
5. Place the respective ROT switch in the “Remote” position.
6. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORUSS in the “Auto” Position.
- b. In the Automatic mode the pump operates as called for by signals from PLC-ORUSS. Under normal conditions the selected pump will start after a 0 - 180 second delay and operate continuously.

Manual mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORUSS in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
7. Visually verify the pump is operating.
 8. Verify that the isolation valves on both sides (inlet and outlet) of the metering tube associated with the flowmeter are open and that the valve in the meter bypass line is closed.
 9. Observe the flowmeter reading (flow rate should be 180 gpm or greater).

Odor Reduction NaOH Metering Pumps

Start-up the sodium hydroxide metering pump according to the procedures listed below:

1. Select the NaOH metering pump that will be in service.
2. Verify the NaOH metering pump pipe valving is in the proper orientation and the selected pump discharge and suction valves are open.
3. Place the respective ROT switch in the “Remote” position.
4. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORUSS in the “Auto” Position.
- b. In the Automatic mode, the pump operates as called for by PCC-ORUSS. Under normal conditions the selected pump will start after a 0 - 180 second delay and operate continuously with the pump stroke being automatically adjusted based on the pH analyzer signal.

Manual mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORUSS in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
5. Visually verify the pump is operating.
6. Observe the discharge pressure of the pump (discharge pressure should be approximately 40 psi).

Odor Reduction Station NaOCl Metering Pumps

Start-up the sodium hypochlorite metering pumps according to the procedures listed below:

1. Select the NaOCl metering pump that will be in service.
2. Verify the NaOCl metering pump valving is in the proper orientation and selected pump discharge and suction valves are open.
3. Place the respective ROT switch in the “Remote” position.
4. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORUSS in the “Auto” Position.
 - b. In the Automatic mode, the pump operates as called for by PLC-ORUSS. Under normal conditions the selected pump will start after a 0 - 180 second delay and operate continuously.

Manual mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORUSS in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
5. Visually verify the pump is operating.

6. Observe the discharge pressure of the pump (discharge pressure should be approximately 40 psi).
7. Manually adjust the electronic stroke control on the metering pump to achieve the desired ORP millivolt reading at the ORP transmitter (between 575 and 725 mV per air permit requirements).

Odor Reduction Station NaOH Storage Tank

Start-up the NaOH storage tanks according to the procedures listed below:

1. Ensure that there is sufficient caustic in the tank (50% of full min.).
2. Open the appropriate isolation valves on the outlet lines.

Odor Reduction Station NaOCl Storage Tank

Start-up the sodium hypochlorite storage tank according to the procedures listed below:

1. Ensure that there is sufficient sodium hypochlorite in the tank (50% full min.).
2. Open the appropriate isolation valves on the outlet lines.

NaOH and NaOCl Containment Sump Pumps

Start the respective sump pump according to the procedures below:

1. Assess what liquid is in the sump (water or chemical).

If the liquid is water:

- a. Open the isolation valve to the tank drain.

If the liquid is chemical:

- a. Arrange for a hazardous waste truck to be called onto the site.
 - b. Connect the quick connect from the sump pump discharge line to the hazardous waste truck.
 - c. Open the isolation valve to the quickconnect line. Ensure the isolation valve to the tank drain is closed.
2. Place the appropriate On/Off switch in the “On” position.
 3. Press the Pump Start pushbutton.

4. After a 0 to 180 second delay the pump motor starts and pump operates until a low level is signaled by a float switch.
5. Visually verify pump is running.

Odor Reduction Station Water Softening System

Start-up the water softener according to the procedures below:

1. Ensure that the local electrical disconnect is positioned to energize the water softening systems controls.
2. Open appropriate isolation valves on the inlet and outlet side of the water softening system.
3. Close the by-pass valve.
4. Adjust the flow of softened water to the scrubber tower to meet the desired flow rate.
5. Observe the calcium analyzer indicator (reading should be below 8 ppm).

4.7.3 Step by Step Shutdown Procedures

4.7.3.1 General System Shutdown Procedures

The Unstabilized Sludge Storage Facilities should be shut down according to the following procedures:

1. Refer to the General Shutdown Procedures presented in Section 4.0.3.
2. Shut down the Sludge Storage Tanks according to the procedures presented in Section 4.7.3.2.1.
3. Shut down the Sludge Mixing System according to the procedures presented in Section 4.7.3.2.2.
4. Shut down the Ferric Chloride Addition System to the primary sludge line according to the procedures presented in Section 4.2.3.2.5.2.
5. Shut down the Unstabilized Sludge Storage Odor Reduction Facilities according to the procedures presented in Section 4.7.3.2.4. If the odor reduction station is to be shut down in its entirety, the shut down order for the various pieces of odor reduction equipment shall be as follows:

- a. NaOH Metering Pump
- b. NaOH Storage Tank
- c. NaOCl Metering Pump
- d. NaOCl Storage Tank
- e. pH and ORP Controllers
- f. Recirculation Pump
- g. Scrubber
- h. Water Softening System
- i. Exhaust Fans

4.7.3.2 Individual Equipment Shutdown Procedures

4.7.3.2.1 Sludge Storage Tanks

Shut down the sludge storage tanks according to the procedures listed below:

1. Shut down the sludge feed system by closing the respective isolation valves on the sludge and skimmings feed lines and respective pumps.
2. Continue to operate the respective sludge mixing system and to transfer sludge to the sludge dewatering facilities.
3. Monitor sludge level in the tank.
4. After sludge level in the tank reaches the low level setting, shut down the sludge mixing system according to the procedures described in Section 4.7.3.2.2.
5. Continue transfer of sludge to the sludge dewatering facilities. After sludge transfer is complete, close sludge draw-off valves.
6. Close isolation damper on the odor control exhaust duct.
7. Materials that do not drain from the storage tank must be diluted, pumped out using a portable submersible pump, and safely disposed.

4.7.3.2.2 Sludge Mixing System

Shut down the sludge mixing system according to the procedures listed below:

1. Turn the respective On/Off switch at LCP-USS for Unstabilized Sludge Storage Tank 1 and on the SCADA touch screens for Unstabilized Sludge Storage Tank 2 for the sludge mixing pumps to be shut down to the “Off” position.
2. Verify the pump is stopped.

3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source.
5. If the entire tank sludge mixing system (or one of its legs) is to be out of service for an extended period of time, close the isolation valves on pump suction and discharge sides and isolation valves on the associated circulation flow injection lines.

Note: Each sludge mixing pump will also be automatically shut down on the following conditions:

- a. “No flow” as detected by a discharge check valve lever limit switch.
- b. Seal water failure.
- c. Motor overload.
- d. Low level condition in the storage tank.

4.7.3.2.3 Ferric Chloride Addition System

Refer to the shutdown procedures presented in Section 4.2.3.2.5.2.

4.7.3.2.4 Odor Reduction Station

Odor Reduction Station Exhaust Fans

Shut down the odor reduction station fan according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORUSS for the odor reduction fan to be shut down to the “Off” position.
2. Verify the fan is stopped.
3. Lock the appropriate ROT switch.
4. If the fan is to be out of service for an extended period of time, disconnect power source.
5. If the odor reduction system (or one of the fans) is to be out of service for an extended period of time, close the isolation damper on the inlet and discharge of the fan.

Note: The fan will also be automatically shut down on a low discharge flow signal from the downstream flow sensor.

Odor Reduction Station Scrubber

Shut down the odor reduction scrubber station according to the procedures listed below:

1. Shut down the outlet isolation valves.
2. If the tank is to be out of service for an extended period of time, disconnect the power from the level transmitter.

Odor Reduction Station pH and ORP Controllers

Shut down the pH and ORP controllers according to the procedures listed below:

1. Close the inlet needle valves and the downstream ball valves to isolate the pH and ORP probes.
2. If a controllers are to be out of service for an extended period of time, disconnect the power to the controller.

Odor Reduction Station Recirculation Pump

Shut down the recirculation pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORUSS for the Odor Reduction Station recirculation pump to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source.
5. If the entire odor reduction system (or one of the recirculation pumps) is to be out of service for an extended period of time, close the isolation valves on the pump suction and discharge.

Note: The pump will also be automatically shut down by PLC-ORUSS upon one of the following:

- a. High or low pressure signal from the downstream pressure switch.
- b. Low flow signal from the seal water flow switch.
- c. Low low liquid level signal from the scrubber liquid level sensor.

Odor Reduction Station NaOH Metering Pumps

Shut down the sodium hydroxide metering pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-USS for the sodium hydroxide metering pump to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source.
5. If the entire odor reduction system (or one of the NaOH metering pumps) is to be out of service for an extended period of time, close the isolation valves on the pump suction and discharge.

Note: The pump will also be automatically shut down by PLC-ORUSS upon one of the following:

- a. Low low level signal from the tank liquid level sensor.
- b. Ruptured diaphragm signal from the pump mounted conductivity sensor.

Odor Reduction Station NaOCl Metering Pump

Shut down the sodium hypochlorite metering pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORUSS for the sludge mixing pumps to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source.
5. If the entire odor reduction system (or one of the NaOCl metering pumps) is to be out of service for an extended period of time, close the isolation valves on pump suction and discharge.

Note: The pump will also be automatically shut down by PLC-ORUSS upon one of the following:

- a. Low low level signal from the tank liquid level sensor.
- b. Ruptured diaphragm signal from the pump mounted conductivity sensor.

Odor Reduction Station NaOH Storage Tank

Shut down the NaOH storage tank according to the procedures listed below:

1. Shut down the outlet isolation valves.
2. If the tank is to be out of service for an extended period of time, disconnect the power from the level transmitter.

Odor Reduction Station NaOCl Storage Tank

Shut down the NaOCl storage tank according to the procedures listed below:

1. Shut down the outlet isolation valves.
2. If the tank is to be out of service for an extended period of time, disconnect the power from the level transmitter.

NaOH and NaOCl Containment Sump Pumps

Shut down the respective sump pump according to the following procedures:

1. Press the Pump Stop pushbutton.
2. Verify the pump has stopped.
3. Lock the appropriate lock switch.
4. If pump is to be out of service for an extended period of time, disconnect power source and close the isolation valves.

Note: The sump pump will also automatically shut down on low water level.

Odor Reduction Station Water Softening System

Shut down the water softening system according to the procedures listed below:

1. Ensure that each of the vessels of the water softening system is on either the “Operation” or “Stand-by” mode. (If the softening system is in some other mode, wait until the regeneration cycle is complete.)

2. Close the isolation valves on the inlet and outlet sides of the water softening system.
3. If the water softening system is to be out of service for an extended period of time, disconnect power source.

4.7.4 Alarm and Status Annunciation

4.7.4.1 Sludge Storage Tanks

The following alarm/status annunciation components are associated with the unstabilized sludge storage tanks:

<u>Alarm/Status</u>	<u>Display Location</u>
USS Tank 1 High-High Level Annunciator	LCP-USS and SCADA
USS Tank 1 High Level Annunciator	LCP-USS and SCADA
USS Tank 1 Low Level Annunciator	LCP-USS and SCADA
USS Tank 1 Level Indicator	LCP-USS and SCADA
USS Tank 1 High Combustible Gas Annunciator	LCP-USS and SCADA
USS System 1 Failure Annunciator	LCP-USS and SCADA
USS Tank 2 High-High Level Annunciator	SCADA
USS Tank 2 High Level Annunciator	SCADA
USS Tank 2 Low Level Annunciator	SCADA
USS Tank 2 Level Indicator	SCADA
USS Tank 2 High Combustible Gas Annunciator	SCADA
USS System 2 Failure Annunciator	SCADA

4.7.4.2 Sludge Mixing System

The following alarm/status annunciation components are associated with the Sludge Mixing System:

<u>Alarm/Status</u>	<u>Display Location</u>
Sludge Mixing Pump 1A Run/Off Lights	MCC-USST
Sludge Mixing Pump 1B Run/Off Lights	MCC-USST
Sludge Mixing Pump 1C Run/Off Lights	MCC-USST
Sludge Mixing Pump 1A Run Light	LCP-USS and SCADA
Sludge Mixing Pump 1B Run Light	LCP-USS and SCADA
Sludge Mixing Pump 1C Run Light	LCP-USS and SCADA
Sludge Mixing Pump 1A Motor Failure Annunciator	LCP-USS and SCADA
Sludge Mixing Pump 1B Motor Failure Annunciator	LCP-USS and SCADA
Sludge Mixing Pump 1C Motor Failure Annunciator	LCP-USS and SCADA
Sludge Mixing Pump 1A Failure Annunciator	LCP-USS and SCADA
Sludge Mixing Pump 1B Failure Annunciator	LCP-USS and SCADA
Sludge Mixing Pump 1C Failure Annunciator	LCP-USS and SCADA
USS System 1 Seal Water Failure Annunciator	LCP-USS and SCADA
USS System 1 Failure Annunciator	SCADA
Sludge Mixing Pump 2A Run/Off Lights	MCC-USST
Sludge Mixing Pump 2B Run/Off Lights	MCC-USST
Sludge Mixing Pump 2C Run/Off Lights	MCC-USST

<u>Alarm/Status</u>	<u>Display Location</u>
Sludge Mixing Pump 2A Run Light	SCADA
Sludge Mixing Pump 2B Run Light	SCADA
Sludge Mixing Pump 2C Run Light	SCADA
Sludge Mixing Pump 2A Motor Failure Annunciator	SCADA
Sludge Mixing Pump 2B Motor Failure Annunciator	SCADA
Sludge Mixing Pump 2C Motor Failure Annunciator	SCADA
Sludge Mixing Pump 2A Failure Annunciator	SCADA
Sludge Mixing Pump 2B Failure Annunciator	SCADA
Sludge Mixing Pump 2C Failure Annunciator	SCADA
USS System 2 Seal Water Failure Annunciator	SCADA
USS System 2 Failure Annunciator	SCADA

4.7.4.3 Ferric Chloride Addition System

Refer to Section 4.2.4.5.2 for the list of alarm/status annunciation components.

4.7.4.4 Odor Reduction Station

The following alarm/status annunciation components are associated with odor reduction station.

Odor Reduction Station Exhaust Fan

<u>Alarm/Status</u>	<u>Display Location</u>
Exhaust Fan OREF5 Run/Off Lights	MCC-SPPB
Exhaust Fan OREF6 Run/OFF Lights	MCC-SPPB

Exhaust Fan OREF5 Run Light	LCP-ORUSS and SCADA
Exhaust Fan OREF5 Motor Fan Failure Light	LCP-ORUSS and SCADA
Exhaust Fan OREF5 Failure Annunciator	LCP-ORUSS and SCADA
Exhaust Fan OREF6 Run Light	LCP-ORUSS and SCADA
Exhaust Fan OREF6 Motor Fan Failure Light	LCP-ORUSS and SCADA
Exhaust Fan OREF6 Failure Annunciator	LCP-ORUSS and SCADA
USS Odor Reduction Station Failure	SCADA

Odor Reduction Station Scrubber

Alarm/Status

Display Location

ORUSS Scrubber ORSC3 Low Level Annunciator	LCP-ORUSS and SCADA
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Odor Reduction Station pH and ORP Controllers

Alarm/Status

Display Location

ORUSS Scrubber ORSC3 High pH Annunciator	LCP-ORUSS and SCADA
ORUSS Scrubber ORSC3 Low pH Annunciator	LCP-ORUSS and SCADA

ORUSS Scrubber ORSC3 Low ORP Annunciator	LCP-ORUSS and SCADA
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ORUSS Scrubber ORSC3 High ORP Annunciator	LCP-ORUSS and SCADA
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Odor Reduction Station Recirculation Pumps

Alarm Status

Display Location

Odor Reduction Recirculation Pump ORRP5
Run/Off Lights

MCC-SPPB

Odor Reduction Recirculation Pump ORRP6
Run/Off Lights

MCC-SPPB

Odor Reduction Recirculation Pump ORRP5 Run
Light

LCP-ORUSS and
SCADA

Odor Reduction Recirculation Pump ORRP5 Motor
Failure Light

LCP-ORUSS and
SCADA

ORUSS Recirculation Pump ORRP5 Failure
Annunciator

LCP-ORUSS and
SCADA

Odor Reduction Recirculation Pump ORRP6 Run
Light

LCP-ORUSS and
SCADA

Odor Reduction Recirculation Pump ORRP6 Motor
Failure Light

LCP-ORUSS and
SCADA

ORUSS Recirculation Pump ORRP6 Failure
Annunciator

LCP-ORUSS and
SCADA

ORUSS Recirculation Pump Seal Water Failure
Annunciator

LCP-ORUSS and
SCADA

Alarm Status**Display Location**

ORUSS Scrubber ORSC3 Low Level	LCP-ORUSS and SCADA
Recirculation Pumps Area Shower Alarm Annunciator	LCP-ORUSS and SCADA
USS Odor Reduction Station Failure Annunciator	SCADA

Odor Reduction Station NaOH Metering Pumps**Alarm/Status****Display Location**

ORUSS Caustic (NaOH) Metering Pump ORMP9 Run/Off Lights	MCC-SPPB
ORUSS Caustic (NaOH) Metering Pump ORMP10 Run/Off Lights	MCC-SPPB
ORUSS Caustic Metering Pump ORMP9 Run Light	LCP-ORUSS and SCADA
ORUSS Caustic Metering Pump ORMP9 Motor Failure Light	LCP-ORUSS and SCADA
ORUSS Caustic Metering Pump ORMP9 Failure Annunciator	LCP-ORUSS and SCADA
ORUSS Caustic Metering Pump ORMP10 Run Light	LCP-ORUSS and SCADA
ORUSS Caustic Metering Pump ORMP10 Motor Failure Light	LCP-ORUSS and SCADA
ORUSS Caustic Metering Pump ORMP10 Failure Annunciator	LCP-ORUSS and SCADA
USS Odor Reduction Station Failure Annunciator	SCADA

Odor Reduction Station NaOCl Metering Pump

<u>Alarm/Status</u>	<u>Display Location</u>
ORUSS Sodium Hypochlorite Metering Pump ORMP11 Run/Off Lights	MCC-SPPB
ORUSS Sodium Hypochlorite Metering Pump ORMP12 Run/OFF Lights	MCC-SPPB
ORUSS Sodium Hypochlorite Metering Pump ORMP11 Run Light	LCP-ORUSS and SCADA
ORUSS Sodium Hypochlorite Metering Pump ORMP11 Motor Failure Light	LCP-ORUSS and SCADA
ORUSS Sodium Hypochlorite Metering Pump ORMP11 Failure Annunciator	LCP-ORUSS and SCADA
ORUSS Sodium Hypochlorite Metering Pump ORMP12 Run Light	LCP-ORUSS and SCADA
ORUSS Sodium Hypochlorite ORMP12 Motor Failure Annunciator	LCP-ORUSS and SCADA
ORUSS Sodium Hypochlorite ORMP12 Failure Annunciator	LCP-ORUSS and SCADA
USS Odor Reduction Station PCC Failure Annunciator	SCADA

Odor Reduction Station NaOH Storage Tank and Containment Area

<u>Alarm/Status</u>	<u>Display Location</u>
ORUSS Caustic Storage Tank ORSOHT3 Low Level Annunciator	LCP-ORUSS and SCADA
ORUSS Caustic Storage Tank ORSOHT3 Low Low Level Annunciator	LCP-ORUSS and SCADA
ORUSS Caustic Storage Tank ORSOH3 High Level Annunciator	LCP-ORUSS and SCADA
ORUSS Caustic Storage Tank ORSOHT3 High Level Alarm, Horn and Indicator Light	NaOH Fill Station

Alarm/Status**Display Location**

ORUSS Caustic Containment Sump High Level Annunciator	LCP-ORUSS and SCADA
Caustic Fill Panel Area Shower Alarm Annunciator	LCP-ORUSS and SCADA
Caustic Storage Area Shower Alarm Annunciator	LCP-ORUSS and SCADA

Odor Reduction Station NaOCl Storage Tank and Containment Area**Alarm/Status****Display Location**

ORUSS Sodium Hypochlorite Storage Tank ORSHT3 Low Level Annunciator	LCP-ORUSS and SCADA
ORUSS Sodium Hypochlorite Storage Tank ORSHT3 Low Low Level Annunciator	LCP-ORUSS and SCADA
ORUSS Sodium Hypochlorite Storage Tank High Level Annunciator	LCP-ORUSS and SCADA
ORUSS Sodium Hypochlorite Storage Tank High Level Alarm, Horn and Indicator Light	NaOCl Fill Station
ORUSS Sodium Hypochlorite Containment Sump High Level Annunciator	LCP-ORUSS and SCADA
Sodium Hypochlorite Storage Area Shower Alarm Annunciator	LCP-ORUSS and SCADA

Odor Reduction Station Water Softening System**Alarm/Status****Display Location**

ORUSS Water Softening System ORSFT3 Alarm Annunciator	LCP-ORUSS and SCADA
USS Odor Reduction Station Failure Annunciator	SCADA

4.7.5 Daily Operational Checks

4.7.5.1 General

1. Refer to the general daily operation check requirements described in Section 4.0.5.
2. Consult Sections 4.7.5.2-4.7.5.5 and the appropriate manufacturer's operation and maintenance manuals for specific monitoring requirements.

4.7.5.2 Sludge Storage Tanks

1. Visually observe each tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, ducts, valves, sampling wells and manholes for any signs of damage or improper installation. All sampling wells and manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves, and dampers for each element of the tanks to confirm the requirements of your Operations Supervisor.
4. Check control settings of each element of the tank to confirm the requirements of your Operations Supervisor.
5. Check and record sludge level in the tank locally and at LCP-SP and combustible gas concentration locally to satisfy the requirements established by your Operations Supervisor.
6. Calibrate the combustible gas sensor for the unstabilized sludge storage tanks on a monthly basis.

4.7.5.3 Sludge Mixing System

1. Check the positions of the manually operated valves on sludge circulation lines and pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the sludge mixing pumps operation to see that they are operating smoothly and quietly. Record run time for each pump.

3. Check the sludge mixing pumps for leaks, excessive noise, and temperature (hand touch).
4. Check seal water flow to each sludge mixing pump. Adjust as necessary.
5. Check that the lever weighted check valves on all operating pumps are open. This condition is alarmed at LCP-USS and SCADA for Unstabilized Sludge Storage Tank 1 and on SCADA for Unstabilized Sludge Storage Tank 2, but a visual check provides added redundancy. If an operating pump has a check valve that is closed, then check and open the discharge and suction isolation valves. If both discharge and suction isolation valves are open, and the associated check valve is in the closed position, then the respective pump should be taken out of service by locking the ROT switch in the “Off” position.
6. Check the discharge and suction pressures using the sludge mixing pump pressure gauges.
7. Check control settings of the sludge mixing pumps locally and at the LCP-SP and on SCADA to confirm the requirements of your Operations Supervisor.
8. Consult the manufacturer’s O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the Sludge Mixing System:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sludge Mixing Pumps (Section 11060). Prepared by Goulds Pumps, Inc. June 1997.

Operations and Maintenance Instructions – South Bay International Wastewater Treatment Plant – Sludge Mixing Pumps and (1) Spare (Section 11.82.13). Prepared by Wemco Pump, January 2010.

4.7.5.4 Ferric Chloride Addition System

Refer to the procedures presented in Section 4.2.5.7.2.

4.7.5.5 Odor Reduction Station

The daily check of the odor reduction station should be according to the following procedures:

Odor Reduction Station Exhaust Fans

1. Check the positions of the manually operated damper circulation lines and pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the exhaust fan operation to see that they are operating smoothly.
3. Check the exhaust fan for leaks, excessive noise, and temperature (hand touch).
4. Check that the lever weighted back draft on the operating fan is open. If an operating fan has a back draft damper that is closed, then check and open the discharge isolation damper. If discharge isolation damper is open, and the associated backdraft damper is in the closed position, then the respective fan should be taken out of service by locking the ROT switch in the "Off" position.
5. Check control settings of the fan locally and at the LCP-ORUSS to confirm the requirements of your Operations Supervisor.
6. Consult the manufacturer's O & M Manuals for troubleshooting and test procedures. The following O & M Manual should be consulted for the odor reduction station exhaust fans:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plan - Odor Reduction Scrubber systems (Section 11050). Prepared by RJ Environmental, June 1997.

Odor Reduction Station Scrubber

1. Visually observe scrubber sump and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the tower and all pipes, ducts, valves, sampling valves, and manholes for any signs of damage or improper installation. All sampling valves and manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves, and dampers for each to confirm the requirements of your Operations Supervisor.
4. Check level control settings to confirm the requirements of your Operations Supervisor.

5. Check and record sump liquid level locally at LCP-USS and on SCADA, ORUSS mist elimination differential pressure, and the ORUSS packed B-O differential pressure, to satisfy the requirements established by your Operations Supervisor.
6. Consult the manufacturer's O & M Manuals for troubleshooting and test procedures. The following O & M Manual should be consulted for the odor reduction station scrubber:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plan - Odor Reduction Scrubber systems (Section 11050). Prepared by RJ Environmental, June 1997.

Odor Reduction Station pH and ORP Controllers

1. Visually observe each controller and all piping and connections for cracking, any signs of liquid leaks, and any other unusual problems.
2. Check the positions of the manually-operated valves, to confirm the requirements of your Operations Supervisor.
3. Check and record pH and ORP readings locally and at LCP-ORUSS and on SCADA to satisfy the requirements established by your Operations Supervisor.
4. Consult the manufacturer's O & M Manuals for troubleshooting and test procedures. The following O & M Manual should be consulted for the odor reduction station pH and ORP controllers:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plan - Odor Reduction Scrubber systems (Section 11050). Prepared by RJ Environmental, June 1997.

Odor Reduction Station Recirculation Pumps

1. Check the positions of the manually operated valves on recirculation lines and pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the recirculation pump operation to see that they are operating smoothly and quietly.
3. Check the recirculation pumps for leaks, excessive noise, and temperature (hand touch).

4. Check seal water flow to each recirculation pump. Adjust as necessary.
5. Check and record the discharge pressure using the local recirculation pump pressure gauge.
6. Check control status of the recirculation pumps at the LCP-ORUSS and on SCADA to confirm the requirements of your Operations Supervisor.
7. Consult the manufacturer's O & M Manuals for troubleshooting and test procedures. The following O & M Manual should be consulted for the odor reduction recirculation pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Odor Reduction Scrubber Systems (Section 11050).
Prepared by R.J. Environmental, Inc., June 1997.

Odor Reduction Station NaOH Metering Pump

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check the discharge pressures using the local pressure gauge.
5. Check and record the discharge flowmeter reading.
6. Check control settings of the caustic metering pump locally and at the LCP-ORUSS to confirm the requirements of your Operations Supervisor.
7. Consult the manufacturer's O & M Manuals for troubleshooting and test procedures. The following O & M Manual should be consulted for the odor reduction station NaOH Metering pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-diaphragm Chemical Metering Pumps (Section 11018).
Prepared by PulsaFeeder, Inc. June, 1997.

Odor Reduction Station NaOCl Metering Pump

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check the discharge and pressures using the local pressure gauge.
5. Check control settings of the sodium hypochlorite pump locally and at the LCP-ORUSS to confirm the requirements of your Operations Supervisor.
6. Consult the manufacturer's O & M Manuals for troubleshooting and test procedures. The following O & M Manual should be consulted for the odor reduction station NaOCl metering pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Diaphragm Chemical Metering Pumps (Section 11018). Prepared by PulsaFeeder, Inc. June, 1997.

Odor Reduction Station NaOH Storage Tank

1. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, ducts, valves, sampling wells and manholes for any signs of damage or improper installation. All sampling wells and manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves of the tanks to confirm the requirements of your Operations Supervisor.
4. Check control settings of each element of the tank to confirm the requirements of your Operations Supervisor.
5. Check and record sodium hydroxide level in the tank locally at LCP-ORUSS and on SCADA to satisfy the requirements established by your Operations Supervisor.

6. Consult the manufacturer's O & M Manuals for troubleshooting and test procedures. The following O & M Manual should be consulted for the odor reduction station NaOH storage tank:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant -Fiberglass Reinforced Plastic Tanks (Section 11030).
Prepared by Belco Manufacturing June, 1997.

Odor Reduction Station NaOCl Storage Tank

1. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, ducts, valves, sampling wells and manholes for any signs of damage or improper installation. All sampling wells and manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves of the tanks to confirm the requirements of your Operations Supervisor.
4. Check control settings of each element of the tank to confirm the requirements of your Operations Supervisor.
5. Check and record sodium hypochlorite level in the tank locally at LCP-ORUSS and on SCADA to satisfy the requirements established by your Operations Supervisor.
6. Consult the manufacturer's O & M Manuals for troubleshooting and test procedures. The following O & M Manual should be consulted for the odor reduction station NaOCl storage tank:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant -Fiberglass Reinforced Plastic Tanks (Section 11030).
Prepared by Belco Manufacturing June, 1997.

NaOH and NaOCl Containment Sump Pumps

1. Check sump levels in the NaOH and NaOCl storage areas.
2. Record run times of the sump pumps.

3. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the sump pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sump Pumps (Section 11016). Prepared by Multi W Systems, Inc. June 1997.

Odor Reduction Station Water Softener System

1. Check water softener vessels for leaks.
2. Check and record water flow rate, calcium ion reading, and pressure.
3. Consult the manufacturer's O & M Manuals for troubleshooting and test procedures. The following O & M Manual should be consulted for the odor reduction station water softener system:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant -Water Softening Equipment (Section 11233). Prepared by Culligan Water Conditioning, June 1997.

4.7.6 Training Record

The following record should be used by the Operator to ensure a complete understanding of the Unstabilized Sludge Storage Facilities.

4.7.6.1 Reading Assignment

1. Chapters 8, 9, 13, 24, 25, Operation of Wastewater Treatment Plants - MOP 11. Water Environment Federation, 1996.
2. Chapter 12, Operation of Wastewater Treatment Plants - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1993.
3. Chapters 1, 3, Advanced Waste Treatment - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1991.

4.7.6.2 Field Instruction

The operator should review and know the location and purpose of each of the following items:

<u>Item</u>	<u>Operator Initials</u>
Sludge Storage Tanks	
Sludge and Skimmings Feed Valves	_____
Sludge Draw-Off Valves	_____
Scum Removal Valves	_____
Access Manholes	_____
Sample Wells	_____
Thermowells	_____
Combustible Gas Sensor	_____
Level Sensor	_____
LCP-USS Alarms	_____
SCADA Alarms	_____
Sludge Mixing Pumps	
Isolation Valves	_____
Seal Water Assembly	_____
Local Controls	_____
LCP-USS Controls and Alarms	_____
LCP-USS2 SCADA Controls	_____

<u>Item</u>	<u>Operator Initials</u>
SCADA Alarms	_____
Odor Reduction Station Exhaust Fan	
Isolation Damper	_____
Backdraft Damper	_____
Low Flow Switch	_____
Local Controls	_____
LCP-ORUSS and SCADA Controls	_____
SCADA Alarms	_____
Odor Reduction Station Scrubber	
Isolation Valves	_____
Level Control	_____
Mist Eliminator D/P	_____
Packed Bed D/P	_____
SCADA Alarms	_____
Odor Reduction Station pH and ORP Controllers	
By-Pass Line Operation	_____
pH Controls	_____
RP Controls	_____
LCP-ORUSS Alarms	_____
SCADA Alarms	_____

<u>Item</u>	<u>Operator Initials</u>
Odor Reduction Station Recirculation Pumps	
Flow Testing	_____
Isolation Valves	_____
Seal Water Assembly	_____
Local Controls	_____
LCP-ORUSS Controls and Alarms	_____
SCADA Alarms	_____
Odor Reduction Station NaOH Metering Pumps	
Isolation Valves	_____
Local Controls	_____
LCP-ORUSS and SCADA Controls	_____
SCADA Alarms	_____
Odor Reduction Station NaOCl Metering Pumps	
Isolation Valves	_____
Local Controls	_____
LCP-ORUSS and SCADA Controls	_____
SCADA Alarms	_____
Odor Reduction Station NaOH Storage Tank	
Isolation Valves	_____
Level Sensor	_____

<u>Item</u>	<u>Operator Initials</u>
LCP-ORUSS and SCADA Controls	_____
SCADA Alarms	_____
Odor Reduction Station NaOCl Storage Tank	
Isolation Valves	_____
Level Sensor	_____
LCP-ORUSS and SCADA Controls	_____
SCADA Alarms	_____
NaOH and NaOCl Containment Sump Pumps	
Local Controls	_____
LCP-SP Alarms	_____
SCADA Alarms	_____
Odor Reduction Station Water Softening System	
Isolation/By-Pass Valves	_____
Low Pressure Switch	_____
Calcium Fan Controller	_____
Duplex Controller	_____
LCP-ORUSS Alarms	_____
SCADA Alarms	_____

4.8 SLUDGE DEWATERING FACILITIES

4.8.1 Description of Controls and Operation

4.8.1.1 General Control Philosophy

Refer to the general control and operational philosophy description presented in Section 4.0.1.

Process Schematics for the sludge dewatering system and the polymer conditioning system are presented in Figures 3.8-1 and 3.8-2, respectively. Odor Reduction Station Scrubbers Process Schematics and air flow schematics are presented as Figures 3.8-3, 3.8-4, 3.8-5, and 3.8-6.

The control, status and annunciators for the Sludge Dewatering Facilities consist of field controls and local control panels (LCP) located in the field or in the Solids Processing Local Control Center (SP-LCC).

The Sludge Dewatering Facilities is primarily controlled from the solids processing local control panel (LCP-SP) located at the SP-LCC and by the four belt filter press local control panels (LCP-BFP1 to LCP-BFP4) located on the second floor of the Sludge Dewatering Building. The programmable logic control for the solids processing (PLC-SP) is located at the LCP-SP in the SP-LCC. The SP-LCC also houses switchboards, motor control centers (MCC-SP) and variable frequency drives (VFD).

4.8.1.2 Dewatering System Pumping Facilities

The sludge grinder is equipped with a local NEMA 4X control panel (LCP-G1) located adjacent to the grinder which includes a Remote-Off-Test switch, Start/Stop pushbuttons, elapsed time meter, and Run, Stop, Grinder Overload (Trip), and Motor Overload lights for indication. In the “Remote” position, the grinder is controlled by signals from Programmable Logic Controller PLC-SP. In this position, the grinder is interlocked with the BFP sludge feed pumps, so if any of the pumps are called to start, the grinder starts first to provide necessary grinding of the incoming unstabilized sludge, and if all BFP pumps shut down or fail, the grinder automatically shuts down.

The “Off” position of the ROT switch is lockable and disables all other controls. The “Test” position does **not** spring load and enables the local Start/Stop pushbuttons.

The sludge grinder is also provided with a Run light, Auto light (grinder is controlled by PLC-SP), and a fail alarm at the Auxiliary Equipment Local Control Panel (LCP-AE) located on the second floor of the Sludge Dewatering Building.

Failure of the grinder is included in a common alarm “LCP-AE FAILURE” at the LCP-SP located at the SP-LCC and is included in a common alarm “SOLIDS PROCESSING SYSTEM FAILURE” at the PCC.

The motor of each BFP sludge feed pump is equipped with a Remote-Off-Test (ROT) switch located at the pump. Start/stop pushbuttons and a run light for each pump are located on individual dedicated NEMA 4X belt filter press control panels (LCP-BFP). The “Off” position of the ROT switch is lockable and disables all other controls. The “Test” position is spring loaded. The “Remote” position energizes controls at the respective LCP-BFP.

The variable frequency drives for the sludge feed pumps are located in the Sludge Dewatering Building. The VFD control panel is provided with Run and Fault indicating lights, set-up and display control, speed control, and start/stop control. For normal operations the speed control and start/stop control are to be in the Remote position and not the Keypad position. In the Remote position, the speed and start/stop control are performed at the respective LCP-BFP. Each LCP-BFP is equipped with a ten turn potentiometer to manually adjust the speed of the feed pump selected at the panel.

A lockable circuit breaker for each pump is located beside the pump. Limit switches with time delay are installed on the check valve arm for each pump discharge piping to indicate motor failure, pump failure and loss of flow. Each pump is also provided with a motor high temperature switch and a discharge line high pressure switch which will shut down the pump when the respective pre-set limit is reached. In addition, the discharge from each pump is provided with a pressure gauge (0 - 100 psi) with an isolation diaphragm to isolate the pressure gauge from the sludge flow.

Failure of the BFP sludge feed pumps is individually annunciated at the respective LCP-BFPs, is included in a common alarm “BELT FILTER PRESS NO. 1 (2, 3, or 4) FAILURE” at the LCP-SP, and is included in a common alarm at the PCC to indicate

“SOLIDS PROCESSING SYSTEM FAILURE.”

The sister/sister relationship between BFP1 and BFP2 and between BFP3 and BFP4 with the sludge feed pumps is described below. A selector switch is provided at each belt filter press control panel to select one of two feed pumps to be dedicated to feed the individual belt filter presses. That is, Belt Filter Press No. 1 can be fed by Pump No. 1 or No. 2. Belt Filter Press No. 2 can be fed by Pump No. 1 or No. 2. Belt Filter Press No. 3 can be fed by Pump No. 3 or No. 4. Belt Filter Press No. 4 can be fed by Pump No. 3 or No. 4. When the pair is configured in an “interchange” mode, one total Belt Filter Press unit operates. For instance, if BFP1 is being supplied by Pump No. 2, then Pump No. 1 cannot supply BFP2; therefore BFP2 is out of service.

A “Sludge Pump 1/2/3” selector switch is located at each LCP-BFP to control the configuration of the sludge feed pumps to the belt filter presses. When the selector switches are in position “1” at LCP-BFP1 and at LCP-BFP2, both sludge feed pumps operate and feed sludge to their dedicated BFPs (Pump 1 feeds BFP1 and Pump 2 feeds BFP2). When the “Sludge Pump 1/2/3” selector switches are in position “2” at LCP-BFP1 and at LCP-BFP2, then sludge feed pump 1 feeds BFP2, and BFP1 is out of service. When the “Sludge Pump 1/2/3” selector switches are in position “3” at LCP-BFP1 and LCP-BFP2, then sludge feed pump 2 feeds BFP1, and BFP2 is out of service. The same control applies for BFP3/Pump 3 and BFP4/Pump 4 configuration when substituted for BFP1/Pump 1 and BFP2/Pump 2 respectively.

Each sludge feed line is provided with a Fischer & Porter, magnetic flow meter (0 - 200 gpm) and totalizer non-resettable (0 - 1,000,000 gallons). The flow rate indicator and totalizer for each sludge feed line are mounted at the respective LCP-BFP. In addition, total sludge flow is indicated at LCP-SP and at PCC.

A common seal water supply manifold to the pumps is equipped with a strainer, flow switch, pressure gauge, and pressure regulator. The seal water flow switch activates a common “SLUDGE FEED SEAL WATER FAILURE” alarm (one for four pumps) at LCP-SP on “no” seal water flow conditions and shuts down all the pumps. The pressure gauge on the seal water manifold is provided to indicate the pressure in the seal water. A BFP sludge

feed pump seal water failure reset pushbutton is provided at the LCP-SP. At each pump, a rotameter and needle valve are provided for flow and pressure control.

The alarm acknowledge and reset pushbuttons at the LCP-BFPs are provided to acknowledge and silence the LCP-BFP and LCP-AE alarms. The system components which are shut down on alarm conditions are restarted according to normal start-up procedures after the alarm conditions have been corrected.

Any alarm conditions in the dewatering system pumping facilities are annunciated at the PCC as a common alarm “SOLIDS PROCESSING SYSTEM FAILURE.”

4.8.1.3 Dewatering System Polymer Conditioning Facilities

The dewatering system polymer conditioning facilities are a semi-automatic system and require routine and daily operator attention to transfer, mix, and deliver polymer to the belt filter presses.

Polymer Bulk Storage

No mechanical equipment is incorporated into bulk storage of polymer. However, sensors are provided to indicate a high and low bulk polymer supply to each tank, prevent polymer spillage and to protect the transfer pump from running dry, respectively.

The high level sensor at each tank is set to indicate when the bulk polymer level is 10 inches below the top of the tank and a signal is transmitted to the individual annunciators at the Solids Processing Local Control Panel (LCP-SP) located in the SP-LCC to indicate “BULK POLYMER STORAGE TANK HIGH LEVEL.” The low level sensor at each tank is set to indicate when only five days of polymer is remaining (level is approximately 2 feet), and a signal is transmitted to the individual annunciator at the local control panel LCP-SP to indicate “BULK POLYMER STORAGE TANK LOW LEVEL.” The low low level sensor at each tank is set to indicate when the bulk polymer level is 3 inches above the transfer pump suction line, and is transmitted to an individual annunciator at the local control panel LCP-SP to indicate “BULK POLYMER STORAGE TANK LOW LOW LEVEL.”

Any alarm conditions in the bulk polymer storage facility are included in a common alarm “SOLIDS PROCESSING SYSTEM FAILURE” at the PCC. The polymer storage area is also provided with a sump and float switch which sends an alarm “SOLIDS

PROCESSING HIGH LEVEL CONTAINMENT AREA” to the LCP-SP and to the PCC.

The bulk polymer storage tank elevations and PLC-SP setpoints are as follows:

Level Description	Elevation (ft)	PLC-SP Setpoints (ft)
Top of tank (straight shell)	72.67	--
Invert of overflow pipe	72.00	--
High switch which indicates a “BULK POLYMER SUPPLY TANK HIGH LEVEL” alarm at the LCP-POL	69.50	12
Low switch which indicates a “BULK POLYMER SUPPLY TANK LOW LEVEL” alarm at the LCP-POL. Reminder to order chemical.	60.00	2.5
Low low switch which indicates a “BULK POLYMER SUPPLY TANK LOW LOW LEVEL” at the LCP-POL; disables the polymer transfer pump regardless of HOA position and transmits failure alarm.	58.50	1.0
Pump suction outlet centerline	58.17	--
Bottom of tank	57.50	--

At the fill station panel, a high level alarm indicator light and an alarm horn receive a signal from the PLC to indicate high level in the respective bulk storage tank. An acknowledge pushbutton is provided at the fill station panel to silence the alarm horn. The alarm indicator light will be illuminated until the tank level is lowered.

The bulk polymer containment area is provided with a permanently installed sump pump with no automatic control. To drain the area, the operator manually opens and closes the appropriate discharge isolation valves, then manually starts the pump.

The lockable On/Off pump disconnect switch, control On/Off switch, control power light, Pump Start and Pump Stop pushbuttons, and pump run lights are provided at the sump pump control panel located at the pump. The control On/Off switch, when in the “On”

position, energizes the sump pump control panel and the control power light will illuminate. The Pump Start pushbutton, when pressed, starts the sump pump which operates until a low level is signaled by the float switch. A Pump Stop pushbutton is provided to manually stop the pump. The Stop pushbutton is provided with a key release lock so that a key is required to unlock the stop pushbutton after it has been pressed. The stop button must be released before the pump can be started.

Bulk Polymer Transfer Pumps

The motor for each of the bulk polymer transfer pumps is provided with two hand switches, variable speed drive and indicator lights. A Remote-Off-Test (ROT) switch is located at the motor. The “Off” position of the ROT switch is lockable and disables all other controls. The “Test” position is spring loaded. The “Remote” position energizes controls at the LCP-POL. A Hand-Off-Auto (HOA) switch is located at the Polymer Local Control Panel (LCP-POL) which is part of the LCP-SP. Located at each transfer pump is a variable speed drive controller providing localized adjustment of the bulk polymer feed rate. Each speed controller is equipped with a ten (10) turn potentiometer for speed control.

Two (2) bulk polymer transfer pumps are provided for the Advanced Primary Treatment Plant (CC-2) and the Phase I South Bay IWTP (CC-2 and CC-3). One pump is dedicated to each bulk polymer storage tank and to each polymer mixing tank. One pump is normally in service and the other serves as manual standby. Each pump is integrated into the dedicated polymer mixing tank make up process. In the Auto mode, the selected pump operates as called for by the level signals from the dedicated polymer mixing tank. The pump starts on a low level signal and stops on high or high high level signals.

In the “Hand” position of the HOA switch, the mixing tank low level and high level setpoints are disabled and each pump operates continuously until the polymer solution level reaches the mixing tank high high level conditions. The pump automatically shuts down on high high level conditions, regardless of the position of the HOA switch.

Individual run lights are provided for each pump at the LCP-POL and at each pump’s SCR controller.

A high/low pressure switch is installed on the discharge side of each pump to indicate motor failure, pump failure, loss of suction and blocked discharge. Failure is annunciated

individually for each of the bulk transfer pumps at the LCP-SP.

In addition, each pump is provided with a pressure gauge on the discharge piping for local indication of the discharge pressure.

The make-up water solenoid valve operates automatically as called for by the level signals from the dedicated polymer mixing tank. The valve opens on a low level signal and closes on high or high high level signals.

A common seal water supply manifold to the pumps is equipped with a strainer, flow switch, pressure gauge, and pressure regulator. The seal water flow switch activates a common “POLYMER TRANSFER SEAL WATER FAILURE” alarm (one for two pumps) at LCP-SP on “no” seal water flow conditions and shuts down the pumps. The pressure gauge on the seal water manifold is provided to indicate the pressure in the seal water. A polymer transfer seal water failure reset pushbutton is provided at the LCP-POL. At each pump, a rotameter and needle valve are provided for flow and pressure control.

Polymer Mixing Tanks

Each of the mixer motors is provided with two hand switches and indicator lights. A Remote-Off-Test (ROT) switch is located at the motor. The “Off” position of the ROT switch is lockable and disables all other controls. The “Test” position is spring loaded. The “Remote” position energizes controls at the LCP-POL. An On-Off switch is located at LCP-POL. In the “On” position, the mixer runs continuously.

Run/Stop/Trip lights and an elapse time meter for each mixer are provided at the MCC-SP. In addition, individual run lights are provided for each mixer at the LCP-POL.

Failure of the mixers is annunciated individually at the LCP-SP such as “POLYMER MIXER NO. 1FAILURE”.

Each mixing tank is equipped with a level sensor to indicate the various level setpoints. The low level is located at a tank capacity of approximately 800 gallons and transmits a signal to the respective bulk polymer transfer pump and make-up water solenoid valve to add polymer and water to the mixing tank. The low level is set so that the liquid level is one propeller diameter above the mixer propeller. This protects the mixer from damage due to vortexing. The low low level setpoint is located 3 inches above the polymer feed pump suction piping. Low low level signals from each tank are transmitted to

individual annunciators at the LCP-SP and deactivate the polymer feed pump and automatically initiate a BFP shutdown sequence.

A polymer mixing tank selector switch “Tank 1/Tank 2/Tank 1-2,” is provided in LCP-POL to select the tank(s) to be used in the polymer feed supply sequence and to provide a control interlock between the selected tank(s) and the dedicated polymer feed pumps and belt filter presses.

The high level setpoint is located 12 inches below the top of the tanks, and transmits a signal to the dedicated polymer transfer pump to shut down, and to the make-up water solenoid valve to close. The high high level alarm setpoint is located 6 inches below the top of the tank and is also transmitted to the dedicated polymer transfer pump to shut down, and to the make-up water solenoid valve to close, and to individual annunciators at the LCP-SP. Resetting of the make-up water solenoid valve is done automatically.

Low low level and high high level signals from each tank, and failure of the make-up water supply of each tank is individually annunciated at LCP-SP.

The polymer mixing tank elevations and PLC-SP setpoints are as follows:

Level Description	Elevation (ft)	PLC-SP Setpoints (ft)
Top of tank	65.00	--
High high switch which indicates a “POLYMER SOLUTION LEVEL HIGH” alarm to LCP-POL, disables both polymer transfer pump regardless of HOA position and transmits failure alarm	64.40	7.4
Transfer pump “Off” switch, also closes NPW solenoid valve	63.60	6.6
Transfer pump “On” switch, also opens NPW solenoid valve. Level in tank protects mixer from creating vortex.	62.00	5.0
Low low switch which indicates a “LOW POLYMER SOLUTION SUPPLY” alarm at LCP-POL, disables all polymer addition pump regardless of HOA position and transmits failure alarm	58.00	1.0

Level Description	Elevation (ft)	PLC-SP Setpoints (ft)
Pump suction outlet centerline	57.67	--
Tank bottom	57.00	--

Polymer Feed Pumps

The motor of each polymer feed pump is equipped with a Remote-Off-Test (ROT) switch located at the motor. The “Off” position of the ROT switch is lockable and disables all other controls. The “Test” position is spring loaded. The “Remote” position energizes controls at the LCP-BFP1 (2, 3, or 4). Start/stop pushbuttons are located on the individual NEMA 4X LCP-BFP.

Each pump is equipped with a speed indicator to provide a digital readout in RPM at the individual LCP-BFP. The variable speed drives for the polymer feed pumps are located at each pump. A ten turn potentiometer dedicated to each pump is located in the respective individual LCP-BFP to manually adjust the speed of the polymer feed pump selected at each LCP-BFP. Additionally, a ten turn potentiometer and running lights for each pump are located at the SCR controller. The local potentiometer is for calibration only. It is functional only when the ROT switch is in the “Test” position.

The sister/sister relationship between BFP1 and BFP2 and between BFP3 and BFP4 with the polymer feed pumps is described below. A selector switch is provided at each LCP-BFP to select one of two polymer feed pumps to be dedicated to feed the individual belt filter presses. That is, Belt Filter Press No. 1 can be supplied polymer by Polymer Pump No. 1 or No. 2. Belt Filter Press No. 2 can be supplied polymer by Polymer Pump No. 1 or No. 2. Belt Filter Press No. 3 can be supplied polymer by Polymer Pump No. 3 or No. 4. Belt Filter Press No. 4 can be supplied polymer by Polymer Pump No. 3 or No. 4. When the pair are configured in an “interchange” mode, one total Belt Filter Press unit operates. For instance, if BFP1 is being supplied by Pump No. 2, then Pump No. 1 cannot supply BFP1; therefore BFP2 is out of service.

A “Polymer Pump 1/2/3” selector switch is located at each LCP-BFP to control the configuration of the polymer feed pumps to the belt filter presses. When the selector switches are in position “1” at LCP-BFP1 and at LCP-BFP2, both polymer feed pumps operate and feed polymer to their dedicated BFPs (Pump 1 feeds BFP1 and Pump 2 feeds BFP2). When the “Polymer Pump 1/2/3” selector switches are in position “2” at LCP-BFP1 and at LCP-BFP2, then polymer feed pump 1 feeds BFP2, and BFP1 is out of service. When the “Polymer Pump 1/2/3” selector switches are in position “3” at LCP-BFP1 and LCP-BFP2, then polymer feed pump 2 feeds BFP1, and BFP2 is out of service. The same control applies for BFP3/Pump 3 and BFP4/Pump 4 configuration when substituted for BFP1/Pump 1 and BFP2/Pump 2, respectively.

Flow switches are installed on the discharge piping of each pump to indicate motor failure, pump failure, loss of suction, and blocked discharge. Failure of the pumps is annunciated individually “POLYMER SYSTEM FAIL” for each pump at the respective LCP-BFP and is included in a common alarm “BELT FILTER PRESS NO. 1(2, 3, or 4) FAILURE” at the LCP-SP. On failure of each individual polymer feed pump, the respective belt filter press sludge feed pump automatically stops and a BFP shutdown sequence of the associated belt filter press commences.

In addition, each pump is provided with a pressure gauge located on the discharge piping for local pressure indication.

An individual run light is provided for each pump at the respective LCP-BFP.

A common seal water supply manifold to the pumps is equipped with a strainer, flow switch, pressure gauge, and pressure regulator. The seal water flow switch activates a common “POLYMER FEED SEAL WATER FAILURE” alarm (one for four pumps) at LCP-POL on “no” seal water flow conditions and shuts down the pumps. A pressure gauge on the seal water manifold is provided to indicate the pressure in the seal water. A polymer feed seal water failure reset pushbutton is provided at the LCP-POL. At each pump, a rotameter and needle valve are provided for flow and pressure control.

Any alarm conditions in the dewatering system polymer conditioning facilities are annunciated at the PCC as a common alarm “SOLIDS PROCESSING SYSTEM FAILURE.”

4.8.1.4 Belt Filter Presses

Each belt filter press is served by its own local control panel LCP-BFP1 (2, 3, or 4) of NEMA 4X construction, free standing, 316 stainless steel, single door enclosure with bottom conduit entrance. A red rotation beacon and a horn are mounted on the top of each LCP-BFP.

An Emergency Stop mushroom head weatherproof pushbutton is mounted on the outer door. An additional emergency stop pushbutton is mounted at the press. The emergency stop buttons are interlocked with emergency stop taglines located around the perimeter of the belt filter press at two elevations. The manufacturer's Operation and Maintenance Manual refers to the taglines as trip cords.

Additionally, an alarm test, alarm acknowledge, and reset pushbuttons are provided on the outer door of the LCP-BFPs.

Mounted on the hinged panel behind the see-through section of the front door are the following:

1. Control Power On/Off selector switch and "Control Power On" indicating light.
2. System Hand-Off-Auto (HOA) switch for manual or semi-automatic mode of starting and stopping of the press and ancillary equipment. "Hand" and "Auto" indicating lights located right above HOA switch.
3. Master System Auto Start pushbutton and Auto Stop pushbutton.
4. Start/stop pushbuttons and "Run" indicating lights for the following:
 - a. Upper/Lower Belt Drives (common)
 - b. Hydraulic Pump
 - c. Washwater Pump
5. "Select 1/2/3" (Sister-Sister) selector switches, start/stop pushbuttons and "Run" indicating lights for the following:
 - a. Sludge Feed Pump
 - b. Polymer Feed Pump
6. "Pre-Wash Cycle", "Press Ready", and "Wash down Cycle" indicating lights.

7. Manual speed adjustment 10 turn potentiometers for the following:
 - a. Upper/Lower Belt Drivers (common)
 - b. Sludge Feed Pump
 - c. Polymer Feed Pump
8. Belt Speed indicating meter.
9. RPM speed indicator for the polymer pump.
10. Sludge Flow Indicator (0 to 200 gpm) and non-resettable sludge flow totalizer (8 digit readout).
11. “Conveyor/Lime System Running” indicating light.
12. Fail annunciators for the following:
 - a. Emergency Stop
 - b. Belt Drive Fail
 - c. Low Water Pressure
 - d. Washwater Pump Fail
 - e. Hydraulic Pressure Fail
 - f. Hydraulic Pump Fail
 - g. Belt Misaligned
 - h. Belt Broken
 - i. Polymer System Fail
 - j. Sludge System Fail
 - k. No cake

Each panel also contains the following equipment:

1. Main and redundant programmable logic controllers (PLC) for automatic sequencing of start-up and shutdown of the press and ancillary equipment, and for provision of interlocking and alarms
2. Main 240V 2 pole circuit breaker
3. Control transformer 240V - 120V single phase with secondary fuse
4. Control terminal blocks
5. 600V polar terminal blocks for 240V incoming power
6. Wiring from panel components to terminal blocks for all remote connections

With the startup of the required belt filter press conveyors (detailed description in Section 4.9) completed, the following operation provisions are provided:

1. The controls are arranged to provide a combined semi-automatic sequenced startup and shutdown with the System HOA switch in the “Automatic” position. After the Auto Start pushbutton is manually pressed, the following events automatically occur: the washwater valve opens, the washwater booster pump starts, the hydraulic pump starts, and the belt drive motors start (after adjustable time delay).

After the belt drive motors are running and the “Press Ready” light illuminates, the operator manually starts the polymer feed pump and, after a short delay, the sludge feed pump. The controls are arranged so that the selected sludge feed pump cannot be started without the polymer feed pump running. The sludge feed and polymer feed pumps are manually started only. If the sludge feed pump has not started within an adjustable time period after the polymer feed pump is started, the press goes into a normal shutdown/wash down sequence. The sludge grinder will automatically start-up when a sludge feed pump is verified running.

The semi-automatic shutdown begins with manually depressing the Auto Stop pushbutton. The polymer feed pump and sludge feed pump will stop immediately. After an adjustable time delay necessary for a complete wash down of the belts, the entire system shuts down simultaneously including the belt drives, the hydraulic pump, the washwater booster pump, and finally the washwater valve closes.

2. Individual Start/Stop on the LCP-BFP are armed only when the system HOA switch is in the “Hand” position except for the sludge feed and polymer feed pumps. Automatic start-up/shutdown sequence interlocking is disabled when in the “Hand” operation.
3. The following components of each belt filter press are provided with local (drive mounted) Remote-Off-Test (ROT) switches. The “Off” position of the ROT switch is lockable and disables all other controls. The “Test” position is spring loaded. The “Remote” position energizes controls at the respective LCP-BFP.
 - a. Hydraulic Pump
 - b. Upper Belt Drive
 - c. Lower Belt Drive
 - d. Washwater Booster Pump
4. While operating in either the manual or automatic modes, the following fault conditions will cause all equipment in the system to be de-energized. At this

time, the Alarm Horn will sound and the appropriate annunciator window will flash. Pressing the Alarm Silence pushbutton will silence the Alarm Horn and cause the alarm window to illuminate steady. After the alarm fault has been cleared, pressing the Reset pushbutton will reset the system and de-energize the alarm window.

- a. “Emergency Stop” (taglines; BFP or LCP-BFP pushbutton)
- b. “Belt Drive Fail”
- c. “Low Washwater Pressure” (after time delay)
- d. “Washwater Pump Fail”
- e. “Hydraulic Pressure Fault” (after time delay)
- f. “Hydraulic Pump Fail”
- g. “Belt Misaligned” (after time delay)
- h. “Belt Broken” (after time delay)

The low water pressure and hydraulic pressure fault alarm logic will be enabled only if the associated pumps are proofed running. If the HOA selector is placed in the “Off” position, all equipment will be shut down immediately.

- 5. The following shutdowns also automatically initiate a wash down sequence when in automatic or manual mode of operation:

- a. “Polymer System Fail”: “Polymer Pump Fail”
“Loss of Polymer Flow”
“Low Low Polymer Mix Tank Level”
- b. “Sludge System Fail”: “Sludge Pump Fail”
“Loss of Sludge Flow”
“Sludge Pump High Pressure”
- c. “No Cake”

The no cake alarm logic will be enabled only if the polymer pump or sludge pump is proofed running.

- 6. The following remote signals automatically initiate selective shutdown of sludge and polymer feeds and initiate wash down sequences as indicated:

- a. Loss of BFP Conveyors No. 1A/1B - Presses No. 1 and No. 2
- b. Loss of BFP Conveyors No. 2A/2B - Presses No. 3 and No. 4
- c. Loss of Lime Stabilization System No. 1 - Presses No. 1 and No. 2
- d. Loss of Lime Stabilization System No. 2 - Presses No. 3 and No. 4

- 7. In the “Hand” mode of operation, the elements of each belt filter press are started and shut down by the individual start/stop pushbuttons. When the

system HOA switch is placed in the “Off” position, all elements of the system shut down and trigger the associated interlocks with the respective lime stabilization system regardless of the mode of operation of the system.

8. All the above shutdowns are for the four individual presses, that is, the shutdown of one press does not shut down the remaining presses.
9. Each Belt Filter Press is provided with two (2) cable operated (“tag line”) safety switches, each with two N.C. isolated contacts, one for shutdown and one for alarm. The taglines are installed around the perimeter of each belt filter press at two elevations (first and second floor). The tagline switch has a positive safety lock, so that manual reset of switch is required. The activated tagline is interlocked with emergency stop buttons and is individually annunciated at each LCP-BFP, LCP-SP and at PCC.
10. The following devices are wired in conduit to each belt press terminal box terminal blocks:
 - a. Limit switch for loss of sludge cake
 - b. Limit switches for excessive belt misalignment
 - c. Limit switches for belt breakage
11. Failure of the belt filter presses is transmitted to individual annunciator at the LCP-SP to indicate “BELT FILTER PRESS NO. 1 FAILURE,” “BELT FILTER PRESS NO. 2 FAILURE,” “BELT FILTER PRESS NO. 3 FAILURE,” “BELT FILTER PRESS NO. 4FAILURE.”
12. Any alarm conditions in the belt filter presses is transmitted to the PCC for annunciation as a common alarm “SOLIDS PROCESSING SYSTEM FAILURE.” The critical emergency type shutdowns (taglines or emergency stop buttons) are individually annunciated at each LCP-BFP and transmitted to LCP-SP and PCC and are listed below:
 - a. Belt Filter Press No. 1 - EMERGENCY SHUTDOWN
 - b. Belt Filter Press No. 2 - EMERGENCY SHUTDOWN
 - c. Belt Filter Press No. 3 - EMERGENCY SHUTDOWN
 - d. Belt Filter Press No. 4 - EMERGENCY SHUTDOWN

4.8.1.5 Odor Reduction Station

The Solids Processing Odor Reduction Station is provided with a local control panel LCP-ORSP, with a NEMA 4X enclosure for control of the scrubber and appurtenances. Process schematics for SP Odor Reduction Station Scrubber Nos. 1 and 2, and air flow schematics are presented in Figures 3.8-3 and 3.8-4, and 3.8-5 and 3.8-6 respectively.

Odor Reduction Station Scrubber Exhaust Fans

The three exhaust fans which are common to scrubber systems 1 and 2 are furnished with a locally-mounted ROT switch and an HOA switch in LCP-ORSP located at the odor reduction station. The “Remote” position of the ROT switch enables controls located at LCP-ORSP. The “Off” position is lockable to prevent the exhaust fan from operating. The “Test” position is spring loaded and is used to test the operation of the exhaust fan with the HOA switch in the “Off” position. Run/Stopped/Trip lights and elapsed time meter are located in the MCC cabinet. A flow switch is installed on the discharge side of each of the exhaust fans to indicate motor failure or blocked discharge.

Two of the exhaust fans pull odorous air from the dewatering building. A duty/stand-by selection switch is provided at LCP-ORSP for the operator to select which of the two fans will be in service. Failure of either of these two exhaust fans results in de-energizing the corresponding motor and activates alarms at the LCP-ORSP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. In the “Auto” position, failure of the in-service fan automatically starts the stand-by unit.

The third exhaust fan pulls odorous air from the truck loading building. This fan stands alone without a stand-by unit. Failure of the fan results in de-energizing the motor and activates alarms at LCP-ORSP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules.

Odor Reduction Station Scrubber No. 1

Differential pressure indicators are provided for the scrubber for local indication. The differential pressure indicators are installed across the mist eliminator and packed bed, respectively. Indicators are mounted on the scrubber, approximately 5 ft above the finished floor.

A pressure transducer is installed on the scrubber sump. The low level set point is set to indicate six inches above the recirculation pump suction line and when tripped activates alarms at the LCP-ORSP and a common “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. If the sump level continues to drop to three inches above the recirculation pump suction, the recirculation pumps shut down.

Odor Reduction Station No. 1 pH Controller

The pH analyzer is installed at the odor reduction station recirculation pump bypass loop. The pH reading is displayed at the analyzer and at the pH controller mounted in LCP-ORUSS. The pH operating range shall be set between 3 and 4 with a target set point of 3.5 pH. The pH controller can be operated in either manual or automatic mode. In manual mode the controller displays the setpoint dialed in by the operator on front of the panel mounted controller. In automatic mode the controller tracks the actual pH. The pH setpoint is maintained through electric control of the stroke controller of the selected H₂SO₄ metering pump.

Odor Reduction Station No. 1 Recirculation Pumps

Each recirculation pump is furnished with a locally-mounted ROT switch and an HOA switch in LCP-ORSP. The “Remote” position of the ROT switch enables the controls at LCP-ORSP. The “Off” position which is lockable prevents the recirculation pump from operating. The “Test” position is spring loaded and is used to test the operation of the exhaust fan with the HOA switch in the “Off” position. A duty/standby selector switch is provided at the LCP-ORSP for the operator to select the in-service recirculation pump. Run/Stopped/Trip lights for each recirculation pump are provided at the MCC cabinet. A pressure switch is installed on the discharge side of each recirculation pump to indicate motor failure or blocked discharge. Failure of either recirculation pump results in de-energizing the corresponding motor and activates alarms at the LCP-ORSP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. In the “Auto” position, failure of the in-service pump starts the standby unit.

Seal water is provided to each recirculation pump. Failure of seal water supply activates alarms at LCP-ORSP, and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules, and shuts down both recirculation pumps.

Odor Reduction Station No. 1 H₂SO₄ Metering Pumps

Each H₂SO₄ metering pump has a locally-mounted ROT switch and an HOA switch in LCP-ORSP. The “Remote” position of the ROT switch enables the controls located at the LCP-ORSP. The “Off” position which is lockable prevents the H₂SO₄ metering pump from operating. The “Test” position is spring loaded, and is used to test the operation of the H₂SO₄ metering pump with the HOA switch in the “Off” position. A duty/standby selector

switch is provided at LCP-ORSP for the operator to select the in-service H₂SO₄ pump. Run/Stopped/Trip lights for each H₂SO₄ pump are provided at the MCC cabinet. A pressure relief valve is provided on the discharge side of each H₂SO₄ pump to bypass flow back to the storage tank. A conductivity meter is installed in each H₂SO₄ metering pump to indicate diaphragm rupture. Failure of either H₂SO₄ pump de-energizes the motor and activates alarms at the LCP-ORSP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. In the “Auto” position, failure of the in-service pump automatically starts the standby unit.

Each H₂SO₄ metering pump is of variable stroke length and has an integral non-reversing electric stroke control motor for purposes of varying the pump stroke. Stroke control is the direct-acting type and mounted directly to the pump in a NEMA 4 enclosure. Each H₂SO₄ metering pump stroke controller is capable of capacity adjustment for 0-100% by changing piston stroke length based on a 4-20mA signal input from panel mounted pH controller.

Odor Reduction Station H₂SO₄ Storage Tank

There is no mechanical equipment within the H₂SO₄ bulk storage tank. A pressure transducer is installed on the side of the H₂SO₄ storage tank. The low level setpoint is set to indicate when only five days of H₂SO₄ is remaining and activates alarms at the LCP-ORSP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The low low level setpoint is set to indicate when H₂SO₄ is only 3 inches above the metering H₂SO₄ pump suction line and activates alarms at the LCP-OR SP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The high level setpoint is set to indicate a liquid level 6 inches below tank overflow and activates an alarm at the LCP-OR SP and the “SP ODOR REDUCTION STATION FAILURE” alarm at the PCC annunciator modules.

At the fill station panel, a high level alarm indicator light and an alarm horn receive a signal from the PLC to indicate high level in the respective bulk storage tank. An acknowledge pushbutton is provided at the fill station panel to silence the alarm horn. The alarm indicator light will be illuminated until the tank level is lowered.

Odor Reduction Station Scrubber No. 2

Differential pressure indicators are installed across both the mist eliminator and packed bed to provide indication of pressure loss across the scrubber for local identification only. Indicators are mounted on the scrubber, approximately 5 ft above the finished floor.

A pressure transducer is installed on the scrubber sump. The low level set point is set to indicate (6) inches above the recirculation pump suction line and when tripped activates alarms at the LCP-ORSP and a common “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. If the sump level continues to drop to 3-inches above the recirculation pump suction, the recirculation pumps shut down.

Odor Reduction Station Scrubber No. 2 pH and ORP Controllers

The pH analyzer is installed in the odor reduction station recirculation pump bypass loop. The pH reading is displayed at the analyzer and at the pH controller mounted in LCP-ORSP. The pH operating range shall be set between 9 and 11 with a target set point of 10.5 pH. The pH controller can be operated in either manual or automatic mode. In manual mode the controller displays the setpoint dialed in by the operator on front of the panel mounted controller. In automatic mode the controller tracks the actual pH. The pH setpoint is maintained through electric control of the stroke controller of the selected NaOH metering pump. Low and high pH annunciate at the LCP-ORSP.

A ORP analyzer is installed in the odor reduction station recirculation pump bypass loop. The ORP operating range is set between 575 mv to 725 mv. The desired operating ORP is maintained by manually adjusting the stroke control potentiometer on the NaOCl metering pumps. Low and high ORP are annunciated at the LCP-ORSP.

Odor Reduction Station No. 2 Recirculation Pumps

Each recirculation pump is furnished with a locally-mounted ROT switch and an HOA switch in LCP-ORSP. The “Remote” position of the ROT switch enables the controls at LCP-ORSP. The “Off” position which is lockable prevents the recirculation pump from operating. The “Test” position is spring loaded and is used to test the operation of the exhaust fan with the HOA switch in the “Off” position. A duty/standby selector switch is provided at the LCP-ORSP for the operator to select the in-service recirculation pump. Run/Stopped/Trip lights for each recirculation pump are provided at the MCC cabinet. A pressure switch is installed on the discharge side of each recirculation pump to indicate

motor failure or blocked discharge. Failure of either recirculation pump results in de-energizing the corresponding motor and activates alarms at the LCP-ORSP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. In the “Auto” position, failure of the in-service pump starts the standby unit.

Seal water is provided to each recirculation pump. Failure of seal water supply activates alarms at LCP-ORSP, and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules, and shuts down both recirculation pumps.

Odor Reduction Station Scrubber No. 2 NaOH Metering Pumps

Each NaOH metering pump has a locally-mounted ROT switch and an HOA switch in LCP-ORSP. The “Remote” position of the ROT switch enables the controls located at the LCP-ORSP. The “Off” position which is lockable prevents the NaOH metering pump from operating. The “Test” position is spring loaded and is used to test the operation of the NaOH metering pump with the HOA switch in the “Off” position. A duty/standby selector switch is provided at LCP-ORSP for the operator to select the in-service NaOH pump. Run/Stopped/Trip lights for each NaOH pump are provided at the MCC cabinet. A pressure relief valve is provided on the discharge side of each NaOH pump to bypass flow back to the storage tank. A conductivity sensor is installed in each NaOH metering pump to indicate diaphragm rupture. Failure of either NaOH pump de-energizes the motor and activates alarms at the LCP-ORSP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. In the “Auto” position, failure of the in-service pump automatically starts the standby unit.

Each NaOH metering pump is of variable stroke length and has an integral non-reversing electric stroke control motor for purposes of varying the pump stroke. Stroke control is the direct-acting type and mounted directly to the pump in a NEMA 4 enclosure. Each NaOH metering pump stroke controller is capable of capacity adjustment for 0-100% by changing piston stroke length based on a 4-20mA signal input from panel mounted pH controller.

Odor Reduction Station Scrubber No. 2 NaOCl Metering Pumps

Each NaOCl metering pump has a locally-mounted ROT switch and an HOA switch in LCP-ORSP. The “Remote” position of the ROT switch enables the controls located at the LCP-ORSP. The “Off” position which is lockable prevents the NaOCl feed pump from

operating. The “Test” position is spring loaded and is used to test the operation of the NaOCl metering pump with the HOA switch in the “Off” position. A duty/standby selector switch is provided at LCP-ORSP for the operator to select the in-service NaOCl pump. Run/Stopped/Trip lights for each NaOCl pump are provided at the MCC cabinet. A pressure relief valve is provided on the discharge side of each NaOCl pump to bypass flow back to the storage tank. A conductivity sensor is provided at each NaOCl pump to detect a diaphragm rupture. Failure of either NaOCl pump results in de-energizing the corresponding motor and activates alarms at the LCP-ORSP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. In the “Auto” position, failure of the in-service pump automatically starts the standby unit.

Each NaOCl metering pump is of variable stroke length and equipped with an integral non-reversing electric stroke control motor for purposes of varying the pump stroke. The stroke control is the direct-acting type and mounted directly to the pump in a NEMA 4 enclosure. Each NaOCl metering pump stroke controller is capable of capacity adjustment for 0-100% by changing piston stroke length by manually adjusting the locally mounted potentiometer.

Odor Reduction Station NaOH Storage Tank

There is no mechanical equipment within the NaOH bulk storage tank. A pressure transducer is installed on the side of the NaOH storage tank. The low level setpoint is set to indicate when only five days of NaOH is remaining and activates alarms at the LCP-ORSP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The low low level setpoint is set to indicate when NaOH is only three inches above the NaOH metering pump suction line and activates alarms at the LCP-ORSP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The high level setpoint is set to indicate a liquid level 6 inches below tank overflow and activates an alarm at the LCP-ORSP and the “SP ODOR REDUCTION STATION FAILURE” alarm at the PCC annunciator modules.

At the fill station panel, a high level alarm indicator light and an alarm horn receive a signal from the PLC to indicate high level in the respective bulk storage tank. An acknowledge pushbutton is provided at the fill station panel to silence the alarm horn. The alarm indicator light will be illuminated until the tank level is lowered.

Odor Reduction Station Scrubber No. 2 NaOCl Storage Tank

A pressure transducer is installed on the side of the NaOCl storage tank. The low level setpoint is set to indicate when only five days of NaOCl is remaining and activates alarms at the LCP-ORSP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The low low level setpoint is set to indicate when NaOCl is only three inches above the NaOCl metering pump suction line and activates alarms at the LCP-ORSP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules. The high level setpoint is set to indicate a liquid level 6 inches below tank overflow and activates an alarm at the LCP-ORSP and the “SP ODOR REDUCTION STATION FAILURE” alarm at the PCC annunciator modules.

At the fill station panel, a high level alarm indicator light and an alarm horn receive a signal from the PLC to indicate high level in the respective bulk storage tank. An acknowledge pushbutton is provided at the fill station panel to silence the alarm horn. The alarm indicator light will be illuminated until the tank level is lowered.

H₂SO₄, NaOH and NaOCl Containment Sump Pumps

Each containment area is provided with a permanently installed sump pump with no automatic control. To drain the area, the operator manually opens and closes the appropriate discharge isolation valves, then manually starts the pump.

The lockable On/Off pump disconnect switch, control On/Off switch, control power light, Pump Start and Pump Stop pushbuttons, and pump run lights are provided at the sump pump control panel located at the pump. The control On/Off switch, when in the “On” position, energizes the sump pump control panel and the control power light will illuminate. The Pump Start pushbutton, when pressed, starts the sump pump which operates until a low level is signaled by the float switch. A Pump Stop pushbutton is provided to manually stop the pump. The Stop pushbutton is provided with a key release lock so that a key is required to unlock the stop pushbutton after it has been pressed. The stop button must be released before the pump can be started.

Odor Reduction Station Water Softening System

The water softener duplex system common to scrubber's No. 1 and No. 2 is energized by a 120V circuit. A pressure switch is installed on the inlet side of the water softener to indicate inadequate softened water system pressure. Inadequate softened water system pressure will activate an alarm at the LCP-ORSP and the "SP ODOR REDUCTION STATION FAILURE" alarm at the PCC annunciator modules. There is a varea-meter on the discharge of the water softening system to indicate flowrate.

The water softener has local automatic controls which facilitate backwash/reconcentration/rinse cycles based on the volume of water treated. A calcium ion analyzer senses an overall failure in the softening system and activates an alarm at the LCP-ORSP and the "SP ODOR REDUCTION STATION FAILURE" alarm at the PCC annunciator modules.

Sludge Dewatering Building Air Supply and Exhaust Fans

The air supply fans, SF2 and SF3, are each furnished with a locally-mounted ROT switch and an HOA switch at LCP-ORSP. The "Remote" position of the ROT switch enables controls located at LCP-ORSP. The "Off" position is lockable and prevents the air supply fan from operating. The "Test" position is spring loaded and is used to test the operation of the air supply fan with the HOA switch in the "Off" position. Run/Stopped/Trip lights for the air supply fan are located at the MCC cabinet. A flow switch is installed on the discharge side of each air supply fan to indicate motor failure or blocked discharge. Failure of each air supply fan de-energizes the motor and activates alarms at the LCP-ORSP and "SP ODOR REDUCTION STATION FAILURE" at the PCC annunciator modules.

The exhaust fans, EF4 to EF7, are each furnished with a locally-mounted On/Off switch. Run/Stopped/Trip lights for the exhaust fans are located at the MCC cabinet.

Smoke detectors are installed in the sludge dewatering building. The activation of smoke alarms shuts down scrubber exhaust fans, shutdown air supply and exhaust fans in sludge dewatering building.

Truck Loading Building Air Supply Fans

Air supply fans, SF4 and SF5, are each furnished with a locally-mounted ROT switch and an HOA switch at LCP-ORSP. The "Remote" position of the ROT switch enables controls located at LCP-ORSP. The "Off" position is lockable and prevents the air supply

fan from operating. The “Test” position is spring loaded, and is used to test the operation of the air supply fan with the HOA switch in the “Off” position. Run/Stopped/Trip lights for the air supply fan are located at the MCC cabinet. A flow switch is installed on the discharge side of the air supply fan to indicate motor failure or blocked discharge. Failure of the air supply fan de-energizes the motor and activates alarms at the LCP-ORSP and “SP ODOR REDUCTION STATION FAILURE” at the PCC annunciator modules.

Smoke detectors are installed in the truck loading building. The activation of smoke alarms shuts down scrubber exhaust fans, shutdown air supply and exhaust fans in truck loading building.

4.8.2 Step by Step Start-Up Procedures

4.8.2.1 General System Start-Up Procedures

The Sludge Dewatering Facilities should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Visually inspect the belt filter presses, the Sludge Dewatering Building, and the BFP Sludge Feed Pump Station for any signs of damage or improper installation. The areas should be cleaned of all installation or maintenance equipment and other articles which are not part of the system.
3. Determine which belt filter press, sludge feed pump, and polymer feed pump will be in service.
4. Ensure that Local Control Panels LCP-SP located at the SP-LCC; LCP-AE, the appropriate LCP-LS1 and LCP-LS2, and the appropriate LCP-BFP1 to LCP-BFP4 located on the second floor of the Sludge Dewatering Building; LCP-G1 located at the BFP Sludge Feed Pump Station; LCP-LU1 and LCP-LU2 located adjacent to the silo quick lime fill pipe; and LCP-ORSP located at the SP Odor Reduction Station are energized.
5. Ensure that appropriate Distribution Panels DPM5, DPL5, DPC5, and DPP5 located at the SP-LCC and DPM7, DPL7, DPC7, and DPP7 located at the Truck Loading Building are energized.
6. Ensure that circuit breakers at the Motor Control Center MCC-SP located at SP-LCC are energized.

7. Start SP Odor Reduction Station according to the procedures described in Sections 4.8.2.2.4. If the odor reduction station is to be started up after a complete shutdown, the order of start up for the various pieces of odor reduction equipment shall be as follows:
 - a. Sludge Dewatering Building Air Supply and Exhaust Fans
 - b. Truck Loading Building Air Supply Fans
 - c. Exhaust Fans (OREF 9 and OREF 7 or OREF 8)
 - d. Water Softening System
 - e. Scrubbers No. 1 and No. 2
 - f. Recirculation Pumps (One per Scrubber)
 - g. pH and ORP Controllers
 - h. H₂SO₄ Storage Tank
 - i. H₂SO₄ Metering Pump
 - j. NaOCl Storage Tank
 - k. NaOCl Metering Pump
 - l. NaOH Storage Tank
 - m. NaOH Metering Pump
8. Verify that the USST has a minimum level of 4 feet and that at least two sludge mixing pumps are operational. Ensure that the draw-off valves at the USST are in the open position.
9. After normal operation of the Odor Reduction Station is established, begin mixing the polymer solution for the 60 minute mix time at the Sludge Dewatering Polymer Conditioning Facilities (See Section 4.8.2.2.2).
10. Ensure that the sludge feed pumps are ready to be operational according to procedures described in Section 4.8.2.2.1. Do not start-up pump.
11. Ensure that the polymer feed pumps are ready to be operational according to procedures described in Section 4.8.2.2.2. Do not start-up pump.
12. Start the respective Sludge Conveyance and Lime Stabilization System according to procedures described in Section 4.9.2.1. The “Conveyor/Lime System Running” light will illuminate.
13. Start the selected BFPs according to procedures described in Section 4.8.2.2.3, depending on semi-automatic or manual mode of operation.
14. Once BFP(s) is confirmed running, start the polymer feed pump(s) (See Section 4.8.2.2.2).
15. Once polymer feed pump(s) has run for 15-30 seconds, start the sludge feed pump(s) and sludge grinder (See Section 4.8.2.2.1).

16. The optimum setpoints (pressure, level, pH, ORP) and configuration of the systems and the odor reduction station should be in accordance with your Operations Supervisor's direction based on operating experience and the odor reduction station air permit.

4.8.2.2 Individual Equipment Start-Up Procedures

4.8.2.2.1 Dewatering System Pumping Facilities

BFP Sludge Feed Pumps

Start the BFP sludge feed pumps according to the procedures listed below:

1. Select the BFP and the BFP sludge feed pump that will be in service.
2. Place the Sludge Pump 1/2/3 selector switch at the selected LCP-BFP to the appropriate position based on the desired configuration. See Section 4.8.1.2 for detailed description of sister/sister relationship.
3. Verify all appropriate isolation valves are in proper orientation through the entire sludge feed line from the sludge grinder to the selected BFP.
4. Ensure that seal water is being supplied to the pump.
5. Place the respective ROT switch for the pump in the "Remote" position.
6. Select the "Remote" position for the Start/Stop Control and the "Remote" position for the speed control at the appropriate VFD located in the Sludge Processing Building.
7. After the "Press Ready" light is illuminated and the "Polymer Feed Pump Running" light is illuminated, press the Sludge Pump Start pushbutton located at the LCP-BFP of the BFP which is to be in service.
8. After a 0 to 180 second delay the pump motor starts and pump operates continuously. When the BFP sludge feed pump starts, the Sludge Pump Running light illuminates.
9. Control the speed of the sludge feed pump by adjusting the potentiometer at the respective LCP-BFP as required by your Operations Supervisor.
10. Visually verify that the pump is running.

Sludge Grinder

Start up the Sludge Grinder according to the procedures listed below:

1. Open the isolation valves on each side of the grinder.
2. Place the respective ROT switch in the “Remote” position (located at the LCP-G1 in the BFP Sludge Feed Pump Station).
3. Place the grinder into operation as follows:

Automatic Mode of Operation

- a. When the HOA switch at the LCP-BFP is placed in the “Auto” position, the grinder operates based on signals from the PLC-SP. The grinder will operate when any sludge feed pump is operating to feed sludge to the BFPs.

Manual Mode of Operation

- a. When the HOA switch at the LCP-BFP is placed in the “Hand” position, the grinder operates based on controls at the LCP-AE.
 - b. Push the Start pushbutton located at the LCP-AE to “Start” the grinder.
3. Visually verify the grinder is operating.

4.8.2.2.2 Dewatering System Polymer Conditioning Facilities

Start up the Dewatering System Polymer Facilities by starting up the specific equipment in the order as listed below.

Polymer Bulk Storage

1. Fill bulk storage tank according to the following procedures:
 - a. Energize the fill station panel.
 - b. Attach chemical supply truck hose to the quick connect of the fill pipe for the tank to be filled.
 - c. Open the isolation valve.
 - d. Pump the ordered amount of chemical into the chemical storage tank carefully watching the sight glass on the side of the tank so as not to over fill the tank.
 - e. When pumping is completed purge the feed pipe with air. Close the isolation valve. Disconnect the supply hose and cap the fill pipe.

WARNING: In case the high level alarm horn sounds, stop chemical pumping immediately. (A high level alarm is designed to activate before the tank overflows.) Silence the alarm by pressing the Acknowledge

pushbutton. Alarm light will stay illuminated until the chemical level in the tank is below the high level.

Polymer Transfer Pumps

Start up the polymer transfer pumps according to the procedures listed below:

1. Select the bulk polymer tank, transfer pump, and mix tank system that will be in service.
2. Place the Polymer Mixing Tank Select Tank 1/Tank 2 /Tank 1-2 switch to the desired position.
3. Verify all appropriate valves are in proper orientation between the selected bulk storage tank and the selected mixing tank.
4. Ensure seal water is being supplied to the pumps.
5. Place the ROT switch for the transfer pump in the “Remote” position.
6. Place the circuit breaker adjacent to the pump in the “On” position.
7. Place the transfer pump into operation as follows:

Automatic Mode of Operation

- a. Place the appropriate HOA switch at the LCP-POL in the “Auto” position.
- b. The pump operates as called for by the low and high level signals from the dedicated polymer mix tank as described in Section 4.8.1.3.4. The transfer pump will start up when the level in the mixing tank reaches the “low” level. When the transfer pump operates the non-potable make-up water should automatically be discharging to the mixing tank. When the level in the mixing tank reaches the “high” level, the transfer pump stops and the valve controlling the make-up water automatically shuts.
- c. The flow rate of the polymer from the transfer pump and the make-up water are individually controlled by manual settings. The flow rate should be set as required by your Operations Supervisor.
- d. Visually verify the pump is operating and the make-up water is flowing.

Manual Mode of Operation

- a. Place the appropriate HOA switch at the LCP-POL in the “Hand” position.

- b. After a 0 to 180 second delay the transfer pump will operate continuously.
- c. Visually verify pump is operating.

Polymer Mixer

Start up mixer in the selected mixing tank according to the procedures listed below:

1. Verify the mixer is free from interferences and properly mounted.
2. Place the ROT switch in the “Remote” position.
3. Place the circuit breaker adjacent to the mixers in the “On” position.
4. Place the On/Off switch at the LCP-POL in the “On” position. The mixer will operate continuously.
5. Visually verify the mixer is operating.

Polymer Feed Pumps

Start up the polymer feed pumps according to the procedures listed below:

1. Allow the polymer solution in the mixing tank to mix for 60 minutes or as required by your Operations Supervisor.
2. Select the BFP and polymer feed pump that will be in service.
3. Place the Polymer Pump 1/2/3 selector switch at the selected LCP-BFP to the appropriate position based on the desired configuration. See Section 4.8.1.3.4 for detailed description of the sister/sister relationship.
4. Verify the selected polymer pump pipe valving is in the proper orientation and the pump discharge and suction lines are open.
5. Ensure that seal water is being supplied to the pump.
6. Place the respective ROT switch for the polymer feed pump(s) to the “Remote” position.
7. After the “Press Ready” light is illuminated, press the Polymer Pump Start pushbutton located at the LCP-BFP of the BFP which is to be in service.
8. After a 0 to 180 second delay the pump motor starts and pump will operate continuously. When the polymer feed pump starts, the Polymer Pump Running light illuminates.

9. Control the speed of the polymer feed pump by adjusting the potentiometer at the LCP-BFP as required by your Operations Supervisor.
10. Visually verify the polymer feed pump is operating.

Solids Processing Polymer Storage Area Sump Pump

Start the solids processing polymer storage area sump pump according to the procedures below:

1. Assess what liquid is in the sump (water or chemical).

If the liquid is water:

- a. Open the isolation valve to the tank drain.

If the liquid is chemical:

- a. Arrange for a hazardous waste truck to be called onto the site.
 - b. Connect the quick connect from the sump pump discharge line to the hazardous waste truck.
 - c. Open the isolation valve to the quick connect line. Ensure the isolation valve to the tank drain is closed.
2. Place the appropriate pump disconnect On/Off switch in the “On” position.
 3. Place the Control On/Off switch in the “On” position. The control power light will illuminate.
 4. Release the depressed stop button with the appropriate key.
 5. Press the Pump Start pushbutton.
 6. After a 0 to 180 second delay the pump motor starts and pump operates until a low level is signaled by a float switch.
 7. Visually verify pump is running.

4.8.2.2.3 Belt Filter Presses

1. Select the BFP that will be in service.
2. Verify all appropriate valves are in proper orientation at the BFP.
3. Prepare the BFP for start up by performing the following pre-start inspection:

- a. Verify no foreign objects are on belts or in an area that will interfere with the belt filter press operation.
 - b. Ensure the chicanes are positioned on the belt.
 - c. Verify tensioning control valve is in the tension position and that the belts are ready for tensioning.
 - d. Ensure all feed pumps are ready for operation and all valves are open.
 - e. Verify panel and machine have not been locked-out due to a prior alarm or maintenance condition.
 - f. Inspect hydraulic power unit and verify the oil level is adequate for operation.
 - g. Verify the taglines are set and have not been pulled. If they have been pulled, reset the tagline switches.
4. Place the Control Power On/Off selector switch located at the respective LCP-BFP to the “On” position. The Control Power On light will illuminate, the Alarm Horn will sound, and all the annunciator windows will flash. After a time delay, the horn will be automatically silenced and the annunciator windows will remain on steady. The annunciator will automatically reset the alarm windows with the “EMERGENCY STOPPED” alarm window remaining on.
5. Press the “Reset” pushbutton to energize the Emergency Stop Relay, de-energize the emergency stop alarm condition and reset the alarm window.
6. Place the respective ROT switches in the “Remote” position for the following BFP equipment:
 - a. Hydraulic Unit Pump Motor
 - b. Washwater Booster Pump
 - c. Upper Belt Drive
 - d. Lower Belt Drive
7. Select the “Remote” position for the Start/Stop Control and the “Remote” position for the Speed Control at the appropriate VFD located at the SP-LCC.
8. Place the BFP into operation as follows:

Semi-Automatic Mode of Operation

- a. When the Conveyance/Lime System Running light is illuminated at the LCP-BFP, place the HOA switch for the BFP to the “Auto” position.
- b. Press the Auto Start pushbutton at the LCP-BFP.
- c. After time delays, the washwater booster pump, the hydraulic unit pump and the belt drives will come into operation in a way as called

- for by signals from the respective LCP-BFP PLC.
- d. Ensure hydraulic pressure is set to 350 psig or as required by your Operations Supervisor.

Manual Mode of Operation

- a. When the Conveyance/Lime System Running light is illuminated at the LCP-BFP, place the HOA switch for the BFP to the “Hand” position.
- b. Press the Washwater Pump Start pushbutton at the LCP-BFP. The washwater valve will open and after a time delay the washwater pump will start. When the washwater pump is proofed running, the Running pilot light will be illuminated.
- c. Press the Hydraulic Pump Start pushbutton at the LCP-BFP. When the hydraulic pump is proofed running, the Running pilot light will be illuminated.
- d. Set the pressure of the hydraulic unit to 350 psig or as required by your Operations Supervisor.
- e. Ensure the Tension/Retract switch of the hydraulic control valve is in the “Tension” position and that the belts are in tension (allow two minutes for belts to completely tension).

CAUTION: In the manual mode, there are no interlocks to prevent the belt drive from being energized prior to the belts being fully tensioned. Operating the belt drive without allowing the belts to be fully tensioned may cause damage to the belts.

- f. Press the Belt Drive Start pushbutton at the LCP-BFP. When the belt drive is proofed running, the Running pilot light will be illuminated.

CAUTION: In the manual mode, there is no interlock to prevent the polymer pump from being energized prior to the belts being fully pre-wetted. Operating the polymer pump without allowing the belts to be fully pre-wetted may cause damage to the belts.

- g. Run the belts for two minutes to allow the belts to become completely pre-wetted prior to adding sludge.
9. Visually verify the washwater booster pump, hydraulic unit pump, and lower and upper belt drives are in operation.
 10. Control the speed of the belts by adjusting the potentiometer at the LCP-BFP as required by your Operations Supervisor.

4.8.2.2.4 Odor Reduction Station

Odor Reduction Station Exhaust Fans No. 7 and No. 8 (Sludge Dewatering Building)

Start up the odor reduction station exhaust fans according to the procedures listed below:

1. Select the odor reduction station exhaust fan that will be in service at the LCP-ORSP.
2. Verify that the odor reduction duct and duct drain is in the proper orientation and that the selected fan inlet and discharge dampers are open.
3. Place the respective ROT switch in the “Remote” position.
4. Place the fan into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Auto” position.
- b. In the automatic mode, the fan operates as called for by signals from PLC-ORSP. Under normal conditions the selected fan will start after a 0 to 180 second delay and operate continuously.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and the fan will operate continuously.
5. Visually verify the fan is operating.

Odor Reduction Station Exhaust Fan No. 9 (Truck Unloading Building)

Start up to odor reduction station exhaust fan according to the procedures listed below:

1. Verify that the odor reduction duct and duct drain is in the proper orientation and that the fan inlet and discharge dampers are open.
2. Place the respective ROT switch in the “Remote” position.
3. Place the fan into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Auto” position.
- b. In the automatic mode, the fan operates as called for by signals from PLC-ORSP. Under normal conditions, the selected fan will start after a 0 to 180 second delay and operate continuously.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and the fan will operate continuously.
4. Visually verify the fan is operating.

Odor Reduction Station Scrubber No. 1

Start-up the scrubber according to procedures listed below:

1. Ensure that the drain and sample valves are closed.
2. Open the appropriate isolation valves including the sulfuric acid feed line and sump make up water line.
3. Ensure the sump is full of liquid and overflow rate (blowdown) has been established.

Odor Reduction Station Scrubber No. 1 pH Controller

Start-up the pH controller according to the procedures listed below:

1. Ensure that the pH analyzer is energized and displaying pH reading.
2. Calibrate pH probe per Manufacturer's recommendation.
3. Open the upstream and downstream ball valves which isolate the pH inlet header (by-pass line) from the recirculation pump discharge and suction piping.
4. Open the respective downstream ball valves which isolate the pH probe from the common outlet headers.
5. Adjust flow rates into the pH probe with the respective upstream throttling valve so that 11 gpm flows through the analyzer.

6. Verify and adjust as necessary the pH setpoint to the desired value (between 3.0 and 4.0 per air permit requirements).

Odor Reduction Station Scrubber No. 1 Recirculation Pumps

Start-up the recirculation pumps according to the procedures below:

1. Select the recirculation pump that will be in service at LCP-ORSP.
2. Verify that the recirculation pump pipe valving is in the proper orientation and the selected pump discharge and suction valves are open.
3. Ensure that the upstream throttling valve and downstream ball valve which isolate the pH controller from the recirculation pump suction and discharge piping are closed. Excessive pressures can damage the probes.
4. Ensure that seal water is being supplied to the pump.
5. Place the respective ROT switch in the “Remote” position.
6. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Auto” position.
- b. In the Automatic mode the pump operates as called for by signals from PLC-ORSP. Under normal conditions the selected pump will start after a 0 to 180 second delay and operate continuously.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Hand” Position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
7. Visually verify the pump is operating.
 8. Verify that the isolation valves on both sides (inlet and outlet) of the orifice plate associated with the flowmeter (rotameter) are open and that the valve in the meter bypass line is closed.
 9. Observe the flowmeter reading (flow rate should be 700 gpm or greater).

Odor Reduction Station Scrubber No. 1 H₂SO₄ Metering Pumps

Start-up the sulfuric acid metering pump according to the procedures listed below:

1. Select the H₂SO₄ metering pump that will be in service at the LCP-ORSP.
2. Verify the H₂SO₄ metering pump pipe valving is in the proper orientation and the selected pump discharge and suction valves are open.
3. Place the respective ROT switch in the “Remote” position.
4. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Auto” Position.
- b. In the Automatic mode, the pump operates as called for by PLC-ORSP. Under normal conditions the selected pump will start after a 0 to 180 second delay and operate continuously with the pump stroke being automatically adjusted based on the pH analyzer signal.

Manual mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Hand” position.
- b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
5. Visually verify the pump is operating.
6. Observe the discharge pressure of the pump (discharge pressure should be approximately 40 psi).

Odor Reduction Station Scrubber No. 1 H₂SO₄ Storage Tank

1. Fill bulk storage tank according to the following procedures:
 - a. Energize the fill station panel.
 - b. Attach chemical supply truck hose to the quickconnect of the fill pipe for the tank to be filled.
 - c. Open the isolation valve.
 - d. Pump the ordered amount of chemical into the chemical storage tank.
No sightglass is available on the sulfuric acid storage tank. Monitor level continuously at the level indicator located at panel LCP-ORSP.
 - e. When pumping is completed purge the feed pipe with air. Close the isolation valve. Disconnect the supply hose and cap the fill pipe.

WARNING: In case the high level alarm horn sounds, stop chemical pumping immediately. (A high level alarm is designed to activate before the tank overflows.) Silence the alarm by pressing the Acknowledge pushbutton. Alarm light will stay illuminated until the chemical level in the tank is below the high level.

2. Start-up the H₂SO₄ storage tanks according to the procedures listed below:
 - a. Ensure that there is sufficient acid in the tank (minimum 30% full).
 - b. Open the appropriate isolation valves on the outlet lines.

Odor Reduction Station Scrubber No. 2

Start-up the scrubber according to procedures listed below:

1. Ensure that the drain and sample valves are closed.
2. Open the appropriate isolation valves including the sodium hypochlorite feed line, sodium hydroxide feed line, and sump make up water line.
3. Ensure the sump is full of liquid and overflow (blowdown) rate has been established.

Odor Reduction Station Scrubber No. 2 pH and ORP Controllers

Start-up the pH and ORP controllers according to the procedures listed below:

1. Ensure that the ORP analyzer is energizing and displaying a millivolt reading.
2. Ensure that the pH analyzer is energized and displaying a pH reading.
3. Calibrate ORP and pH probes per Manufacturer's recommendation.
4. Open the upstream and downstream ball valves which isolate the pH and ORP inlet header (by-pass line) from the recirculation pump discharge and suction piping.
5. Open the respective downstream ball valves which isolate the pH and ORP probes from the common outlet headers.
6. Adjust flow rates into the pH and ORP probes with the respective upstream needle valves so that 11 gpm flow through each analyzer.
7. Verify and adjust as necessary the pH setpoint to the desired value (between 9.0 and 11.0 per air permit requirements).

Odor Reduction Station Scrubber No. 2 Recirculation Pumps

Start-up the recirculation pumps according to the procedures below:

1. Select the recirculation pump that will be in service at the LCP-ORSP.
2. Verify that the recirculation pump pipe valving is in the proper orientation and the selected pump discharge and suction valves are open.
3. Ensure that the upstream throttling valves and downstream ball valves which isolate the pH and ORP controllers from the recirculation pump suction and discharge piping are closed. Excessive pressures can damage the probes.
4. Ensure that seal water is being supplied to the pump.
5. Place the respective ROT switch in the “Remote” position.
6. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Auto” Position.
- b. In the Automatic mode the pump operates as called for by signals from PLC-ORSP. Under normal conditions the selected pump will start after a 0 to 180 second delay and operate continuously.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
7. Visually verify the pump is operating.
 8. Verify that the isolation valves on both sides (inlet and outlet) of the orifice plate associated with the flowmeter (rotameter) are open and that the valve in the meter bypass line is closed.
 9. Observe the flowmeter reading (flow rate should be 700 gpm or greater).

Odor Reduction Station Scrubber No. 2 NaOH Metering Pumps

Start-up the sodium hydroxide metering pump according to the procedures listed below:

1. Select the NaOH metering pump that will be in service at the LCP-ORSP.

2. Verify the NaOH metering pump pipe valving is in the proper orientation and the selected pump discharge and suction valves are open.
3. Place the respective ROT switch in the “Remote” position.
4. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Auto” Position.
- b. In the Automatic mode, the pump operates as called for by PLC-ORSP. Under normal conditions the selected pump will start after a 0 to 180 second delay and operate continuously with the pump stroke being automatically adjusted based on the pH analyzer signal.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
5. Visually verify the pump is operating.
 6. Observe the discharge pressure of the pump (discharge pressure should be approximately 40 psi).
 7. Verify that flow is occurring through pump using the calibration column.

Odor Reduction Station Scrubber No. 2 NaOCl Metering Pumps

Start-up the sodium hypochlorite metering pumps according to the procedures listed below:

1. Select the NaOCl metering pump that will be in service at the LCP-ORSP.
2. Verify the NaOCl metering pump pipe valving is in the proper orientation and selected pump discharge and suction valves are open.
3. Place the respective ROT switch in the “Remote” position.
4. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Auto” Position.
- b. In the Automatic mode, the pump operates as called for by PLC-ORSP. Under normal conditions the selected pump will start after a 0 to 180 second delay and operate continuously.

Manual Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump will operate continuously.
5. Visually verify the pump is operating.
 6. Observe the discharge pressure of the pump (discharge pressure should be approximately 40 psi).
 7. Verify that flow is occurring through pump using the calibration column.
 8. Manually adjust the electronic stroke control on the metering pump to achieve the desired ORP millivolt reading at the ORP transmitter (between 575 and 725 mV per air permit requirements).

Odor Reduction Station Scrubber No. 2 NaOH Storage Tank

1. Fill bulk storage tank according to the following procedures:
 - a. Energize the fill station panel.
 - b. Attach chemical supply truck hose to the quickconnect of the fill pipe for the tank to be filled.
 - c. Open the isolation valve.
 - d. Pump the ordered amount of chemical into the chemical storage tank carefully watching the sight glass on the side of the tank so as not to over fill the tank.
 - e. When pumping is completed purge the feed pipe with air. Close the isolation valve. Disconnect the supply hose and cap the fill pipe.

WARNING: In case the high level alarm horn sounds, stop chemical pumping immediately. (A high level alarm is designed to activate before the tank overflows.) Silence the alarm by pressing the Acknowledge pushbutton. Alarm light will stay illuminated until the chemical level in the tank is below the high level.

2. Start-up the sodium hydroxide storage tanks according to the procedures listed below:
 - a. Ensure that there is sufficient caustic in the tank (minimum 30% full).
 - b. Open the appropriate isolation valves on the outlet lines.
 - c. Turn on power for the field-mounted control panel for heat tracing system.

Odor Reduction Station Scrubber No. 2 NaOCl Storage Tank

1. Fill bulk storage tank according to the following procedures:
 - a. Energize the fill station panel.
 - b. Attach chemical supply truck hose to the quick connect of the fill pipe for the tank to be filled.
 - c. Open the isolation valve.
 - d. Pump the ordered amount of chemical into the chemical storage tank carefully watching the sight glass on the side of the tank so as not to over fill the tank.
 - e. When pumping is completed purge the feed pipe with air. Close the isolation valve. Disconnect the supply hose and cap the fill pipe.

WARNING: In case the high level alarm horn sounds, stop chemical pumping immediately. (A high level alarm is designed to activate before the tank overflows.) Silence the alarm by pressing the Acknowledge pushbutton. Alarm light will stay illuminated until the chemical level in the tank is below the high level.

2. Start-up the sodium hypochlorite storage tank according to the procedures listed below:
 - a. Ensure that there is sufficient sodium hypochlorite in the tank (minimum 30% full).
 - b. Open the appropriate isolation valves on the outlet lines.

H₂SO₄, NaOH and NaOCl Containment Sump Pumps

Start the respective sump pump according to the procedures below:

1. Assess what liquid is in the sump (water or chemical).

If the liquid is water:

- a. Open the isolation valve to the tank drain.

If the liquid is chemical:

- a. Arrange for a hazardous waste truck to be called onto the site.

- b. Connect the quick connect from the sump pump discharge line to the hazardous waste truck.
 - c. Open the isolation valve to the quickconnect line. Ensure the isolation valve to the tank drain is closed.
2. Place the appropriate pump disconnect On/Off switch in the “On” position.
3. Place the Control On/Off switch in the “On” position. The control power light will illuminate.
4. Release the depressed stop button with the appropriate key.
5. Press the Pump Start pushbutton.
6. After a 0 to 180 second delay the pump motor starts and pump operates until a low level is signaled by a float switch.
7. Visually verify pump is running.

Odor Reduction Station Water Softening System

Start-up the water softener according to the procedures below:

1. Ensure that the local electrical disconnect is positioned to energize the water softening systems controls.
2. Open appropriate isolation valves on the inlet and outlet side of the water softening system.
3. Close the by-pass valve.
4. Adjust the flow of softened water to the scrubber tower to meet the desired flow rate.
5. Observe the calcium analyzer indicator (reading should be below 8 ppm).

Sludge Dewatering Building Air Supply Fans

Start up the Sludge Dewatering Building air supply fans (SF2 and SF3) according to the procedures listed below:

1. Place the respective ROT switch in the “Remote” position.
2. Place the fans into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Auto” position
- b. In the “Automatic” mode, the fan operates as called for by PLC-ORSP.
- c. The fans under normal conditions will start after a 0 to 180 second delay and operate continuously.
- d. Visually observe operation of respective fan.

Manual Mode of Operation

- a. Place the respective Hand/Off/Auto switch at the LCP-ORSP in the “Hand” position.
- b. After a 0 to 180 second delay the fan motor starts and pump will operate continuously.
- c. Visually observe that the respective fan is operating.

Sludge Dewatering Building Exhaust Fans

Start up the Sludge Dewatering Building exhaust fans (EF4, EF5, EF6, and EF7) according to the procedures listed below:

1. Place the locally mounted On/Off switch in the “On” position.
2. Verify that the respective fan is operating.

Note: There is no automatic start-up condition associated with these fans.

Truck Loading Building Air Supply Fans

Start up the Truck Loading Building air supply fans (SF4 and SF5) according to the procedures listed below:

1. Place the respective ROT switch in the “Remote” position.
2. Place the fans into operation as follows:

Automatic Mode of Operation

- a. Place the Hand/Off/Auto switch at the LCP-ORSP in the “Auto” position
- b. In the “Automatic” mode, the fan operates as called for by PLC-ORSP.
- c. The fans under normal conditions will start after a 0 to 180 second delay and operate continuously.
- d. Visually observe operation of respective fan.

Manual Mode of Operation

- a. Place the respective Hand/Off/Auto switch at the LCP-ORSP in the “Hand” position.
- b. After a 0 to 180 second delay the fan motor starts and pump will operate continuously.
- c. Visually observe that the respective fan is operating.

4.8.3 Step by Step Shutdown Procedures

4.8.3.1 General System Shutdown Procedures

The Sludge Dewatering Facilities should be shut down according to the following procedures:

1. Refer to the General Shutdown Procedures presented in Section 4.0.3.
2. Place the BFP out of operation as follows:

Semi-Automatic Mode of Operation

- a. Verify the HOA switch at the LCP-BFP is in the “Auto” position.
- b. Shut down the BFP by pressing the Auto Stop pushbutton at the LCP-BFP according to procedures described in Section 4.8.3.2.3. With the semi-automatic mode of operation, the shutdown of the belt filter presses will trigger an automatic shutdown of the feed pumps, sludge conveyance, and lime stabilization facilities.
- c. After the sludge and polymer feed pumps and BFP has stopped, complete the shutdown of the polymer and sludge feed pumps according to procedures described in Sections 4.8.3.2.1 and 4.8.3.2.2.

Manual Mode of Operation

- a. Verify the HOA for the BFP to the “Hand” position.
- b. Press the Polymer Pump Stop pushbutton and the Sludge Feed Pump Stop pushbutton. Complete the shutdown of the polymer and sludge feed pumps according to procedures described in Section 4.8.3.2.1 and 4.8.3.2.2.
- c. After a time delay, shut down the sludge grinder at the LCP-AE if no other sludge feed pumps are running, according to procedures described in Section 4.8.3.2.1.

- d. If the sister BFP of the BFP being shut down is **not** operational, then shut down the appropriate sludge conveyors and lime stabilization equipment according to procedures described in Section 4.9.3.
 - e. After allowing belts to clean, shut down the BFP according to the manual shutdown procedures as described in Section 4.8.3.2.3.
3. If **all** BFPs are to be shut down, then shut down the entire Polymer Conditioning Facilities according to procedures described in Section 4.8.3.2.2.
4. If **all** the BFPs are shut down, then shut down the Lime Stabilization Facilities according to the procedures presented under 4.9.3.
5. If **all** the BFPs are shut down, then shut down the Sludge Dewatering Odor Reduction Station according to the procedures presented under Section 4.8.3.2.5. If the odor reduction station is to be shut down in its entirety, the shut down order for the various pieces of odor reduction equipment shall be as follows:
 - a. NaOH Metering Pump
 - b. NaOH Storage Tank
 - c. NaOCl Metering Pump
 - d. NaOCl Storage Tank
 - e. H₂SO₄ Metering Pump
 - f. H₂SO₄ Storage Tank
 - g. pH and ORP Controllers
 - h. Recirculation Pumps
 - i. Scrubbers No. 1 and No. 2
 - j. Water Softening System
 - k. Exhaust Fans
 - l. Truck Loading Building Air Supply Fans
 - m. Sludge Dewatering Building Air Supply and Exhaust Fans

4.8.3.2 Individual Equipment Shutdown Procedures

4.8.3.2.1 Dewatering System Pumping Facilities

BFP Sludge Feed Pumps

Shut down the sludge feed pumps according to the procedures listed below:

1. Press the Sludge Pumps Stop pushbutton at LCP-BFP for the pump to be shut down.
2. Verify the pump is stopped.

3. Lock the appropriate ROT switch.
4. Turn off the seal water supplied to the pump.
5. If the pump is to be out of service for an extended period of time, flush all sludge lines with non-potable water.
6. If the pump is to be out of service for an extended period of time, disconnect power source, close the isolation valves on pump suction and discharge sides.

Note: The pumps will also automatically shut down on high discharge pressure, a “no flow” condition as detected by signals from a check valve lever position switch, and high motor temperature.

Sludge Grinder

If all the sludge feed pumps are to be out of service, shut down the grinder according to the following procedures:

1. Press the Stop pushbutton located at the LCP-AE.
2. Turn the grinder ROT switch to the “Off” position.
3. If the grinder is to be out of service for an extended period of time, disconnect power source, close the isolation valves on grinder suction and discharge sides.

Note: Grinder will also automatically shut down as called for by signals from the operational logic as described in Section 4.8.1.2.

4.8.3.2.2 Dewatering System Polymer Conditioning Facilities

Shut down the Dewatering System Polymer Conditioning Facilities according to the procedures outlined below:

Polymer Bulk Storage Tank

Shut down the polymer bulk storage tanks according to the procedures listed below:

1. Continue to operate the respective transfer pump and to transfer polymer to the mixing tank(s).
2. Monitor polymer level in the bulk tank.

3. After polymer level in the tank reaches the low low level setting, the polymer transfer pump will automatically shut down. Complete the shut down according to the procedures described in the next section.
4. Materials that do not drain from the storage tank must be diluted, pumped out using a portable submersible pump, and safely disposed.
5. Close the respective tank discharge isolation valve.
6. If the tank is to be out of service for an extended period of time, disconnect the power to the level transmitter.

Polymer Transfer Pumps

Shut down the polymer transfer pumps according to the procedure listed below:

1. Turn the respective HOA switch at LCP-POL for the pumps to be shut down to the “Off” position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, flush all chemical lines with non-potable water and disconnect power source.
5. If the bulk storage tank is to be out of service for an extended period of time, close the isolation valves on pump suction and discharge sides.

Note: The pumps will also automatically shut down on low or high discharge pressure, on low low storage tank level, or on motor failure. Additionally, the pump will automatically shut down as called by the mixing tank level switch signals (see Section 4.8.1.3 for detailed description).

Polymer Mixing Tanks

Shut down the polymer mixing tanks according to the procedures listed below:

1. Close the respective isolation valves on the feed lines to the mixing tank.
2. Continue to operate the polymer feed pumps.
3. Monitor the polymer solution level in the mixing tank.
4. When the level in the mixing tank is below the low level, turn off the mixer by turning the ROT switch to the “Off” position and lock it out. Do not

operate the mixer when the polymer level is below the low setting to prevent excessive splashing and mixer vibration.

5. After polymer level in the tank reaches the low low level setting, shut down the mixing tank as follows:

If alternate mixing tank is to be operational:

- a. Place the Tank 1/Tank 2/Tank 1-2 switch to the mixing tank which is to be operational.
- b. Start-up alternate tank. (Refer to start-up procedures in Section 4.8.2.2.2 to start up alternate tank).

If entire polymer system is to be shut down:

- a. Shut down the polymer feed pumps according to the procedures described in the next section.
6. Materials that do not drain from the mixing tank must be diluted, pumped out using a portable submersible pump, and safely disposed.
7. If the tank is to be out of service for an extended period of time, disconnect the power to the level transmitter.

Note: The mixer will also automatically shut down on motor overload.

Polymer Feed Pumps

Shut down the polymer feed pumps according to the procedures listed below:

1. Press the “Stop” pushbutton at the respective LCP-BFP.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. Turn off the seal water supplied to the pump.
5. If the pump is to be out of service for an extended period of time, flush all chemical lines with non-potable water, disconnect power source, and close the isolation valves.

Note: The pump will also automatically shut down on polymer solution low level in the mixing tank, on no flow condition as detected by a flow switch or on motor overload.

Solids Processing Polymer Storage Area Sump Pump

Shut down the sump pump according to the following procedures:

1. Press the Pump Stop pushbutton.

Note: A key is required to unlock the stop pushbutton when the sump pump needs to be started again.

2. Verify the pump has stopped.
3. Lock the appropriate lock switch.
4. If pump is to be out of service for an extended period of time, disconnect power source and close isolation valves.

Note: The sump pump will also automatically shut down on low liquid level or motor overload.

4.8.3.2.3 Belt Filter Presses

Shut down the belt filter presses according to the procedures listed below:

1. Place the belt filter press out of operation as follows:

Semi-Automatic Mode of Operation

- a. Press the Auto Stop pushbutton at the LCP-BFP.
- b. The BFP will automatically begin wash down cycle. Therefore, the polymer and sludge feed pumps, grinder (if no other sludge pumps are running), lime stabilization system, and sludge conveyors will automatically shut down after time delays.
- c. After wash down cycle is complete, the belt drives, hydraulic pump, and washwater pump will automatically shut down.

Manual Mode of Operation

- a. Verify that the sludge feed pumps, polymer feed pumps, grinder (if no other sludge pumps are running) lime stabilization system, BFP conveyors, and the truck loading conveyor have been shut down.
 - b. Allow the belt wash stations to run for a minimum of 45 minutes without any sludge or polymer feeding onto the belt press.
 - c. Press the Stop pushbutton for the belt drive.
 - d. Press the Stop pushbutton for the hydraulic pump.
 - e. Press the Stop pushbutton for the washwater booster pumps.
2. Verify the BFP has stopped.

3. Place the HOA switch at the LCP-BFP to the “Off” position.
4. Wash down the auxiliary equipment of the BFP:
 - a. Lift the inlet distribution flap and wash down the gravity section. While working through the chicanes, raise the chicanes and wash.
 - b. Wash down the collection pans and neoprene slates.
 - c. Manually wash conveyor chutes and knife edges.
 - d. Wash down residuals into belt press sump.
 - e. Release knife edges after sludge flow has been cleared and cleaned.
5. Lock the appropriate ROT switches on the BFP equipment:
 - a. Hydraulic Unit Pump Motor
 - b. Washwater Booster Pump Motor
 - c. Upper Belt Drive
 - d. Lower Belt Drive
6. If the press is to be out of service for an extended period of time, disconnect power source and close the appropriate isolation valves.

Note: The BFP will also automatically shut down with or without a wash down mode based on BFP failures, feed failures, or lime stabilization failures as called for by the operational logic described in Section 4.8.1.4.

4.8.3.2.4 Odor Reduction Station

Odor Reduction Station Exhaust Fans

Shut down the odor reduction station exhaust fans according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORSP for the odor reduction fan to be shut down to the “Off” position.
2. Verify the fan is stopped.
3. Lock the appropriate ROT switch.
4. If the fan is to be out of service for an extended period of time, disconnect power source.

5. If the odor reduction system (or one of the fans) is to be out of service for an extended period of time, close the isolation damper on the inlet and discharge of the fan.

Note: The fan will also be automatically shut down on a low discharge flow signal from the downstream flow sensor.

Odor Reduction Station Scrubber No. 1

Shut down the odor reduction station scrubber according to the procedures listed below:

1. Shut down the outlet isolation valves.
2. If the tank is to be out of service for an extended period of time, disconnect the power to the level transmitter.

Odor Reduction Station pH Controllers

Shut down the pH controllers according to the procedures listed below:

1. Close the inlet throttling valves and the downstream ball valves to isolate the pH probes.
2. If a controller is to be out of service for an extended period of time, disconnect the power to the controller.

Odor Reduction Station Scrubber No. 1 Recirculation Pump

Shut down the recirculation pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORSP for the odor reduction station recirculation pump to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source.
5. If the entire odor reduction system (or one of the recirculation pumps) is to be out of service for an extended period of time, close the isolation valves on the pump suction and discharge.

Note: The pump will also be automatically shut down by PLC-ORSP upon one of the following:

- a. High or low pressure signal from the downstream pressure switch.

- b. Low flow signal from the seal water flow switch.
- c. Low low liquid level signal from the scrubber liquid level sensor.

Odor Reduction Station H_2SO_4 Metering Pump

Shut down the sulfuric acid metering pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORSP for the sludge mixing pumps to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, flush all chemical lines with non-potable water and disconnect power source.
5. If the entire odor reduction system (or one of the NaOCl metering pumps) is to be out of service for an extended period of time, close the isolation valves on pump suction and discharge.

Note: The pump will also be automatically shut down by PLC-ORSP upon one of the following:

- a. Low low level signal from the tank liquid level sensor.
- b. Ruptured diaphragm signal from the pump mounted conductivity sensor.

Odor Reduction Station H_2SO_4 Storage Tank

Shut down the sulfuric acid storage tank according to the procedures listed below:

1. Shut down the outlet isolation valves.
2. If the tank is to be out of service for an extended period of time, disconnect the power to the level transmitter and order a service of a specialized contractor to pump out and mothball the tank.

Odor Reduction Station Scrubber No. 2

Shut down the odor reduction station scrubber according to the procedures listed below:

1. Shut down the outlet isolation valves.
2. If the tank is to be out of service for an extended period of time, disconnect the power to the level transmitter.

Odor Reduction Station Scrubber No. 2 pH and ORP Controllers

Shut down the pH and ORP controllers according to the procedures listed below:

1. Close the inlet throttling valves and the downstream ball valves to isolate the pH and ORP probes.
2. If the controllers are to be out of service for an extended period of time, disconnect the power to the controller.

Odor Reduction Station Scrubber No. 2 Recirculation Pump

Shut down the recirculation pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORSP for the odor reduction station recirculation pump to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source.
5. If the entire odor reduction system (or one of the recirculation pumps) is to be out of service for an extended period of time, close the isolation valves on the pump suction and discharge.

Note: The pump will also be automatically shut down by PLC-ORSP upon one of the following:

- a. High or low pressure signal from the downstream pressure switch.
- b. Low flow signal from the seal water flow switch.
- c. Low liquid level signal from the scrubber liquid level sensor.

Odor Reduction Station Scrubber No. 2 NaOH Metering Pumps

Shut down the sodium hydroxide metering pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORSP for the sodium hydroxide metering pump to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.

4. If the pump is to be out of service for an extended period of time, flush all chemical lines with non-potable water and disconnect power source.
5. If the entire odor reduction system (or one of the NaOH metering pumps) is to be out of service for an extended period of time, close the isolation valves on the pump suction and discharge.

Note: The pump will also be automatically shut down by PLC-ORSP upon one of the following:

- a. Low low level signal from the tank liquid level sensor.
- b. Ruptured diaphragm signal from the pump mounted conductivity sensor.

Odor Reduction Station Scrubber No. 2 NaOCI Metering Pump

Shut down the sodium hypochlorite metering pump according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at LCP-ORSP for the sodium hypochlorite metering pump to be shut down to the “Off” position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, flush all chemical lines with non-potable water and disconnect power source.
5. If the entire odor reduction system (or one of the NaOCI metering pumps) is to be out of service for an extended period of time, close the isolation valves on pump suction and discharge.

Note: The pump will also be automatically shut down by PLC-ORSP upon one of the following:

- a. Low low level signal from the tank liquid level sensor.
- b. Ruptured diaphragm signal from the pump mounted conductivity sensor.

Odor Reduction Station Scrubber No. 2 NaOH Storage Tank

Shut down the sodium hydroxide storage tank according to the procedures listed below:

1. Shut down the outlet isolation valves.

2. If the tank is to be out of service for an extended period of time, disconnect the power to the level transmitter and to the field-mounted control panel for heat tracing system and drain the tank according to the procedures similar to those shown in Section 4.5.3.2.2.

Odor Reduction Station Scrubber No. 2 NaOCl Storage Tank

Shut down the sodium hypochlorite storage tank according to the procedures listed below:

1. Shut down the outlet isolation valves.
2. If the tank is to be out of service for an extended period of time, disconnect the power to the level transmitter and drain the tank according to the procedures similar to those shown in Section 4.5.3.1.2.

H₂SO₄, NaOH and NaOCl Containment Sump Pumps

Shut down the respective sump pump according to the following procedures:

1. Press the Pump Stop pushbutton.

Note: A key is required to unlock the stop pushbutton when the sump pump needs to be started again.
2. Verify the pump has stopped.
3. Lock the appropriate lock switch.
4. If pump is to be out of service for an extended period of time, disconnect power source and close isolation valves.

Note: The sump pump will also automatically shut down on low liquid level or motor overload.

Odor Reduction Station Water Softening System

Shut down the water softening system according to the procedures listed below:

1. Ensure that each of the vessels of the water softening system is in either the “Operation” or “Stand-by” mode. (If the softening system is in some other mode, wait until the regeneration cycle is complete before proceeding.)
2. Close the isolation valves on the inlet and outlet sides of the water softening system.
3. If the water softening system is to be out of service for an extended period of time, disconnect power source.

Sludge Dewatering Building Air Supply Fans

Shut down the Sludge Dewatering Building air supply fans (SF2 and SF3) according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at the LCP-ORSP in the “Off” position.
2. Verify that the respective fan has stopped.
3. Lock the appropriate ROT switch.
4. If the fan(s) are to be out of service for an extended period of time, disconnect the power source.

Note: The supply fan will also automatically shut down on a low discharge flow signal from the downstream sensor and on a fan motor failure signal from the PLC-ORSP.

Sludge Dewatering Building Exhaust Fans

Shut down the Sludge Dewatering Building exhaust fans (EF4, EF5, EF6, and EF7) according to the procedures listed below:

1. Place the locally mounted On/Off switch in the “Off” position.
2. Verify that the respective fan has stopped.

Note: Each exhaust fan will automatically shut down when a fan motor failure signal is detected by PLC-ORSP.

Truck Loading Building Air Supply Fans

Shut down the Truck Loading Building air supply fans (SF4 and SF5) according to the procedures listed below:

1. Turn the respective Hand/Off/Auto switch at the LCP-ORSP in the “Off” position.
2. Verify that the respective fan has stopped.
3. Lock the appropriate ROT switch.
4. If the fan(s) are to be out of service for an extended period of time, disconnect the power source.

Note: Each exhaust fan will automatically shut down when a fan motor failure signal is detected by PLC-ORSP.

4.8.4 Alarm and Status Annunciation

The following sections list the alarm and status annunciators associated with the Sludge Dewatering Facilities:

4.8.4.1 Dewatering System Pumping Facilities

<u>Alarm/Status</u>	<u>Display Location</u>
Sludge Grinder Run Light	LCP-G1
Sludge Grinder Stop Light	LCP-G1
Sludge Grinder Trip Annunciator	LCP-G1
Sludge Grinder Motor Overload Annunciator	LCP-G1
Sludge Grinder No. 1 Run Light	LCP-AE
Sludge Grinder No. 1 Auto Light	LCP-AE
Sludge Grinder No. 1 Failure Annunciator	LCP-AE
LCP-AE Failure Annunciator	LCP-SP
Sludge Pump Running Light	LCP-BFP1
Sludge Pump Running Light	LCP-BFP2
Sludge Pump Running Light	LCP-BFP3
Sludge Pump Running Light	LCP-BFP4
Sludge System Fail Annunciator	LCP-BFP1
Sludge System Fail Annunciator	LCP-BFP2
Sludge System Fail Annunciator	LCP-BFP3
Sludge System Fail Annunciator	LCP-BFP4
Belt Filter Press No. 1 Failure Annunciator	LCP-SP
Belt Filter Press No. 2 Failure Annunciator	LCP-SP
Belt Filter Press No. 3 Failure Annunciator	LCP-SP
Belt Filter Press No. 4 Failure Annunciator	LCP-SP
Sludge Feed Seal Water Failure Annunciator	LCP-SP

<u>Alarm/Status</u>	<u>Display Location</u>
Solids Processing System Failure Annunciator	PCC

4.8.4.2 Sludge Dewatering Polymer Conditioning Facilities

<u>Alarm/Status</u>	<u>Display Location</u>
Polymer Bulk Storage Tank No. 1 High Level Annunciator	LCP-SP
Polymer Bulk Storage Tank No. 2 High Level Annunciator	LCP-SP
Polymer Bulk Storage Tank No. 1 Low Level Annunciator	LCP-SP
Polymer Bulk Storage Tank No. 2 Low Level Annunciator	LCP-SP
Polymer Bulk Storage Tank No. 1 Low Low Level Annunciator	LCP-SP
Polymer Bulk Storage Tank No. 2 Low Low Level Annunciator	LCP-SP
Polymer Transfer Pump No. 1 Run Light	LCP-POL (part of LCP-SP)
Polymer Transfer Pump No. 2 Run Light	LCP-POL
Polymer Transfer Pump No. 1 Run Light	SCR Controller
Polymer Transfer Pump No. 2 Run Light	SCR Controller
Polymer Transfer Pump No. 1 Failure Annunciator	LCP-SP
Polymer Transfer Pump No. 2 Failure Annunciator	LCP-SP
Polymer Mixing Tank No. 1 High High Level Annunciator	LCP-SP
Polymer Mixing Tank No. 2 High High Level Annunciator	LCP-SP
Polymer Mixing Tank No. 1 Low Low Level Annunciator	LCP-SP
Polymer Mixing Tank No. 2 Low Low Level Annunciator	LCP-SP
Polymer Mixer No. 1 Run Light	LCP-POL

<u>Alarm/Status</u>	<u>Display Location</u>
Polymer Mixer No. 2 Run Light	LCP-POL
Polymer Mixer No. 1 Run/Stopped/Reset Lights	MCC-SP
Polymer Mixer No. 2 Run/Stopped/Reset Lights	MCC-SP
Polymer Mixer No. 1 Failure Annunciator	LCP-SP
Polymer Mixer No. 2 Failure Annunciator	LCP-SP
Polymer Mixing Tank No. 1 Make Up Water Failure Annunciator	LCP-SP
Polymer Mixing Tank No. 2 Make Up Water Failure Annunciator	LCP-SP
Polymer Pump Running Light	LCP-BFP1
Polymer Pump Running Light	LCP-BFP2
Polymer Pump Running Light	LCP-BFP3
Polymer Pump Running Light	LCP-BFP4
Polymer Feed Pump No. 1 Running Light	SCR Controller
Polymer Feed Pump No. 2 Running Light	SCR Controller
Polymer Feed Pump No. 3 Running Light	SCR Controller
Polymer Feed Pump No. 4 Running Light	SCR Controller
Polymer System Fail Annunciator	LCP-BFP1
Polymer System Fail Annunciator	LCP-BFP2
Polymer System Fail Annunciator	LCP-BFP3
Polymer System Fail Annunciator	LCP-BFP4
Polymer Transfer Seal Water Failure Annunciator	LCP-SP
Polymer Feed Seal Water Failure Annunciator	LCP-SP
Solids Processing System Failure Annunciator	PCC
Polymer Addition Area Safety Shower Annunciator	LCP-SP
Polymer Addition Area Shower Annunciator	PCC
Bulk Polymer Safety Shower Annunciator	LCP-SP
Bulk Polymer Safety Shower Annunciator	PCC

<u>Alarm/Status</u>	<u>Display Location</u>
Solids Processing High Level Containment Area Annunciator	LCP-SP
Solids Processing High Level Containment Area Annunciator	PCC

4.8.4.3 Belt Filter Presses

<u>Alarm/Status</u>	<u>Display Location</u>
Control Power On Light	LCP-BFP1
Control Power On Light	LCP-BFP2
Control Power On Light	LCP-BFP3
Control Power On Light	LCP-BFP4
Hand Light	LCP-BFP1
Hand Light	LCP-BFP2
Hand Light	LCP-BFP3
Hand Light	LCP-BFP4
Auto Light	LCP-BFP1
Auto Light	LCP-BFP2
Auto Light	LCP-BFP3
Auto Light	LCP-BFP4
Pre-Wash Cycle Light	LCP-BFP1
Pre-Wash Cycle Light	LCP-BFP2
Pre-Wash Cycle Light	LCP-BFP3
Pre-Wash Cycle Light	LCP-BFP4
Press Ready Light	LCP-BFP1
Press Ready Light	LCP-BFP2
Press Ready Light	LCP-BFP3
Press Ready Light	LCP-BFP4
Wash down Cycle Light	LCP-BFP1
Wash down Cycle Light	LCP-BFP2

<u>Alarm/Status</u>	<u>Display Location</u>
Wash down Cycle Light	LCP-BFP3
Wash down Cycle Light	LCP-BFP4
Belt Drive Running Light	LCP-BFP1
Belt Drive Running Light	LCP-BFP2
Belt Drive Running Light	LCP-BFP3
Belt Drive Running Light	LCP-BFP4
Belt Misaligned Annunciator	LCP-BFP1
Belt Misaligned Annunciator	LCP-BFP2
Belt Misaligned Annunciator	LCP-BFP3
Belt Misaligned Annunciator	LCP-BFP4
Belt Broken Annunciator	LCP-BFP1
Belt Broken Annunciator	LCP-BFP2
Belt Broken Annunciator	LCP-BFP3
Belt Broken Annunciator	LCP-BFP4
Belt Drive Fail Annunciator	LCP-BFP1
Belt Drive Fail Annunciator	LCP-BFP2
Belt Drive Fail Annunciator	LCP-BFP3
Belt Drive Fail Annunciator	LCP-BFP4
Emergency Stop Annunciator	LCP-BFP1
Emergency Stop Annunciator	LCP-BFP2
Emergency Stop Annunciator	LCP-BFP3
Emergency Stop Annunciator	LCP-BFP4
No Cake Annunciator	LCP-BFP1
No Cake Annunciator	LCP-BFP2
No Cake Annunciator	LCP-BFP3
No Cake Annunciator	LCP-BFP4
Belt Filter Press No. 1 Emergency Stop Annunciator	LCP-SP

<u>Alarm/Status</u>	<u>Display Location</u>
Belt Filter Press No. 2 Emergency Stop Annunciator	LCP-SP
Belt Filter Press No. 3 Emergency Stop Annunciator	LCP-SP
Belt Filter Press No. 4 Emergency Stop Annunciator	LCP-SP
Belt Filter Press No. 1 Failure Annunciator	LCP-SP
Belt Filter Press No. 2 Failure Annunciator	LCP-SP
Belt Filter Press No. 3 Failure Annunciator	LCP-SP
Belt Filter Press No. 4 Failure Annunciator	LCP-SP
PLC-SP Primary Failure Annunciator	LCP-SP
PLC-SP Secondary Failure Annunciator	LCP-SP
PLC-SP Failure Annunciator	PCC
BFP No. 1 Emergency Stop Annunciator	PCC
BFP No. 2 Emergency Stop Annunciator	PCC
BFP No. 3 Emergency Stop Annunciator	PCC
BFP No. 4 Emergency Stop Annunciator	PCC
Solids Processing Failure Annunciator	PCC
Hydraulic Pump Running Light	LCP-BFP1
Hydraulic Pump Running Light	LCP-BFP2
Hydraulic Pump Running Light	LCP-BFP3
Hydraulic Pump Running Light	LCP-BFP4
Hydraulic Unit HU1 Run/Stopped/Trip Light	MCC-SP
Hydraulic Unit HU2 Run/Stopped/Trip Light	MCC-SP
Hydraulic Unit HU3 Run/Stopped/Trip Light	MCC-SP
Hydraulic Unit HU4 Run/Stopped/Trip Light	MCC-SP
Hydraulic Pressure Fault Annunciator	LCP-BFP1
Hydraulic Pressure Fault Annunciator	LCP-BFP2
Hydraulic Pressure Fault Annunciator	LCP-BFP3
Hydraulic Pressure Fault Annunciator	LCP-BFP4

<u>Alarm/Status</u>	<u>Display Location</u>
Hydraulic Pump Fail Annunciator	LCP-BFP1
Hydraulic Pump Fail Annunciator	LCP-BFP2
Hydraulic Pump Fail Annunciator	LCP-BFP3
Hydraulic Pump Fail Annunciator	LCP-BFP4
Washwater Pump Running Light	LCP-BFP1
Washwater Pump Running Light	LCP-BFP2
Washwater Pump Running Light	LCP-BFP3
Washwater Pump Running Light	LCP-BFP4
Washwater Booster Pump WWP1 Run/Stopped/Trip Lights	MCC-SP
Washwater Booster Pump WWP2 Run/Stopped/Trip Lights	MCC-SP
Washwater Booster Pump WWP3 Run/Stopped/Trip Lights	MCC-SP
Washwater Booster Pump WWP4 Run/Stopped/Trip Lights	MCC-SP
Low Water Pressure Annunciator	LCP-BFP1
Low Water Pressure Annunciator	LCP-BFP2
Low Water Pressure Annunciator	LCP-BFP3
Low Water Pressure Annunciator	LCP-BFP4
Washwater Pump Fail Annunciator	LCP-BFP1
Washwater Pump Fail Annunciator	LCP-BFP2
Washwater Pump Fail Annunciator	LCP-BFP3
Washwater Pump Fail Annunciator	LCP-BFP4

4.8.4.4 Odor Reduction Station

Odor Reduction Station Exhaust Fans

<u>Alarm/Status</u>	<u>Display Location</u>
Exhaust Fan OREF7 Run/Stopped/Trip Lights	MCC-SP
Exhaust Fan OREF8 Run/Stopped/Trip Lights	MCC-SP
Exhaust Fan OREF9 Run/Stopped/Trip Lights	MCC-SP
Exhaust Fan OREF7 Run Light	LCP-ORSP
Exhaust Fan OREF7 Motor Fan Failure Light	LCP-ORSP
Exhaust Fan OREF7 Failure Annunciator	LCP-ORSP
Exhaust Fan OREF8 Run Light	LCP-ORSP
Exhaust Fan OREF8 Motor Fan Failure Light	LCP-ORSP
Exhaust Fan OREF8 Failure Annunciator	LCP-ORSP
Exhaust Fan OREF9 Run Light	LCP-ORSP
Exhaust Fan OREF9 Motor Fan Failure Light	LCP-ORSP
Exhaust Fan OREF9 Failure Annunciator	LCP-ORSP
SP Odor Reduction Station Failure	PCC

Odor Reduction Station Scrubber No. 1

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Scrubber ORSC4 Low Level Annunciator	LCP-ORSP

Odor Reduction Station Scrubber No. 1 pH Controller

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Scrubber ORSC4 High pH Alarm Annunciator	LCP-ORSP
ORSP Scrubber ORSC4 Low pH Alarm Annunciator	LCP-ORSP

Odor Reduction Station Scrubber No. 1 Recirculation Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
Odor Reduction Recirculation Pump ORRP7 Run/Stopped/Trip Lights	MCC-SP
Odor Reduction Recirculation Pump ORRP8 Run/Stopped/Trip Lights	MCC-SP
Odor Reduction Recirculation Pump ORRP7 Run Light	LCP-ORSP
Odor Reduction Recirculation Pump ORRP7 Motor Failure Light	LCP-ORSP
ORSP Recirculation Pump ORRP7 Failure Annunciator	LCP-ORSP
Odor Reduction Recirculation Pump ORRP8 Run Light	LCP-ORSP
Odor Reduction Recirculation Pump ORRP8 Motor Failure Light	LCP-ORSP
ORSP Recirculation Pump ORRP8 Failure Annunciator	LCP-ORSP
ORSP Recirculation Pump Seal Water Failure Annunciator	LCP-ORSP
ORSP Scrubber ORSC4 Low Level	LCP-ORSP
Recirculation Pumps Area Shower Alarm Annunciator	LCP-ORSP
SP Odor Reduction Station Failure Annunciator	PCC

Odor Reduction Station H₂SO₄ Metering Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Sulfuric Acid Metering Pump ORMP17 Run/Stopped/Trip Lights	MCC-SP
ORSP Sulfuric Acid Metering Pump ORMP18 Run/Stopped/Trip Lights	MCC-SP

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Sulfuric Acid Metering Pump ORMP17 Run Light	LCP-ORSP
ORSP Sulfuric Acid Metering Pump ORMP17 Motor Failure Light	LCP-ORSP
ORSP Sulfuric Acid Metering Pump ORMP17 Failure Annunciator	LCP-ORSP
ORSP Sulfuric Acid Metering Pump ORMP18 Run Light	LCP-ORSP
ORSP Sulfuric Acid Metering Pump ORMP18 Motor Failure Light	LCP-ORSP
ORSP Sulfuric Acid Metering Pump ORMP18 Failure Annunciator	LCP-ORSP
SP Odor Reduction Station Failure Annunciator	PCC

Odor Reduction Station H₂SO₄ Storage Tank And Containment Area

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Sulfuric Acid Storage Tank ORSAT1 Low Level Alarm Annunciator	LCP-ORSP
ORSP Sulfuric Acid Storage Tank ORSAT1 Low Low Level Alarm Annunciator	LCP-ORSP
ORSP Sulfuric Acid Storage Tank ORSAT1 High Level Alarm Annunciator	LCP-ORSP
ORSP Sulfuric Acid Storage Tank ORSAT1 High Level Alarm, Horn and Indicator Light	H ₂ SO ₄ Fill Station
ORSP Sulfuric Acid Containment Sump High Level Alarm Annunciator	LCP-ORSP and PCC
Sulfuric Acid Fill Panel Area Shower Alarm Annunciator	LCP-ORSP and PCC

Odor Reduction Station Scrubber No. 2

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Scrubber ORSC5 Low Level Annunciator	LCP-ORSP

Odor Reduction Station Scrubber No. 2 pH and ORP Controllers

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Scrubber ORSC5 High pH Alarm Annunciator	LCP-ORSP
ORSP Scrubber ORSC5 Low pH Alarm Annunciator	LCP-ORSP
ORSP Scrubber ORSC5 Low ORP Alarm Annunciator	LCP-ORSP
ORSP Scrubber ORSC5 High ORP Alarm Annunciator	LCP-ORSP

Odor Reduction Station Scrubber No. 2 Recirculation Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
Odor Reduction Recirculation Pump ORRP9 Run/Stopped/Trip Lights	MCC-SP
Odor Reduction Recirculation Pump ORRP10 Run/Stopped/Trip Lights	MCC-SP
Odor Reduction Recirculation Pump ORRP9 Run Light	LCP-ORSP
Odor Reduction Recirculation Pump ORRP9 Motor Failure Light	LCP-ORSP
ORSP Recirculation Pump ORRP9 Failure Annunciator	LCP-ORSP
Odor Reduction Recirculation Pump ORRP10 Run Light	LCP-ORSP
Odor Reduction Recirculation Pump ORRP10 Motor Failure Light	LCP-ORSP
ORSP Recirculation Pump ORRP10 Failure Annunciator	LCP-ORSP
ORSP Recirculation Pump Seal Water Failure Annunciator	LCP-ORSP

ORSP Scrubber ORSC5 Low Level	LCP-ORSP
Recirculation Pumps Area Shower Alarm Annunciator	LCP-ORSP
SP Odor Reduction Station Failure Annunciator	PCC

Odor Reduction Station Scrubber No. 2 NaOH Metering Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Caustic (NaOH) Metering Pump ORMP13 Run/Stopped/Trip Lights	MCC-SP
ORSP Caustic (NaOH) Metering Pump ORMP14 Run/Stopped/Trip Lights	MCC-SP
ORSP Caustic Metering Pump ORMP13 Run Light	LCP-ORSP
ORSP Caustic Metering Pump ORMP13 Motor Failure Light	LCP-ORSP
ORSP Caustic Metering Pump ORMP13 Failure Annunciator	LCP-ORSP
ORSP Caustic Metering Pump ORMP14 Run Light	LCP-ORSP
ORSP Caustic Metering Pump ORMP14 Motor Failure Light	LCP-ORSP
ORSP Caustic Metering Pump ORMP14 Failure Annunciator	LCP-ORSP
SP Odor Reduction Station Failure Annunciator	PCC

Odor Reduction Station Scrubber No. 2 NaOCl Metering Pump

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Sodium Hypochlorite Metering Pump ORMP15 Run/Stopped/Trip Lights	MCC-SP
ORSP Sodium Hypochlorite Metering Pump ORMP16 Run/Stopped/Trip Lights	MCC-SP
ORSP Sodium Hypochlorite Metering Pump ORMP15 Run Light	LCP-ORSP
ORSP Sodium Hypochlorite Metering Pump ORMP15 Motor Failure Light	LCP-ORSP

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Sodium Hypochlorite Metering Pump ORMP15 Failure Annunciator	LCP-ORSP
ORSP Sodium Hypochlorite Metering Pump ORMP16 Run Light	LCP-ORSP
ORSP Sodium Hypochlorite Metering Pump ORMP16 Motor Failure Light	LCP-ORSP
ORSP Sodium Hypochlorite Metering Pump ORMP16 Failure Annunciator	LCP-ORSP
SP Odor Reduction Station PCC Failure Annunciator	PCC

Odor Reduction Station Scrubber No. 2 NaOH Storage Tank And Containment Area

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Caustic Storage Tank ORSOHT4 Low Level Alarm Annunciator	LCP-ORSP
ORSP Caustic Storage Tank ORSOHT4 Low Low Level Alarm Annunciator	LCP-ORSP
ORSP Caustic Storage Tank ORSOHT4 High Level Alarm Annunciator	LCP-ORSP
ORSP Caustic Storage Tank ORSOHT4 High Level Alarm, Horn and Indicator Light	NaOH Fill Station
ORSP Caustic Containment Sump High Level Alarm Annunciator	LCP-ORSP and PCC
Caustic Fill Panel Area Shower Alarm Annunciator	LCP-ORSP and PCC
Caustic Storage Area Shower Alarm Annunciator	LCP-ORSP and PCC

Odor Reduction Station Scrubber No. 2 NaOCl Storage Tank and Containment Area

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Sodium Hypochlorite Storage Tank ORSHT4 Low Level Alarm Annunciator	LCP-ORSP
ORSP Sodium Hypochlorite Storage Tank ORSHT4 Low Low Level Alarm Annunciator	LCP-ORSP

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Sodium Hypochlorite Storage Tank ORSHT4 High Level Alarm Annunciator	LCP-ORSP
ORSP Sodium Hypochlorite Storage Tank High Level Alarm Horn and Indicator Light	NaOCl Fill Station
ORSP Sodium Hypochlorite Containment Sump High Level Alarm Annunciator	LCP-ORSP and PCC
Sodium Hypochlorite Storage Area Shower Alarm Annunciator	LCP-ORSP and PCC

Odor Reduction Station Water Softening System

<u>Alarm/Status</u>	<u>Display Location</u>
ORSP Water Softening System ORSFT4 Alarm Annunciator	LCP-ORSP
SP Odor Reduction Station Failure Annunciator	PCC

Sludge Dewatering Building Air Supply Fans

<u>Alarm/Status</u>	<u>Display Location</u>
Air Supply Fan SF2 Run/Stopped/Trip Lights	MCC-SP
Air Supply Fan SF3 Run/Stopped/Trip Lights	MCC-SP
Sludge Dewatering Building Air Supply SF2 Failure Annunciator	LCP-ORSP
Air Supply SF2 Run Light	LCP-ORSP
Air Supply SF2 Motor Failure Light	LCP-ORSP
Sludge Dewatering Building Air Supply SF3 Failure Annunciator	LCP-ORSP
Air Supply SF3 Run Light	LCP-ORSP
Air Supply SF3 Motor Failure Light	LCP-ORSP
Solids Processing Odor Reduction Station Failure Annunciator	PCC

Sludge Dewatering Building Exhaust Fans

<u>Alarm/Status</u>	<u>Display Location</u>
Exhaust Fan EF4 Run/Stopped/Trip Lights	MCC-SP
Exhaust Fan EF5 Run/Stopped/Trip Lights	MCC-SP
Exhaust Fan EF6 Run/Stopped/Trip Lights	MCC-SP
Exhaust Fan EF7 Run/Stopped/Trip Lights	MCC-SP
Sludge Dewatering Building Exhaust Fan EF4 Failure Annunciator	LCP-ORSP
Sludge Dewatering Building Exhaust Fan EF5 Failure Annunciator	LCP-ORSP
Sludge Dewatering Building Exhaust Fan EF6 Failure Annunciator	LCP-ORSP
Sludge Dewatering Building Exhaust Fan EF7 Failure Annunciator	LCP-ORSP
Exhaust Fan EF4 Run Light	LCP-ORSP
Exhaust Fan EF5 Run Light	LCP-ORSP
Exhaust Fan EF6 Run Light	LCP-ORSP
Exhaust Fan EF7 Run Light	LCP-ORSP
Solids Processing Odor Reduction Station Failure Annunciator	PCC

Truck Loading Building Air Supply Fans (SF4 and SF5)

<u>Alarm/Status</u>	<u>Display Location</u>
Air Supply Fan SF4 Run/Stopped/Trip Lights	MCC-SP
Air Supply Fan SF5 Run/Stopped/Trip Lights	MCC-SP
Truck Loading Building Air Supply Fan SF4 Failure Annunciator	LCP-ORSP
Truck Loading Building Air Supply Fan SF5 Failure Annunciator	LCP-ORSP
Air Supply Fan SF4 Run Light	LCP-ORSP
Air Supply Fan SF5 Run Light	LCP-ORSP

<u>Alarm/Status</u>	<u>Display Location</u>
Solids Processing Odor Reduction Station Failure Annunciator	PCC

4.8.5 Daily Operational Checks

4.8.5.1 General

1. Refer to the general daily operation checks requirements described in Section 4.0.5.
2. Consult Sections 4.8.5.2 - 4.8.5.5 and the appropriate manufacturer's operation and maintenance manuals for specific monitoring requirements.

4.8.5.2 Dewatering System Pumping Facilities

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm requirements of your Operations Supervisor.
2. Check seal water flow to each pump. Adjust as necessary.
3. Check the drives of each pump, motor-operated valve, and grinder for leaks, unusual noise, and excessive temperature (hand touch).
4. Check the pumps and grinder operation to see they are operating smoothly and quietly.
5. Check the discharge and suction pressures using the pump pressure gauges.
6. Check control settings of the sludge feed pump locally, at the VFD, and at the LCP-BFP to confirm the requirements of your Operations Supervisor.
7. Check control settings of the sludge grinder locally at LCP-G1 and at the LCP-AE to confirm requirements of your Operations Supervisor.
8. Check and record sludge flow locally, at the Sludge Flow Indicator at the LCP-BFP and compare to the sludge flow at the Sludge Flow Meter Indicator at the LCP-SP.

9. Check and record sludge feed pump speed at the LCP-BFP. If needed, correct speed level by adjusting the sludge pump potentiometers at the LCP-BFP.
10. Check and record the run times for each sludge feed pump at the VFD located at the SP-LCC and for the grinder at the field LCP-G1.
11. Check that the lever weighted check valves on all operating pumps are open. This condition is alarmed at LCP-SP and LCP-BFP, but a visual check provides added redundancy. If an operating pump has a check valve that is closed, then check and open the discharge and suction isolation valves. If both discharge and suction isolation valves are open, and the associated check valve is in the closed position, then the respective pump should be taken out of service by locking the ROT switch in the “Off” position.
12. Consult the Manufacturer’s O&M Manual for troubleshooting and test procedures. The following O&M Manuals should be consulted for the sludge feed pump and grinder:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Progressive Cavity Pumping Equipment (Section 11012). Prepared by Moyno Industrial Products. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sludge and Primary Skimmings Grinding Equipment (Section 11011). Prepared by Franklin Miller, Inc. 1997

4.8.5.3 Dewatering System Polymer Conditioning Facilities

Polymer Bulk Storage Tanks and Mixing Tanks

1. Visually observe each tank and all piping and connections for cracking, any signs of leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, ducts, valves, sampling wells and manholes for any signs of damage or improper installation. All sampling wells and manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves of the tanks to confirm the requirements of your Operations Supervisor.
4. Check control settings of each element of the tank to confirm the requirements of your Operations Supervisor.

5. Check and record level of polymer in bulk storage tanks and polymer mixing tanks.
6. Check level in the sump bulk polymer storage area.
7. Record run times of the sump pumps at the field panel.
8. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manuals should be consulted for the polymer bulk storage and mixing tanks and sump pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Fiberglass Reinforced Plastic Tanks (Section 11030). Prepared by Belco. 1997.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sump Pumps (Section 11016). Prepared by Multi W Systems, Inc. 1997.

Mixers

1. Check the drives for leaks, unusual noise, and excessive temperature (hand touch).
2. Check control settings of the mixer locally and at the LCP-POL to confirm the requirements of your Operations Supervisor.
3. Visually inspect polymer level in tank and mixing quality. Adjust position of mixer to provide proper mixing. If vortexing is occurring, ensure mixer has not moved and low level setting of tank is 14.5 inches above the top propeller.
4. Check and record the run times for each mixer at the respective MCC located at the SP-LCC.
5. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the mixers:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Chemical Mixing Equipment (Section 11031). Prepared by ChemWest, Inc. 1997.

Polymer Transfer Pumps

1. Check the positions of the manually operated valves on the pump suction and discharge lines to confirm the requirements of your Operations Supervisor.
2. Check seal water flow to each pump. Adjust as necessary.
3. Check operation of each polymer transfer pump to see that it is operating smoothly and quietly.
4. Check the drives for leaks, unusual noise, and excessive temperature (hand touch).
5. Check control settings of the polymer transfer pumps locally and at the LCP-POL to confirm the requirements of your Operations Supervisor.
6. Check the discharge pressures using the pump pressure gauges.
7. Check and record NPW flow to mixing tanks when transfer pumps are in operation. Adjust as necessary to ensure correct flow.
8. Calibrate the polymer transfer pumps once a month using a graduated bucket at the 1-inch flushing connection. Adjust speed settings as needed to maintain correct dosage of polymer as required by your Operations Supervisor.
9. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the polymer transfer pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Progressive Cavity Pumping Equipment (Section 11012). Prepared by Moyno Industrial Products. 1997.

Polymer Feed Pumps

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check seal water flow to each pump. Adjust as necessary.
3. Check operation of each polymer feed pump to see that it is operating smoothly and quietly.

4. Check the drives for leaks, unusual noise, and excessive temperature (hand touch).
5. Check control settings of the polymer feed pumps locally and at the LCP-BFP to confirm the requirements of your Operations Supervisor.
6. Check and record polymer feed pump speed at the LCP-BFP. If needed, correct speed level by adjusting the polymer pump potentiometers at the LCP-BFP.
7. Check the discharge pressures using the pump pressure gauges.
8. Calibrate the polymer feed pumps once a month using a graduated bucket at the 1-inch flushing connection. Adjust speed settings as needed to maintain correct dosage of polymer as required by your Operations Supervisor.
9. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the polymer feed pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Progressive Cavity Pumping Equipment (Section 11012). Prepared by Moyno Industrial Products. 1997.

4.8.5.4 Belt Filter Presses

1. Inspect the taglines to ensure they are not tangled, hung up, or obstructed in any fashion that may prevent the taglines engaging the switch.
2. Inspect the belt filter press as follows:
 - a. Ensure feed assembly is evenly loading the belts.
 - b. Ensure chicanes are turning sludge mass and inspect them for wear. Replace chicanes as required.
 - c. Ensure edge restrainer seals are contacting the belts and seals are not worn. Replace as required.
 - d. Ensure doctor blades are functioning correctly. Inspect blades for wear and replace as required.
 - e. Inspect gravity drainage grid for wear. Replace wear bars before belt contacts metal support grid.
 - f. Ensure belt wash system is completely cleaning belts. Look for streaking or striping on the belts. Rotate the wash water handwheel fully counter clockwise and then fully clockwise to clean the spray nozzles.
 - g. Inspect wash box seals for wear. Replace as required.

- h. Inspect dewatering belts for wear. Repair holes per maintenance instructions. Repair or replace broken belt seam wires.
 - i. Ensure steering sensing paddle is in contact with the belt and correcting belt steering as required.
 - j. Ensure there are no leaks from any of the systems.
 - k. Inspect roller coatings for wear and ensure flingers are in place.
- 3. Check the belt drives for leaks, excessive noise and temperature (hand touch).
 - 4. Check the belt drive control settings both locally and at the LCP-BFP.
 - 5. Check and record belt drive run times at the VFD at the SP-LCC.
 - 6. Check the drives for correct operation speed and correct speed level at the LCP-BFP.
 - 7. Check the oil pressures in the hydraulic units and the belt tensions and belt alignment using pressure gauges and adjust the pressures (belt tension and belt aligning) using pressure relief valves.
 - 8. Check the hydraulic units for leaks, excessive noise and temperature (hand touch).
 - 9. Check the hydraulic units control settings both locally and at the LCP-BFP.
 - 10. Check the washwater booster pumps for leaks, excessive noise and temperature (hand touch).
 - 11. Check the washwater booster pump control settings both locally and at the LCP-BFP.
 - 12. Check the operation of the washwater solenoid valves.
 - 13. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the BFPs:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Belt Filter Press Equipment (Section 11063). Prepared by Ashbrook-Simon-Hartley. 1997.

4.8.5.5 Odor Reduction Station

The daily check of the odor reduction station should be according to the following procedures:

Odor Reduction Station Exhaust Fans

1. Check the positions of the manually operated suction and discharge damper and interconnection ducts to confirm the requirements of your Operations Supervisor.
2. Check the exhaust fan operation to see that they are operating smoothly.
3. Check the exhaust fan for leaks, excessive noise, and temperature (hand touch).
4. Check that the lever weighted back draft on the operating fan is open. If an operating fan has a back draft damper that is closed, then check that the inlet and the discharge isolation dampers are open. If the isolation dampers are open, and the associated back draft damper is in the closed position, then the respective fan should be taken out of service by locking the ROT switch in the "Off" position.
5. Check control settings of the fan locally and at the LCP-ORSP to confirm the requirements of your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station exhaust fans:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plan - Odor Reduction Scrubber Systems (Section 11050). Prepared by R.J. Environmental, Inc. 1997.

Odor Reduction Station Scrubber No. 1

1. Visually observe scrubber sump and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the tower and all pipes, ducts, valves, sampling valves, and manholes for any signs of damage or improper installation. All sampling valves and manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves, and dampers for each to confirm the requirements of your Operations Supervisor.

4. Check and record sump liquid level locally and at the LCP-ORSP, the mist elimination differential pressure, and the packed bed differential pressure, to satisfy the requirements established by your Operations Supervisor.
5. Check the scrubber liquid overflow (blowdown) for clarity. A milky solution indicates insufficient overflow rate.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station scrubber:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plan - Odor Reduction Scrubber Systems (Section 11050). Prepared by R.J. Environmental, Inc. 1997.

Odor Reduction Station Scrubber No. 1 pH Controller

1. Visually observe each controller and all piping and connections for cracking, any signs of liquid leaks, and any other unusual problems.
2. Check the positions of the manually-operated valves, to confirm the requirements of your Operations Supervisor.
3. Check and record pH and ORP readings locally and at LCP-ORSP to satisfy the requirements established by your Operations Supervisor.
4. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station pH controllers:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plan - Odor Reduction Scrubber systems (Section 11050). Prepared by R.J. Environmental, Inc. 1997.

Odor Reduction Station Scrubber No. 1 Recirculation Pumps

1. Check the positions of the manually operated valves on recirculation lines and pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the recirculation pump operation to see that they are operating smoothly and quietly.
3. Check the recirculation pumps for leaks, excessive noise, and temperature (hand touch).
4. Check seal water flow to each recirculation pump. Adjust as necessary.

5. Check and record the discharge pressure using the local recirculation pump pressure gauge.
6. Check control status of the recirculation pumps at the LCP-ORSP to confirm the requirements of your Operations Supervisor.
7. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction recirculation pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Odor Reduction Scrubber Systems (Section 11050). Prepared by R.J. Environmental, Inc. 1997.

Odor Reduction Station Scrubber No. 1 H₂SO₄ Metering Pump

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check and record the discharge pressure using the local pressure gauge.
5. Check and record the discharge flowmeter reading.
6. Check control settings of the caustic metering pump locally and at the LCP-ORSP to confirm the requirements of your Operations Supervisor.
7. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station H₂SO₄ metering pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Diaphragm Chemical Metering Pumps (Section 11018). Prepared by PulsaFeeder, Inc. 1997.

Odor Reduction Station Scrubber No. 1 H₂SO₄ Storage Tank

1. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation. All manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves of the tanks to confirm the requirements of your Operations Supervisor.
4. Check control settings of each element of the tank to confirm the requirements of your Operations Supervisor.
5. Check and record sodium hydroxide level in the tank locally and at LCP-ORSP to satisfy the requirements established by your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station H₂SO₄ storage tank:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant - Crosslink Polyethylene Tank (Section 11032). Prepared by Santa Fe Industrial Plastics, Inc. 1997.

Odor Reduction Station Scrubber No. 2

1. Visually observe scrubber sump and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the tower and all pipes, ducts, valves, sampling valves, and manholes for any signs of damage or improper installation. All sampling valves and manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves, and dampers for each to confirm the requirements of your Operations Supervisor.
4. Check and record sump liquid level locally and at the LCP-ORSP, the mist elimination differential pressure, and the packed bed differential pressure, to satisfy the requirements established by your Operations Supervisor.
5. Check the scrubber liquid overflow (blowdown) for clarity. A milky solution indicates insufficient overflow rate.

6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station scrubber:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plan - Odor Reduction Scrubber Systems (Section 11050). Prepared by R.J. Environmental, Inc. 1997.

Odor Reduction Station Scrubber No. 2 pH and ORP Controllers

1. Visually observe each controller and all piping and connections for cracking, any signs of liquid leaks, and any other unusual problems.
2. Check the positions of the manually-operated valves, to confirm the requirements of your Operations Supervisor.
3. Check and record pH and ORP readings locally and at LCP-ORSP to satisfy the requirements established by your Operations Supervisor.
4. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station pH and ORP controllers:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plan - Odor Reduction Scrubber systems (Section 11050). Prepared by R.J. Environmental, Inc. 1997.

Odor Reduction Station Recirculation Pumps

1. Check the positions of the manually operated valves on recirculation lines and pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the recirculation pump operation to see that they are operating smoothly and quietly.
3. Check the recirculation pumps for leaks, excessive noise, and temperature (hand touch).
4. Check seal water flow to each recirculation pump. Adjust as necessary.
5. Check and record the discharge pressure using the local recirculation pump pressure gauge.
6. Check control status of the recirculation pumps at the LCP-ORSP to confirm the requirements of your Operations Supervisor.

7. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction recirculation pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Odor Reduction Scrubber Systems (Section 11050).
Prepared by R.J. Environmental, Inc. 1997.

Odor Reduction Station Scrubber No. 2 NaOH Metering Pump

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check and record the discharge pressure using the local pressure gauge.
5. Check and record the discharge flowmeter reading.
6. Check control settings of the caustic metering pump locally and at the LCP-ORUSS to confirm the requirements of your Operations Supervisor.
7. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station NaOH metering pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Diaphragm Chemical Metering Pumps (Section 11018).
Prepared by PulsaFeeder, Inc. 1997.

Odor Reduction Station No. 2 NaOCl Metering Pump

1. Check the positions of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check and record the discharge pressure using the local pressure gauge.

5. Check control settings of the sodium hypochlorite pump locally and at the LCP-ORSP to confirm the requirements of your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station NaOCl metering pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Diaphragm Chemical Metering Pumps (Section 11018).
Prepared by PulsaFeeder, Inc. 1997.

Odor Reduction Station NaOH Storage Tank

1. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation. All manholes should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually-operated valves of the tanks to confirm the requirements of your Operations Supervisor.
4. Check control settings of each element of the tank to confirm the requirements of your Operations Supervisor.
5. Check and record sodium hydroxide level in the tank locally and at LCP-ORSP to satisfy the requirements established by your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station NaOH storage tank:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant -Fiberglass Reinforced Plastic Tanks (Section 11030).
Prepared by Belco Manufacturing. 1997.

Odor Reduction Station NaOCl Storage Tank

1. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation. All manholes should be properly closed and tightened as directed by your Operations Supervisor.

3. Check the positions of the manually-operated valves of the tanks to confirm the requirements of your Operations Supervisor.
4. Check control settings of each element of the tank to confirm the requirements of your Operations Supervisor.
5. Check and record sodium hypochlorite level in the tank locally and at LCP-ORSP to satisfy the requirements established by your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station NaOCl storage tank:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant -Fiberglass Reinforced Plastic Tanks (Section 11030). Prepared by Belco Manufacturing. 1997.

H₂SO₄, NaOH and NaOCl Containment Sump Pumps

1. Check levels in the sump in the NaOH and NaOCl storage areas.
2. Record run times of the sump pumps.
3. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the sump pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sump Pumps (Section 11016). Prepared by Multi W Systems, Inc. 1997.

Odor Reduction Station Water Softener System

1. Check water softener vessels for leaks.
2. Check and record water flow rate, calcium ion reading, and pressure.
3. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the odor reduction station water softener system:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant -Water Softening Equipment (Section 11233). Prepared by Culligan Technologies. 1997 .

Sludge Dewatering Building Air Supply Fans (SF2 and SF3)

1. Check the supply fan operation to see that it is operating smoothly.
2. Check the supply fan for excessive noise and temperature.
3. Check control settings of the fans locally and at the LCP-ORSP to confirm the requirements of your Operations Supervisor.
4. Consult the manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the Sludge Dewatering Building air supply fans:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant - Fiberglass Reinforced Plastic Fans (Section 15833). Prepared by Hartzell. 1997.

Sludge Dewatering Building Exhaust (EF4, EF5, EF6, and EF7)

1. Check the exhaust fan operation to see that it is operating smoothly.
2. Check the exhaust fan for excessive noise and temperature.
3. Check control settings of the fans locally and at the LCP-ORSP to confirm the requirements of your Operations Supervisor.
4. Consult the manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the Sludge Dewatering Building air exhaust fans:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant - Fiberglass Reinforced Plastic Fans (Section 15833). Prepared by Hartzell. 1997.

Truck Loading Building Air Supply Fans (SF4 and SF5)

1. Check the supply fan operation to see that it is operating smoothly.
2. Check the supply fan for excessive noise and temperature.
3. Check control settings of the fans locally and at the LCP-ORSP to confirm the requirements of your Operations Supervisor.
4. Consult the manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the Truck Loading Building air supply fans:

4.8.6 Training Record

The following record should be used by the Operator to ensure a complete understanding of the Sludge Dewatering Facilities:

4.8.6.1 Reading Assignment

1. Chapters 8, 9, 13, 24, 25, 30, Operation of Wastewater Treatment Plants - MOP 11. Water Environment Federation, 1990.
2. Chapters 1, 3, Advanced Waste Treatment - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1991.

4.8.6.2 Field Instruction

The operator should review and know the location and purpose of each of the following items:

<u>Item</u>	<u>Operator Initials</u>
Sludge Grinder	_____
Isolation Valves	_____
Bypass Line and Valves	_____
LCP-G1 Controls and Alarms	_____
BFP Sludge Feed Pumps	_____
Isolation Valves	_____
Interconnection (sister/sister) valve	_____
Seal Water Assembly	_____
Local Controls	_____
VFD Controls	_____

<u>Item</u>	<u>Operator Initials</u>
LCP-BFP1 to LCP-BFP4 Controls and Alarms	_____
PCC Alarms	_____
Polymer Conditioning Facilities	_____
Bulk Polymer Storage Tanks	_____
Isolation Valves	_____
Level Sight Glass	_____
LCP-POL Controls and Alarms	_____
PCC Alarms	_____
Polymer Storage Area Sump Pump	_____
Local Controls	_____
LCP-SP Alarms	_____
PCC Alarms	_____
Polymer Transfer Pumps	_____
Isolation Valves	_____
Seal Water Assembly	_____
Local Controls	_____
LCP-POL Controls and Alarms	_____
PCC Alarms	_____
Polymer Mix Tanks	_____
Isolation Valves	_____
Level Sight Glass	_____
Mixer	_____
Local Controls	_____
LCP-POL Controls and Alarms	_____
PCC Alarms	_____

<u>Item</u>	<u>Operator Initials</u>
Polymer Feed Pumps	_____
Isolation Valves	_____
Interconnection (sister/sister) Valve	_____
Seal Water Assembly	_____
Local Controls	_____
LCP-POL Alarms	_____
LCP-BFP1 to LCP-BFP4 Controls and Alarms	_____
PCC Alarms	_____
Belt Filter Presses	_____
Belt Drives	_____
VFD Controls	_____
Two Proximity Switches for Belt Breakage	_____
Two Limit Switches for Belt Misalignment	_____
Pressure Switch for Washwater	_____
Temperature Switch for Hydraulic Unit	_____
Pressure Switch for Hydraulic Unit	_____
Emergency Stop Taglines	_____
Emergency Stop Pushbutton on Press	_____
Hydraulic Unit Pump	_____
Hydraulic Unit Pump Drives	_____
Pressure Relief Valve	_____

<u>Item</u>	<u>Operator Initials</u>
Hydraulic Control Valve with Tension/Retract Switch	_____
Washwater Booster Pump	_____
Washwater Booster Pump Drives	_____
Washwater Valves	_____
LCP-BFP1 to LCP-BFP4 Controls and Alarms	_____
PCC Alarms	_____
Sludge Flow Meter	_____
Sludge Flow Meter Indicator	_____
Polymer Static Mixers	_____
Odor Reduction Station Exhaust Fans	_____
Isolation Damper	_____
Backdraft Damper	_____
Low Flow Switch	_____
Local Controls	_____
LCP-ORSP Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station Scrubbers No. 1&2	_____
Isolation Valves	_____
Level Control	_____
Mist Eliminator D/P	_____
Packed Bed D/P	_____
PCC Alarms	_____
Odor Reduction Station pH and ORP Controllers	_____

<u>Item</u>	<u>Operator Initials</u>
By-Pass Line Operation	_____
pH Controls	_____
RP Controls	_____
LCP-ORSP Alarms	_____
PCC Alarms	_____
Odor Reduction Station Recirculation Pumps	_____
Flow Testing	_____
Isolation Valves	_____
Seal Water Assembly	_____
Local Controls	_____
LCP-ORSP Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station H ₂ SO ₄ Storage Tank	_____
Isolation Valves	_____
Level Sensor	_____
LCP-ORSP Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station NaOH Metering Pumps	_____
Isolation Valves	_____
Local Controls	_____
LCP-ORSP Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station NaOCl Metering Pumps	_____

<u>Item</u>	<u>Operator Initials</u>
Isolation Valves	_____
Local Controls	_____
LCP-ORSP Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station H ₂ SO ₄ Storage Tank	_____
Isolation Valves	_____
Level Sensor	_____
LCP-ORSP Controls and Alarms	_____
PCC Alarms	_____
Odor Reduction Station NaOH Storage Tank	_____
Isolation Valves	_____
Level Sensor	_____
LCP-ORSP Controls and Alarms	_____
PCC Alarms	_____
H ₂ SO ₄ , NaOH and NaOCl Containment Sump Pumps	_____
Local Controls	_____
LCP-SP Alarms	_____
PCC Alarms	_____
PCC-Alarms	_____
Odor Reduction Station Water Softening System	_____
Isolation/By-Pass Valves	_____
Low Pressure Switch	_____
Calcium Fan Controller	_____

<u>Item</u>	<u>Operator Initials</u>
Duplex Controller	_____
LCP-ORSP Alarms	_____
PCC-Alarms	_____
Sludge Dewatering Building Supply Fans (SF2 and SF3)	_____
Supply Fan Low Switch	_____
LCP-ORSP Alarms	_____
PCC Alarms	_____
Sludge Dewatering Building Exhaust Fans (EF4, EF5, EF6, and EF7)	_____
LCP-ORSP Alarms	_____
PCC Alarms	_____
Truck Loading Building Supply Fans (SF4 and SF5)	_____
LCP-ORSP Alarms	_____
PCC Alarms	_____

4.9 SLUDGE CONVEYANCE AND LIME STABILIZATION FACILITIES

4.9.1 Description of Controls and Operation

4.9.1.1 General Control Philosophy

Refer to the general control and operational philosophy description presented in Section 4.0.1.

The process schematic for the Lime Stabilization Facilities is presented in Figure 3.9.1. The Odor Reduction Station scrubbers process and air flow schematics are presented in Figures 3.8-3, 3.8-4, 3.8-5, and 3.8-6.

The control, status and annunciation strategies for the Lime Stabilization Facilities include the use of two lime unloading local control panels (LCP) located in the field, additional LCPs in the Sludge Dewatering Building, an annunciator in the Solids Processing Local Control Center (SP-LCC) and Plant Control Center (PCC).

The LCPs contain control switches, status lights, annunciators, essential recorders, and programmable logic controllers, as appropriate for sequencing of equipment operation and adjustment of process and/or equipment set points.

The SP-LCC contains Sludge Processing Local Control Panel (LCP-SP), switchboards, Sludge Processing Motor Control Center (MCC-SP) and variable frequency drives (VFDs) and other equipment as given below.

4.9.1.2 Dewatered Sludge Conveyance System

The motors for the belt filter press (BFP) conveyors which transfer dewatered sludge to the sludge lime mixer are each coupled to two hand switches, VFDs and indicator lights. The first switch is a locally-mounted Remote-Off-Test (ROT) switch. The “Remote” position of the ROT switch enables the controls at Auxiliary Equipment Local Control Panel (LCP-AE). The “Off” position, which is lockable, prevents the conveyor from operating. The “Test” position is spring loaded, and is used to test the operation of the conveyor. The second switch is an On/Off switch located at LCP-AE on the second floor in the Sludge Dewatering Building.

Each pair of the BFP Conveyors (Nos. 1A, 1B or 2A, 2B) is equipped with a common VFD located in SP-LCC. Each pair of the BFP conveyors has an individual field mounted

ten-turn potentiometer to manually adjust the speed of the BFP conveyors.

Each drive unit is equipped with Run/Off lights and a non-resettable elapsed time meter located at the MCC-SP. In addition, a run light for each BFP conveyor is provided in LCP-AE.

Motion detectors and zero speed switches are installed on a tail roller on each conveyor to indicate motor failure, shaft failure and belt breakage.

Failure of a BFP conveyor as detected by its zero speed switch or motor overload automatically shuts down the respective and initiates an alarm for the respective conveyor on panel LCP-AE and the common alarm "LCP-AE FAILURE" at the LCP-SP located in its designated SP-LCC, and the common alarm "SOLIDS PROCESSING SYSTEM FAILURE" at the PCC.

Each conveyor is provided with a safety tagline stop switch which is lockable to prevent accidental reset of the switch. Switches are manually reset upon activation. Activation of the safety tagline stop switch shuts down the respective conveyor, and initiates a "CONVEYOR TAGLINE FAILURE" alarm at LCP-AE and at the LCP-SP, and the common alarm "SOLIDS PROCESSING SYSTEM FAILURE" at the PCC.

LCP-AE is equipped with a common alarm Acknowledge/Reset pushbutton to acknowledge and silence the LCP-AE alarms.

4.9.1.3 Lime Storage Facilities

Each of the two lime storage silos is provided with three (3) rotating paddle type bin level sensors to indicate high, low, and low low level conditions.

The high level sensor at each silo is set to indicate when the lime level is 2.0 ft. below the top of the silo, and a signal is transmitted to the individual annunciators at the respective Lime Unloading Local Control Panels (LCP-LU1 or LCP-LU2) located adjacent to the lime storage silos, and to the respective Lime Stabilization Local Control Panels (LCP-LS1 or LCP-LS2) located on the second floor of the Sludge Dewatering Building to indicate high level conditions.

The low level sensor at each silo is set to indicate when approximately five days of lime storage is remaining (level is approximately 9.5 feet), and a signal is transmitted to the individual annunciators at the LCP-LS1 or LCP-LS2 to indicate low level conditions.

The low low level is set to indicate when the lime level is 2.0 ft. below the bottom of the cylindrical shell of each silo, and is transmitted to an individual annunciator at the LCP-LS1 or LCP-LS2 to indicate low low level conditions.

Each lime storage silo is provided with a bin activator. The motor of each bin activator is furnished with a locally-mounted ROT switch. The “Remote” position of the ROT switch enables controls located at LCP-LS1 or LCP-LS2. The “Off” position is lockable to prevent the bin activator from operating. The “Test” position is spring loaded, and is used to test the operation of the motor. Start/Stop pushbuttons and a run light for each activator are located on respective lime stabilization control panels (LCP-LS1 or LCP-LS2).

Run/Off lights for each activator are provided in the MCC-SP.

Each lime storage silo bin activator has a Run/Cycle selector switch at respective panels LCP-LS1 and LCP-LS2. When in the "Run" position, the bin activator runs continuously. When in the "Cycle" position, the bin activator cycles on and off as dictated by the dedicated adjustable cycle timer located in the designated panels LCP-LS1 and LCP-LS2.

Failure of any bin activator as detected by a motor overload shuts down the respective activator, and initiates an alarm at the respective panel LCP-LS1 and LCP-LS2, and is included in the respective common alarm at panel LCP-SP to indicate "LIME STABILIZATION NO. 1 FAILURE" and "LIME STABILIZATION NO. 2 FAILURE" and the common alarm "SOLIDS PROCESSING SYSTEM FAILURE" at the PCC.

The equipment area under each lime storage silo is provided with a ventilation fan. Each ventilation fan is furnished with a locally-mounted ROT switch. The “Remote” position of the ROT switch enables the controls at LCP-LU1 or LCP-LU2. The “Off” position which is lockable prevents the fan from operating. The “Test” position is spring loaded, and is used to test the operation of the fan. A dedicated thermostat is provided in the equipment area to start/stop the ventilation fan when it is in the “Auto” mode of operation. See Section 4.9.4.2 for a complete description of the lime unloading alarms.

A Hand-Off-Auto (HOA) switch is provided for each ventilation fan at the respective lime unloading panels (LCP-LU1 or LCP-LU2) to select the mode of operation. The fan runs continuously in the “Hand” mode and starts/stops as called for by the dedicated thermostat in

the “Auto” mode of operation when the temperature rises above a predetermined set point, within an adjustable range of 30°F to 100°F.

Run/Off lights and an elapsed time meter for each ventilation fan are provided at the MCC-SP.

Run/Fail lights for each ventilation fan are provided at the dedicated LCP-LU1 or LCP-LU2. The fail light is initiated based on the motor overload.

The lime fill pipe for each storage silo is provided with a quick disconnect cast adaptor equipped with a spring-loaded limit switch to initiate startup/shutdown sequence of the respective dust collect exhaust fan.

The exhaust fan of each dust collector is furnished with a locally mounted ROT switch. The “Remote” position of the ROT switch enables the controls at LCP-LU1 or LCP-LU2. The “Off” position is lockable and prevents the exhaust fan from operating. The “Test” position is spring loaded, and is used to test the operation of the exhaust fan. An HOA switch and run light for each fan is provided at the dedicated LCP-LU. The fan runs continuously when in the “Hand” mode of operation. In the “Auto” mode of operation, the fan starts as called for by a signal from the lime fill pipe limit switch.

Run/Off lights and an elapsed time meter for each dust collector exhaust fan are provided at the MCC-SP.

Failure of the dust collector exhaust fan is annunciated in the dedicated LCP-LU1 or LCP-LU2 based on the motor overload.

In addition, each dust collector is provided with a high differential pressure switch to detect the high differential pressure of the bag house and to initiate an alarm at the respective LCP-LU1 or LCP-LU2 on high differential pressure conditions.

A “DUST COLLECTOR EXHAUST FAN FAILURE” or a “HIGH DIFFERENTIAL PRESSURE” alarm is included in the common alarm at the respective panels LCP-LS1 and LCP-LS2 to indicate "LCP-LU1 FAILURE" and "LCP-LU2 FAILURE." The failure is also included in the common alarm at panel LCP-SP to indicate "LIME STABILIZATION NO. 1 FAILURE" and "LIME STABILIZATION NO. 2 FAILURE," respectively and is included in the common alarm "SOLIDS PROCESSING SYSTEM FAILURE" at the PCC.

Each dust collector is also provided with a shaker to clean the filter bags. Each shaker is furnished with a locally-mounted ROT switch. The “Remote” position of the ROT switch enables the controls at the dedicated LCP-LU1 or LCP-LU2. The “Off” position is lockable and prevents the shaker from operating. The “Test” position is spring loaded, and is used to test the operation of the shaker.

An HOA switch and run light for each shaker is provided at the dedicated LCP-LU1 or LCP-LU2. In the “Auto” position, the shaker starts after the respective dust collector fan is stopped, and the shaker operates for an adjustable time period (0 - 60 seconds) as necessary to clean the dust collector bags. In the “Hand” position, the shaker starts and operates regardless of an operation of the exhaust fan for an adjustable time period (0 - 60 seconds), and then shuts down automatically.

Failure of each shaker as detected by motor overload is individually annunciated at the respective panels LCP-LU1 and LCP-LU2, and is included in the common alarm at respective panels LCP-LS1 and LCP-LS2 to indicate "LCP-LU1 FAILURE" and "LCP-LU2 FAILURE." A failure is also included in the common alarm at panel LCP-SP to indicate "LIME STABILIZATION NO. 1 FAILURE" and "LIME STABILIZATION NO. 2 FAILURE," respectively, and is included in the common alarm "SOLIDS PROCESSING SYSTEM FAILURE" at the PCC.

LCP-LU1 and LCP-LU2 are equipped with common alarm Acknowledge/Reset pushbuttons to acknowledge and silence the alarms.

Each lime storage area (north and south) is provided with individual safety eyewash/shower stations. Each station is equipped with a flow switch to detect flow due to activation of the eyewash/shower. The station is locally provided with a rotating red beacon to illuminate when flow is detected. Activation of the eyewash/shower stations is individually annunciated at the SP-LCC and at the PCC.

Any alarm conditions in the lime storage facilities are annunciated at the respective panels LCP-LS1 or LCP-LS2, and at the SP-LCC as common alarm “LCP-LU1 FAILURE” and “LCP-LU2 FAILURE,” and is included in a common alarm at the PCC “SOLIDS PROCESSING SYSTEM FAILURE."

4.9.1.4 Lime Conveyance Facilities

Lime is supplied to each of the two sludge/lime mixers from the respective lime storage silo by the dedicated lime transfer conveyor via the dedicated lime volumetric feeder.

Each volumetric feeder is furnished with a locally-mounted ROT switch. The “Remote” position of the ROT switch enables the controls at LCP-LS1 or LCP-LS2. The “Off” position is lockable and prevents the volumetric feeder from operating. The “Test” position is spring loaded, and is used to test the operation of the volumetric feeder. Start/Stop pushbuttons are located in the individual LCP-LS1 or LCP-LS2.

Run/Off lights for each feeder are provided at the MCC-SP.

Each lime volumetric feeder is provided with Start-Stop pushbuttons and a run light at the respective panels LCP-LS1 and LCP-LS2.

Each of the two volumetric feeders is equipped with a speed indicator to provide a digital readout in rpm at the individual LCP-LS1 or LCP-LS2. The VFDs for the lime volumetric feeders are DC drives with SCR controllers located at each unit. A ten turn potentiometer dedicated to each unit is located in the respective LCP-LS1 or LCP-LS2 to manually adjust the speed of the volumetric feeder when the lime stabilization system operates in the “Hand” mode. When the lime stabilization system is in the “Auto” mode of operation, the speed of the volumetric feeder is controlled automatically based on a combined sludge flow to the associated pair of the BFPs via manually controlled set points of the lime dosage and the sludge cake concentration adjusted by the respective proportional (bias) controllers located in each LCP-LS1 or LCP-LS2.

A programmable logic controller (PLC) located in each LCP-LS1 or LCP-LS2 automatically controls the flow rate of the respective volumetric feeder (via the speed control) as follows:

$$Q_{Ca0} = 9.294 \times 10^{-8} \times \Sigma Q \times b_{in} \times D_{Ca0},$$

Where:

- | | | |
|---------------------------|---|---|
| Q_{Ca0} | - | Lime feed flow rate, ft. ³ /hr; |
| $\Sigma Q = Q_1 + Q_2$ or | - | Total sludge feed flow to the respective pair of belt |
| $\Sigma Q = Q_3 + Q_4$ | | filter presses, gpm; |
| b_{in} | - | Sludge feed concentration (inlet to the BFPs), mg/l; |

D_{ca0} - Lime dosage, % on dry weight basis.

This equation assumes the following:

- Quickline density: 55 lbs/ft³
- Quickline Concentration: 93%
- Belt Filter Press Solids Capture Rate: 95%

The constant parameter ($9.29^4 \times 10^{-8}$) could be corrected to account for an actual quick line product or a different belt filter press capture rate.

A motion switch sensor is installed on a shaft of each volumetric feeder to provide an input to the associated motion switch control unit located in the dedicated panels LCP-LS1 and LCP-LS2 for speed indication and for shutdown and annunciation on zero speed conditions. The motion switch control unit is connected to the dedicated SCR controller for feedback purposes.

Failure of a lime volumetric feeder as detected based on a zero-speed signal from the motion switch sensor or based on a motor overload shuts down the volumetric feeder, and is individually annunciated at respective panels LCP-LS1 and LCP-LS2. The failure is also included in the respective common alarm at panel LCP-SP to indicate "LIME STABILIZATION NO. 1 FAILURE" and "LIME STABILIZATION NO. 2 FAILURE," and is included in the common alarm "SOLIDS PROCESSING SYSTEM FAILURE" at the PCC.

Each lime transfer conveyor is furnished with a locally-mounted ROT switch. The "Remote" position of the ROT switch enables the controls at LCP-LS1 or LCP-LS2. The "Off" position is lockable and prevents the conveyor from operating. The "Test" position is spring loaded, and is used to test the operation of the conveyor. Start/Stop pushbuttons are located on the individual LCP-LS1 or LCP-LS2.

Run/Off lights for each conveyor are provided at the MCC-SP.

Each lime transfer screw conveyor is provided with Start/Stop pushbuttons and a run light in respective panel LCP-LS1 and LCP-LS2.

Each lime transfer screw conveyor is provided with a motion detector and zero speed switch installed on the conveyor shaft to indicate motor failure or shaft failure. The hatches of each lime transfer conveyor are provided with limit switches (one for each hatch) to shut

down and lock out the unit when any hatch is open and to activate "LIME TRANSFER CONVEYOR HATCH OPEN" alarm in the respective panels LCP-LS1 and LCP-LS2.

Failure of a lime transfer screw conveyor as detected by its zero speed switch, motor overload and "OPEN HATCH" alarms shuts down the lime transfer screw conveyor, and individually annunciates at the respective panels LCP-LS1 and LCP-LS2, and is included in the respective common alarm at panel LCP-SP to indicate "LIME STABILIZATION NO. 1 FAILURE" and "LIME STABILIZATION NO. 2 FAILURE," and is included in a common alarm "SOLIDS PROCESSING SYSTEM FAILURE" at the PCC.

Each lime transfer screw conveyor is provided with a safety tagline stop switch which shall be lockable to prevent accidental reset of the switch. Switches are manually reset upon activation. Activation of the safety tagline stop switch shuts down the respective conveyor, and sends a signal to initiate "EMERGENCY STOP" alarm at the respective panels LCP-LS1 and LCP-LS2, and is included in a common alarm at LCP-SP and at the PCC to indicate "LIME STABILIZATION NO. 1 EMERGENCY STOP" and "LIME STABILIZATION NO. 2 EMERGENCY STOP", respectively. The safety tagline stop switches are interlocked with the dedicated Emergency Stop pushbuttons of the lime transfer screw conveyors, and with the safety tagline stop switches and Emergency Stop pushbuttons of the dedicated sludge/lime mixers.

Each lime transfer screw conveyor is provided with an Emergency Stop pushbutton located near the discharge end of the conveyor. Activation of the Emergency Stop pushbutton shuts down and locks out the respective conveyor, and sends a signal to initiate an "EMERGENCY STOP" alarm at the respective panels LCP-LS1 and LCP-LS2, and is included in a common alarm at LCP-SP and at the PCC to indicate "LIME STABILIZATION NO. 1 EMERGENCY STOP" and "LIME STABILIZATION NO. 2 EMERGENCY STOP", respectively. The Emergency Stop pushbuttons are interlocked with the safety tagline stop switches of the lime transfer screw conveyors, the safety tagline stop switches and the Emergency Stop pushbuttons of the dedicated sludge/lime mixers.

Any alarm conditions in the lime conveyance facilities are annunciated at the LCP-SP as common alarm "LIME STABILIZATION NO. 1 FAILURE" and "LIME

STABILIZATION NO. 2 FAILURE,” and are included in a common alarm at the PCC “SOLIDS PROCESSING SYSTEM FAILURE.”

4.9.1.5 Sludge/Lime Mixing Facilities

Each sludge lime mixer is furnished with a locally-mounted ROT switch. The “Remote” position of the ROT switch enables the controls at LCP-LS1 or LCP-LS2. The “Off” position, which is lockable, prevents the sludge lime mixer from operating. The “Test” position is spring loaded, and is used to test the operation of the sludge lime mixer. Start/Stop pushbuttons and a run light are located on the individual LCP-LS1 or LCP-LS2.

Each sludge/lime mixer is furnished with Start/Stop pushbuttons and a run light in respective panel, LCP-LS1 and LCP-LS2.

A common VFD for the two screw motors of each sludge/lime mixer is located in SP-LCC. A speed indicator and a speed adjustment ten turn potentiometer is provided at the individual LCP-LS1 and LCP-LS2 to manually adjust the speed of the sludge/lime mixer screws when the lime stabilization system operates in the "Hand" mode.

In addition, a field mounted bias speed controller is located at each sludge/lime mixer to adjust the speed of the unit within $\pm 25\%$ range of the speed established by the respective speed potentiometer at LCP-LS1 or LCP-LS2.

A motion detector and integral zero speed switch is installed on a shaft of each screw of the sludge/lime mixer to indicate motor failure or shaft failure. The hatches of each sludge/lime mixer are provided with safety switches (one switch for each hatch) to shut down and lock out the unit when a hatch is open and activates the "SLUDGE/LIME MIXER HATCH OPEN" alarm in the respective LCP-LS1 and LCP-LS2.

The sludge feed chute, lime feed chute, and the sludge discharge chute of each sludge/lime mixer are each equipped with a chute plugged sensor/transmitter to detect plugging conditions in the respective chute.

A motor-operated isolation sludge discharge knife gate valve located at the sludge discharge chute of each sludge/lime mixer is furnished and installed with a local valve actuator that includes a Local/Off/Remote (LOR) selector switch, Open/Stop/Close pushbuttons, Open/Close position lights, and a position indicator. In addition an Open/Close selector switch, and Open/Close position lights are provided at the View Platform in the

Truck Loading Building for each of these actuators. The subject sludge discharge knife gate valves provide means for starting/stopping the stabilized sludge discharge onto the respective truck loading conveyor during changes of the sludge trucks on the respective truck loading scale. The "Closed" position of the valve stops the stabilized sludge discharge from the respective sludge/lime mixer and starts to time-out an adjustable time delay (0 to 5 minutes) incorporated in the respective LCP-LS1 and LCP-LS2 logic. During this time delay, the respective lime stabilization system and associated sludge dewatering equipment and BFP conveyors continue to operate. If the gate valve has not been opened within the adjustable time period, the respective lime stabilization system and the respective sludge dewatering equipment shut down. The gate valve has to be fully opened before starting the respective lime stabilization system. In the "Local" position of the LOR switch, the gate valve is controlled by the local Open/Stop/Close pushbuttons. In the "Remote" position, the valve is controlled by the Open/Close switch at the view platform in the Truck Loading Building

Failure of a sludge/lime mixer as detected by the respective zero speed switch, motor overload, sludge feed chute plugged, lime feed chute plugged, sludge discharge chute plugged, and the hatch open alarms automatically shuts down the respective unit. The failure is individually annunciated at the respective panels LCP-LS1 and LCP-LS2, and initiates the respective common alarm at panel LCP-SP to indicate "LIME STABILIZATION NO. 1 FAILURE" and "LIME STABILIZATION NO. 2 FAILURE" and the common alarm "SOLIDS PROCESSING SYSTEM FAILURE" at the PCC.

Each sludge/lime mixer is provided with a safety tagline stop switch which is lockable to prevent accidental reset of the switch. Manual reset of the switch is required upon activation. Activation of the safety tagline stop switch shuts down the respective mixer, and initiates the "EMERGENCY STOP" alarm at the respective panels LCP-LS1 and LCP-LS2, and the common alarm at LCP-SP and at the PCC to indicate "LIME STABILIZATION NO. 1 EMERGENCY STOP" and "LIME STABILIZATION NO. 2 EMERGENCY STOP", respectively. The safety tagline stop switches is interlocked with the Emergency Stop pushbuttons of the sludge/lime mixers, and with the safety stop tagline switches and Emergency Stop pushbuttons of the dedicated lime transfer screw conveyors.

Each sludge/lime mixer is provided with two (one for each side) field mounted Emergency Stop pushbuttons. Activation of any of the Emergency Stop pushbuttons associated with the unit shuts down and locks out the respective sludge/lime mixer, and initiates the "EMERGENCY STOP" alarm at the respective LCP-LS1 and LCP-LS2, and the common alarm at LCP-SP and at the PCC to indicate "LIME STABILIZATION NO. 1 EMERGENCY STOP" and "LIME STABILIZATION NO. 2 EMERGENCY STOP", respectively. The Emergency Stop pushbuttons are interlocked with the safety tagline stop switches of the sludge/lime mixers, and with the safety tagline stop switches and emergency stop pushbuttons of the dedicated lime transfer screw conveyor.

The operational interlocks between the lime stabilization facilities, BFPs, BFP conveyors, and the truck loading conveyors are described in Section 4.9.1.5.

4.9.1.6 Stabilized Sludge Conveyance/Truck Loading System

Each of the motors for the truck loading conveyors is coupled to two hand switches, corresponding VFD controller and respective indicator lights. The first switch is a locally-mounted ROT switch. The "Remote" position of the ROT switch enables the controls at LCP-AE. The "Off" position is lockable and prevents the conveyor from operating. The "Test" position is spring loaded, and is used to test the operation of the conveyor.

The second switch is a Hand/Off/Remote (HOR) switch located at LCP-AE on the second floor in the Sludge Dewatering Building. Each conveyor is equipped with a field mounted ten turn potentiometer to manually adjust the speed of the conveyor. An On/Off selector switch is provided for each truck loading conveyor at the View Platform in the Truck Loading Building. The HOR switch at LCP-AE, when in the "Hand" position, operates the respective truck loading conveyor on a continuous basis as dictated by the field mounted ten turn potentiometer. The conveyor remains off when the respective HOR switch at LCP-AE is placed in the "Off" position. In the "Remote" position the dedicated truck loading conveyor operates as determined by the On/Off switch located at the View Platform in the Truck Loading Building for start/stop operation of the respective conveyor during changes of the sludge trucks on the respective truck loading scale. The "Off" position of the On/Off selector switch stops the respective conveyor and starts to time-out an adjustable time delay (0 to 2 minutes) incorporated in the respective LCP-LS1 or LCP-LS2. During this time delay, the

respective lime stabilization system and the associated sludge dewatering equipment and BFP conveyors continue to operate. If the respective truck loading conveyor does not re-started within the adjustable time period, the respective lime stabilization system and the respective sludge dewatering equipment shut down. When the On/Off selector switch is in the "On" position the respective truck loading conveyor starts provided the associated HOR selector switch at panel LCP-AE is in the "Remote" position and all associated interlocks are complete.

The VFD controllers for the truck loading conveyors are located in the SP-LCC.

Each drive unit is equipped with Run/Off lights and non-resettable elapsed time meter located at the MCC-SP. In addition, a run light for each conveyor is provided in LCP-AE.

Failure of a truck loading conveyor as detected by its zero speed switch or motor overload automatically shuts down the respective conveyor and initiates an alarm at panel LCP-AE and the common alarm "LCP-AE FAILURE" at the LCP-SP located in SP-LCC, and the common alarm "SOLIDS PROCESSING SYSTEM FAILURE" at the PCC.

Each conveyor is provided with a safety tagline stop switch which is lockable to prevent accidental reset of the switch. Switches are manually reset upon activation. Activation of the safety tagline stop switch shuts down the respective conveyor, and initiates a "CONVEYOR TAGLINE FAILURE" alarm at LCP-AE and at the LCP-SP, and the common alarm "SOLIDS PROCESSING SYSTEM FAILURE" at the PCC.

Each of the two (2) truck scales is equipped with a digital weight transaction instrument located in the SP-LCC. The weight instrument is provided with a digital LED readout, and prints a 4" wide ticket which indicates time, date and gross/tare weights.

The weight transaction instruments are provided with an adjustable overload setpoint to allow the truck overload alarm annunciators to alert the operator of a fully loaded truck. The following annunciators are provided in SP-LCC: "TRUCK SCALE NO. 1 OVERLOAD" and "TRUCK SCALE NO. 2 OVERLOAD".

Located in the Truck Loading Building at the View Platform, an additional digital display LED module is provided for each scale in order to provide the operator visual readout.

Any truck scale overload conditions activate the common alarm at the PCC indicating a "SOLIDS PROCESSING SYSTEM FAILURE."

4.9.2 Step by Step Start-Up Procedures

4.9.2.1 General System Start-Up Procedures

The Lime Stabilization Facilities should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Visually inspect the BFP Conveyors No. 1A, 1B and 2A, 2B, quicklime storage silos, bin activators, volumetric screw feeders, lime transfer screw conveyors, sludge/lime mixers, and truck loading conveyors for any signs of damage or improper installation. The areas should be cleaned of all installation or maintenance equipment and other articles which are not part of the system.
3. Determine which of the two lime stabilization/truck loading systems will be in service.
4. Ensure that Local Control Panels LCP-LS1 and LCP-LC2; LCP-AE and the appropriate LCP-BFP1 to LCP-BFP4 located on the second floor of the Sludge Dewatering Building; LCP-LU1 and LCP-LU2 located adjacent to the silo quick lime fill pipe on the side of the respective silo; and LCP-ORSP located at the Solids Processing Odor Reduction Station are energized.
5. Ensure that distribution panels DPM5, DPL5, DPC5, and DPP5 located at the SP-LCC and DPM7, DPL7, DPC7, and DPP7 located at the Truck Loading Building are energized.
6. Ensure that circuit breakers at the MCC-SP located in the SP-LCC are energized.
7. Verify that the Solids Processing Odor Reduction Station has been started according to the procedures described in Sections 4.8.2.2.4. If the Solids Processing Odor Reduction Station is to be started up after a complete shutdown, the order of start up for the various pieces of odor reduction equipment shall be as follows:
 - a. Sludge Dewatering Building Air Supply and Exhaust Fans
 - b. Truck Loading Building Air Supply Fans
 - c. Exhaust Fans (OREF 9 and OREF 7 or OREF 8)

- d. Water Softening System
 - e. Scrubbers No. 1 and No. 2
 - f. Recirculation Pumps (one per Scrubber)
 - g. pH and ORP Controllers
 - h. H₂SO₄ Storage Tank
 - i. H₂SO₄ Metering Pump
 - j. NaOCl Storage Tank
 - k. NaOCl Metering Pump
 - l. NaOH Storage Tank
 - m. NaOH Metering Pump
8. After normal operation of the Solids Processing Odor Reduction Station is established, prepare to start the sludge conveyance and lime stabilization system by performing the following:
- a. Inspect the entire length of the belts on both of the BFP conveyors and truck loading conveyor belt for debris. Remove debris as necessary.
 - b. Spray a small amount of water on the belts to condition the belts.
 - c. Verify the sludge hauling truck is positioned properly.
 - d. Inspect the volumetric lime feeder, lime transfer conveyor and the sludge/lime mixer for debris or other condition that may interfere with proper operation. Clean as necessary.
 - e. Verify the taglines are set and have not been pulled. If they have been pulled, reset the tagline switches.
 - f. Ensure that the sludge dewatering facilities are ready for operation as described in Section 4.8.2
9. Start the sludge conveyance and lime stabilization system according to the following procedures (System 1 is described. System 2 is the same with the change in the respective LCP and equipment number references):

“Normal” Semi-Automatic Mode of Operation

- a. Place the Truck Loading Conveyor No. 1 HOR selector switch located in LCP-AE in the “Remote” position, and an On/Off selector switch located at the View Platform in the Truck Loading Building in the “On” position.
- b. The truck loading conveyor now operates and a discrete digital output from LCP-AE to LCP-LS1 reports the run status of Truck Loading Conveyor No. 1 to the LCP-LS1 internal logic to permit sequence to proceed.
- c. Place Sludge Discharge Gate Valve No. 1 Local/Off/Remote switch at the valve actuator in the “Remote” position. Turn Open/Closed

- selector switch located at the View Platform in the Truck Loading Building in the “Open” position.
- d. The gate valve now opens and a discrete digital output from MCC-SP to LCP-LS1 reports the open status of the gate valve to the LCP-LS1 internal logic to permit sequence to proceed.
 - e. Place the key operated Lime Feed Bypassed On/Off mode selector switch, located in LCP-LS1, in the Off position.
 - f. Select either the “Run” or “Cycle” position of the Run/Cycle switch for the bin activator at panel LCP-LS1.
 - g. Place the lime stabilization system HOA switch, located in LCP-LS1, in the “Auto” position.
 - h. Depress lime stabilization system Start pushbutton in LCP-LS1 (This action seals-in the pre-programmed semi-automatic start sequence).
 - i. Sludge/Lime Mixer No. 1 now operates and a run status signal is sent to the logic resident in the panel LCP-LS1 which permits the sequence to proceed.
 - j. Place On/Off selector switches of BFP Conveyors, No. 1A and No. 1B within LCP-AE, into the “On” position.
 - k. The conveyors now operate and a discrete digital output from LCP-AE to LCP-LS1 reports the run status of BFP Conveyors No. 1A and No. 1B to the LCP-LS1 internal logic which permits the sequence to proceed.
 - l. Place the sludge grinder ROT selector switch within LCP-G1 into the “Remote” position.
 - m. Start BFP No. 1 and/or No. 2 with all support equipment as specified in Section 4.8.2.2.3.
 - n. When LCP-BFP1 and/or LCP-BFP2 internal logic complete their start-up and wash down sequences and “Ready” lights are initiated (see Section 4.8.2.2.3), depress the BFP Polymer Feed Pump No. 1 and/or No. 2 Start pushbutton, located in LCP-BFP1 and/or LCP-BFP2.
 - o. The respective BFP polymer feed pump(s) now operates.
 - p. Depress the BFP Sludge Feed Pump No. 1 and/or No. 2 Start pushbutton, located in LCP-BFP1 and/or LCP-BFP2.
 - q. The respective BFP sludge feed pump(s) now operates and a discrete digital output from LCP-BFP1 and/or LCP-BFP2 to LCP-AE reports the run status of Sludge Feed Pump No. 1 and/or No. 2 to the LCP-AE internal logic to automatically start the following equipment in the following order:

Sludge Grinder No. 1.
Lime Transfer Conveyor No. 1
Lime Volumetric Feeder No. 1
Bin Activator (“Run” or “Cycle” mode as selected)

- r. The above referenced equipment now operates and a discrete digital output from MCC-SP to LCP-LS1 reports the run status of Bin Activator No. 1 to the LCP-LS1 internal logic to complete the operator assisted semi-automatic startup sequence.
- s. The PLC located within LCP-LS1 now automatically adjusts the speed of the lime volumetric feeder and thereby determines the lime flow to the sludge/lime mixer. The lime addition is paced based on the sludge flow to the associated Belt Filter Presses. The amount of lime added is based on the manually adjusted lime dosage set point bias controller and the manually adjusted under watered sludge concentration set point bias controller located within LCP-LS1.

“Lime Feed Bypassed” Semi-Automatic Mode

WARNING: In this mode of operation, all elements of the lime conveyance system do not operate and are bypassed in the control logic. As a result the sludge will not be mixed with lime and stabilized. This mode of operation is not recommended for routine operation.

- a. Place the Truck Loading Conveyor No. 1 HOR selector switch located in LCP-AE in the “Remote” position, and the On/Off selector switch located at the View Platform in the Truck Loading Building in the “On” position.
- b. The truck loading conveyor now operates and a discrete digital output from LCP-AE to LCP-LS1 reports the run status of Truck Loading Conveyor No. 1 to the LCP-LS1 internal logic to permit sequence to proceed.
- c. Place Sludge Discharge Gate Valve No. 1 Local/Off/Remote switch at the valve actuator in the “Remote” position. Turn Open/Closed selector switch located at the View Platform in the Truck Loading Building in the “Open” position.
- d. The gate valve now opens and a discrete digital output from MCC-SP to LCP-LS1 reports the open status of the gate valve to the LCP-LS1 internal logic to permit sequence to proceed.
- e. Place the key operated Lime Feed Bypassed On/Off mode selector switch, located in LCP-LS1, in the “Lime Feed Bypassed On” position.
- f. Place the lime stabilization system HOA switch, located in LCP-LS1, in the “Auto” position.
- g. Depress lime stabilization system Start pushbutton in LCP-LS1 (This action seals-in the pre-programmed semi-automatic start sequence).
- h. Sludge/Lime Mixer No. 1 now operates and a run status signal is sent to the logic resident in the panel LCP-LS1 which permits the sequence to proceed.

- i. Place On/Off selector switches of BFP Conveyors, No. 1A and No. 1B within LCP-AE, into the “On” position.
- j. The conveyors now operate and a discrete digital output from LCP-AE to LCP-LS1 reports the run status of BFP Conveyors No. 1A and No. 1B to the LCP-LS1 internal logic which permits the sequence to proceed.
- k. Place the sludge grinder ROT selector switch within LCP-G1 into the “Remote” position.
- l. Start BFP No. 1 and/or No. 2 with all support equipment as specified in Section 4.8.2.2.3.
- m. When LCP-BF1 and/or LCP-BFP2 interior logic complete these start-up and washdown sequences and “Ready” lights are initiated (see Section 4.8.2.2.3), depress the BFP Polymer Feed Pump No. 1 and/or No. 2 Start pushbutton, located in LCP-BFP1 and/or LCP-BFP2.
- n. The respective BFP polymer feed pump(s) now operates.
- o. Depress the BFP Sludge Feed Pump No. 1 and/or No. 2 Start pushbutton, located in LCP-BFP1 and/or LCP-BFP2.
- p. The respective BFP sludge feed pump(s) now operates and a discrete digital output from LCP-BFP1 and/or LCP-BFP2 to LCP-AE reports the run status of Sludge Feed Pump No. 1 and/or No. 2 to the LCP-AE internal logic to automatically start Sludge Grinder No. 1.
- q. The Sludge Grinder No. 1 now operates and a discrete digital output from MCC-SP to LCP-LS1 reports the run status to the LCP-LS1 internal logic to complete the operator assisted semi-automatic startup sequence.
- r. The PLC located in LCP-LS1 automatically bypasses the elements of the respective lime feed train (lime transfer screw conveyor, lime volumetric feeder, bin activator, lime chute plugged switch) and excludes them from the overall system's interlocks.

Manual Mode of Operation

- a. Start up selected lime stabilization single units by positioning System HOA switch located in LCP-LS1 in the “Hand” position and using individual start pushbuttons in LCP-LS1. The order of start up for the single units should be as follows:
 - Start up Sludge Loading Scales (see Section 4.9.2.2.5)
 - Start up Truck Loading Conveyor No. 1 (see Section 4.9.2.2.5)
 - Open Sludge Discharge Gate Valve No. 1 (see Section 4.9.2.2.4)
 - Start up Sludge/Lime Mixer No. 1 (see Section 4.9.2.2.4)
 - Start up BFP Conveyors, No. 1A and No. 1B (see Section 4.9.2.2.1)

- Start up BFP No. 1 and/or No. 2 (see Section 4.8.2.2.3)
 - Start up BFP Polymer Feed Pump No. 1 and/or No. 2 (See Section 4.8.2.3.2)
 - Start up BFP Sludge Feed Pump No. 1 and/or No. 2 (See Section 4.8.2.2.1)
 - Start up Sludge Grinder No. 1 (see Section 4.8.2.2.1)
 - Start up Lime Transfer Conveyor No. 1 (see Section 4.9.2.2.3)
 - Start up Lime Volumetric Feeder No. 1 (see Section 4.9.2.2.3)
 - Start up Bin Activator No. 1 (see Section 4.9.2.2.2)
10. Observe the operation of the sludge conveyance and lime stabilization equipment. Adjust the speeds of the BFP conveyors, sludge/lime mixer and truck loading conveyors as necessary and in accordance with your Operations Supervisor's direction based on operating experience.
 11. Verify that the respective BFPs have started. Specific start up procedures for the BFPs are described in Sections 4.8.2.2.1 through 4.8.2.2.3.
 12. The optimum set points (pressure, level, pH, sludge/lime mixer speed, conveyor speed) should be in accordance with your Operations Supervisor's direction based on operating experience.

4.9.2.2 Individual Equipment Start-up Procedures

4.9.2.2.1 Dewatering Sludge Conveyance System

BFP Conveyors

Start up the BFP conveyors as follows:

1. Determine which pair of BFP conveyors is to be started.
2. Visually inspect the respective pair of BFP conveyors for any signs of damage or other condition that may interfere with proper operation. The areas should be cleaned of all installation or maintenance equipment and other items which are not part of the system.
3. Spray a small amount of water on the belts to condition the belts.
4. Verify the taglines are set and have not been pulled. If they have been pulled, reset the tagline switches.
5. Place the respective ROT switch in the "Remote" position.
6. Place BFP conveyors Nos. 1A and 1B into operation as follows:

Manual Mode of Operation Only

- a. Place the respective On/Off switch at the LCP-AE in the “On” position.
- b. After a 0 to 180 second delay conveyors start and operate continuously.
- c. Visually verify the conveyors are operating.
- d. Adjust the speed of the BFP conveyors by using a field monitored speed potentiometer, as necessary and in accordance with your Operations Supervisor’s direction based on operating experience.

4.9.2.2.2 Lime Storage Facilities

Lime Storage Silo

Place the lime storage silo in service according to the procedures listed below:

1. Determine which silo is to be started.
2. Visually inspect the respective silo for any signs of damage or other condition that may interfere with proper operation. The areas should be cleaned of all installation or maintenance equipment and other items which are not part of the system.
3. Verify that the respective lime storage silo level is within the operating limits established by your Operations Supervisor.

Bin Activator

Start up the bin activator according to the procedures listed below (System 1 is described. System 2 is the same with change in the respective LCP and equipment number references):

1. Place the respective ROT switch in the “Remote” position.
2. Select either the “Run” or “Cycle” position of the Run/Cycle switch for the bin activator at panel LCP-LS1.
3. Place the bin activator into operation as follows:

Automatic Mode of Operation

- a. Place the System HOA switch at the LCP-LS1 in the “Auto” position.
- b. In the “Auto” mode, the respective bin activator starts automatically as called for by the LCP-LS1 (refer to Section 4.9.2.1 for the order of equipment start-up in the “Automatic” mode of operation).

Manual Mode of Operation

- a. Place the System HOA switch at the LCP-LS1 in the “Hand” position.
- b. Push the bin activator Start pushbutton at LCP-LS1.
- c. After a 0 to 180 second delay, the bin activator starts and operates in accordance with the position of the Run/Cycle switch. In the “Run position”, the bin activator runs continuously. In the “Cycle” position, the bin activator cycles on and off as dictated by an adjustable timer located in LCP-LS1.
- d. Visually verify the bin activator is operating.

Dust Collector Shaker

Start up the dust collector shaker according to the procedures listed below (System 1 is described. System 2 is the same with change in the respective LCP and equipment number references):

1. Place the respective ROT switch in the “Remote” position.
2. Place the shaker into operation as follows:

Automatic Mode of Operation

- a. Place the respective HOA switch at the LCP-LU1 in the “Auto” position.
- b. In the “Auto” mode, the shaker operates after the dust collector fan has been operated and stopped. The shaker operates for an adjustable time period of 0 to 60 seconds.

Manual Mode of Operation

- a. Place the respective HOA switch at the LCP-LU1 in the “Hand” position.
- b. After a 0 to 180 second delay, the shaker will start.
- c. In the manual mode, the shaker starts and operates regardless of the dust collector exhaust fan operation for an adjustable time period of 0 to 60 seconds and shuts down automatically.
- d. Verify the shaker is operating.

Dust Collector Exhaust Fan

Start up the dust collector exhaust fan according to the procedures listed below (System 1 is described. System 2 is the same with change in the respective LCP and equipment number references):

1. Place the respective ROT switch in the “Remote” position.
2. Place the dust collector exhaust fan into operation as follows:

Automatic Mode of Operation

- a. Place the respective HOA switch at the LCP-LU1 in the “Auto” position.
- b. In the “Auto” mode, the fan starts as called for by a signal from the lime fill pipe connection limit switch, which is actuated by removing the cap on the lime fill pipe.

Manual Mode of Operation

- a. Remove the cap on the lime fill pipe. Place the respective HOA switch at the LCP-LU1 in the “Hand” position.
- b. After a 0 to 180 second delay, the pump motor starts and the fan will operate continuously.
- c. Verify the fan is operating.

Equipment Area Ventilation Fans

Start up the equipment area ventilation fan according to the procedures listed below (System 1 is described. System 2 is the same with change in the respective LCP and equipment number references):

1. Place the respective ROT switch in the “Remote” position.
2. Place the fan into operation as follows:

Automatic Mode of Operation

- a. Place the respective HOA switch at the LCP-LU1 in the “Auto” position.
- b. In the “Auto” mode, the fan starts and stops as called for by the dedicated thermostat within the silo equipment area.

Manual Mode of Operation

- a. Place the respective HOA switch at the LCP-LU1 in the “Hand” position.
- b. After a 0 to 180 second delay, the fan motor starts and the fan will operate continuously.
- c. Visually verify the fan is operating.

4.9.2.2.3 Lime Conveyance Facilities

Lime Transfer Screw Conveyors

Start up the lime transfer screw conveyors according to the procedures listed below:

1. Determine which lime transfer screw conveyor is to be started.
2. Visually inspect the lime transfer screw conveyor for any signs of damage or other conditions that may interfere with proper operation.
3. Verify that the taglines are set and have not been pulled. If they have been pulled, reset the tagline switches.
4. Verify that the hatches of the conveyor are closed.
5. Place the respective ROT switch in the “Remote” position.
6. Place conveyor into operation as follows (System 1 is described. System 2 is the same with change in the respective LCP and equipment number references):

Automatic Mode of Operation

- a. Place the System HOA switch at the LCP-LS1 in the “Auto” position.
- b. In the “Auto” mode, the conveyor starts as called for by LCP-LS1. (Refer to Paragraph 4.9.2.1 for the order of equipment start up in the “Auto” mode.)

Manual Mode of Operation

- a. Place the System HOA switch at the LCP-LS1 in the “Hand” position.
- b. Push the respective Start pushbutton at the LCP-LS1.
- c. After a 0 to 180 second delay conveyors start and operate continuously.
- d. Visually verify the conveyor is operating.

Lime Volumetric Feeders

Start up the lime volumetric feeder according to the procedures listed below:

1. Determine which volumetric feeder is to be started.
2. Visually inspect the respective volumetric feeder for any signs of damage or other condition that may interfere with proper operation.
3. Place volumetric feeder into operation as follows (System 1 is described. System 2 is the same with change in the respective LCP and equipment number references):

Automatic Mode of Operation

- a. Place the System HOA switch at the LCP-LS1 in the “Auto” position.
- b. In the “Auto” mode, the lime volumetric feeder starts as called for by LCP-LS1 (Refer to Paragraph 4.9.2.1 for the order of equipment start up in the “Auto” mode). The speed of the feeder is controlled automatically based on a combined sludge flow to the associated pair of BFPs via manually controlled set points of the lime dosage and the under watered sludge concentration adjusted by the respective bias controller at the LCP-LS1 as described in Section 4.9.1.

Manual Mode of Operation

- a. Place the System HOA switch at the LCP-LS1 in the “Hand” position.
- b. Push the respective Start pushbutton at the LCP-LS1.
- c. After a 0 to 180 second delay conveyor starts and operates continuously.
- d. Visually verify the feeder is operating.
- e. Adjust the speed of the feeder as necessary and in accordance with your Operations Supervisor’s direction based on operating experience.

4.9.2.2.4 Sludge/Lime Mixing Facilities

Sludge/Lime Mixer

Start up the sludge/lime mixer according to the procedures listed below:

1. Determine which mixer is to be started.

2. Visually inspect the respective sludge/lime mixer for any signs of damage or other condition that may interfere with proper operation.
3. Open the sludge discharge knife gate valve as follows:

Remote Mode of Operation

- a. Place the LOR switch at the valve actuator in the “Remote” position.
- b. Place the Open/Closed selector switch located at the View Platform in the Truck Loading Building in the “Open” position.
- c. Visually verify the actuator’s operation and confirm the “Open” status by checking the position indicator and the position indicating lights.

Local Mode of Operation

- a. Place the LOR switch at the valve actuator in the “Local” position.
 - b. Depress the Open pushbutton at the actuator.
 - c. Visually verify the actuator’s operation and confirm the “Open” status by checking the position indicator and the position indicating lights.
4. Place the sludge/lime mixer into operation as follows (System 1 is described. System 2 is the same with change in the respective LCP and equipment number references):

Automatic Mode of Operation

- a. Place the System HOA switch at the LCP-LS1 in the “Auto” position.
- b. In the “Auto” mode, the sludge/lime mixer starts as called for by LCP-LS1 (Refer to Paragraph 4.9.2.1 for the order of equipment start up in the “Auto” mode). Speed of the mixer screws is manually adjusted by using a speed control potentiometer located at panel LCP-LS1 in accordance with your Operations Supervisor’s direction based on operating experience. In addition, the speed of the mixer screws could be adjusted by a field-mounted bias controller within $\pm 25\%$ range of the speed established by the respective speed potentiometer at LCP-LS1.

Manual Mode of Operation

- a. Place the System HOA switch at the LCP-LS1 in the “Hand” position.
- b. Push the respective Start pushbutton at the LCP-LS1.
- c. After a 0 to 180 second delay the mixer starts and operates continuously.
- d. Visually verify the mixer is operating.

- e. Speed of the mixer screws is manually adjusted by using a speed control potentiometer located at panel LCP-LS1 in accordance with your Operations Supervisor's direction based on operating experience. In addition, the speed of the mixer screws could be adjusted by a field-mounted bias controller within $\pm 25\%$ range of the speed established by the respective speed potentiometer at LCP-LS1.

4.9.2.2.5 Stabilized Sludge Conveyance/Truck Loading System

Truck Loading Conveyors

Start up the truck loading conveyors as follows:

1. Determine which truck loading conveyor is to be started.
2. Visually inspect the respective truck loading conveyor for any signs of damage or other condition that may interfere with proper operation. The areas should be cleaned of all installation or maintenance equipment and other items which are not part of the system.
3. Verify that the sludge loading truck is positioned properly.
4. Spray a small amount of water on the belts to condition the belts.
5. Verify the taglines are set and have not been pulled. If they have been pulled, reset the tagline switches.
6. Place the respective ROT switch in the "Remote" position.
7. Place truck loading conveyor into operation as follows:

Remote Mode of Operation

- a. Place the respective HOR switch at the LCP-AE in the "Remote" position.
- b. Place the respective On/Off switch at the truck loading View Platform in the "On" position.
- c. After a 0 to 180 second time delay conveyor starts and operates continuously.
- d. Visually verify the conveyors are in operation.
- e. Adjust the speed of the truck loading conveyors by using a field mounted speed potentiometer, as necessary in accordance with your Operations Supervisor's direction based on operating experience.

Manual Mode of Operation

- a. Place the respective HOR switch at the LCP-AE in the “Hand” position.
- b. After a 0 to 180 second delay conveyor starts and operates continuously.
- c. Visually verify the conveyor is operating.
- d. Adjust the speed of the conveyor by using a field mounted speed potentiometer, as necessary and in accordance with your Operations Supervisor’s direction based on operating experience.

Truck Loading Scales

Place the Truck Loading Scales into operation according to the procedures listed below:

1. Verify that power cords for the two (2) weight transaction instruments, and two ticket printers located against the north wall of SP-LCC are connected to the receptacles (power for the units is provided from adjacent panel DPL-5).
2. The weight transaction instruments have no On/Off switches. A warm-up sequence whereby various component and parameters are checked which lasts between 30 and 60 seconds is initiated on power-up. A six-line display is observable during this warm-up period. The main menu automatically appears when the warm-up is complete. The indicator associated with weight transaction instruments will go through a warm-up sequence which flashes all the digits in sequence. After warm-up the display shows the weight on the scale.
3. Place the power switch of the adjacent printer into the “On” position.
4. Energize the two remote units (Panel DPC-7 provides power to the units.)
5. The indicator panel has pushbuttons which are listed and described below:
 - a. “UNITS” key selects the units to be displayed, lb, kg, or tons.
 - b. “PRINT” key, when pressed, sends data to a printer and a computer.
 - c. “ID” key is used when entering an ID number.
 - d. “TIME/DATE” key is used when entering the time and date into the scale memory, or used to reset the ticket number.
 - e. “TARE” key recalls the tare value presently in the scale’s memory.
 - f. “AUTO TARE” key, when pressed, enters the value of the weight on the platform into the scale’s memory as a tare weight.
 - g. “GROSS/NET” key toggles the scale between the GROSS and NET modes.

- h. "ZERO" key zeros the scale. If there is weight on the platform, sets the weight to zero and turns on the center-of-zero indicator.
- i. "0" through "9" keys are used to enter numeric data from the front panel.
- j. "ENTER" key is used to enter data into the scale's memory.
- k. "SET PT 1" key is used when entering a value for set point 1, preact and dribble.
- l. "SET PT 2" key is used when entering a value for set point 2, preact and dribble.

The front panel also has permanently labeled indicators listed and described below:

- a. "CENTER OF ZERO" indicates that the scale is set to zero.
- b. "TARE" indicates the displayed number is a TARE weight.
- c. "NET" indicates the displayed number is a NET weight.
- d. "ID" indicates the displayed number is an ID number.
- e. "lb" indicates the weight displayed is in pounds.
- f. "kg" indicates the weight displayed is in kilograms.
- g. "TON" indicates the weight displayed is in tons.
- h. "SP 1" indicates the displayed number is the value associated with set point 1.
- i. "SP 2" indicates the displayed number is the value associated with set point 2.

6. Weigh the trucks on the scales according to the procedures listed below:

- a. Press the "ZERO" key. The display then shows "00".
- b. Press the "UNITS" key until the desired unit's indicator is lighted.
- c. Press the "GROSS/NET" key until the "Net" indicator is off.
- d. The display will show the gross weight of the empty truck.
- e. Insert a ticket into the printer (see Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sludge Loading Scales (Section 11080). Prepared by Fairbanks Scales, 1997, for printer operation and print the empty truck weight.
- f. During filling operations the gross weight displays a continuous readout.
- g. Place the sludge discharge knife gate Open/Close selector switch, at the View Platform, into the "Closed" position when the truck has reached the desired weight (see also shutdown procedures in Section 4.9.3.1).
- h. Print the final gross weight of the truck onto the ticket.

4.9.3 Step-by Step Shutdown Procedures

4.9.3.1 General System Shutdown Procedures

The Sludge Conveyance and Lime Stabilization Facilities should be shut down according to the following procedures:

1. Refer to the General Shutdown Procedures presented in Section 4.0.3.
2. Determine which mode the respective Sludge Conveyance and Lime Stabilization System is operating by observing whether the System HOA switch in LCP-LS1 is in the “Auto” position or the “Hand” position and noting the position of the key-operated Lime Feed Bypassed On/Off switch in LCP-LS1. Shut down the selected Sludge Dewatering/Lime Stabilization System according to its operating mode as follows (Lime Stabilization System No. 1 is described below; Lime Stabilization System No. 2 operates in the same way with change in the respective LCP and equipment number references):

“Normal” Semi-Automatic Shutdown Sequence

- a. Depress lime stabilization system Stop pushbutton in LCP-LS1. (This action seals-in the pre-programmed semi-automatic shutdown sequence.)
- b. A discrete digital output from LCP-LS1 to LCP-BFP1 and LCP-BFP2 reports the system automatic stop command to permit the sequence to proceed.
- c. BFPs No. 1 and No. 2, Sludge Feed Pumps No. 1 and No. 2, and Polymer Feed Pumps No. 1 and No. 2 enter a normal shutdown/wash down sequence and report a stop status to the logic resident in the panel LCP-LS1 to permit the sequence to proceed.
- d. Place the BFP Conveyor No. 1A-1B On/Off selector switch in LCP-AE in the “Off” position.
- e. The respective conveyors will stop and a discrete digital output from LCP-AE to LCP-LS1 reports the stop status of BFP Conveyors No. 1A and No. 1B to the LCP-LS1 internal logic sequences the following equipment, in order, to automatically shut down:
 - Lime Volumetric Feeder No. 1
 - Bin Activator No. 1.
 - Lime Transfer Conveyor No. 1 after an operator adjustable time delay.
 - Sludge/Lime Mixer No. 1 after an operator adjustable time delay.

- f. With the above referenced equipment shut down a discrete digital output from sludge/lime mixer VFD to LCP-LS1 reports the stop status of Sludge/Lime Mixer No. 1 to the LCP-LS1 internal logic to permit the sequence to proceed.
- g. Place the Truck Loading Conveyor No. 1 HOR selector switch in LCP-AE in the “Off” position.
- h. Truck Loading Conveyor No. 1 stops and a discrete digital output from LCP-AE to LCP-LS1 reports the stop status of Truck Loading Conveyor No. 1 to the LCP-LS1 internal logic which completes the operator assisted semi-automatic shutdown sequence.

Normal System Shutdown Upon Failure or Shutdown of Individual Process Equipment

The entire respective Sludge Conveyance and Lime Stabilization System will be automatically shut down upon one of the following:

- a. System Stop pushbutton in LCP-LS1 and LCP-LS2 depressed.
- b. System Emergency Stop initiated (Emergency Stop pushbuttons depressed, taglines at lime transfer conveyor or sludge/lime mixer are pulled).
- c. System HOA switch in LCP-LS1 and LCP-LS2 is placed in the “Off” position.
- d. Both of the BFPs (associated with the system) shut down or failed.
- e. BFP conveyors (associated with the system) shut down or failed.
- f. Sludge feed chute plugged.
- g. Bin activator failed.
- h. Lime volumetric feeder failed.
- i. Lime transfer conveyor failed.
- j. Lime transfer conveyor hatch open.
- k. Lime feed chute plugged.
- l. Sludge/lime mixer failed.
- m. Sludge/lime mixer hatch open.
- n. Sludge discharge chute plugged.
- o. Sludge/lime mixer discharge knife gate valve closed. If Open/Closed switch located at the View Platform in the Truck Loading Building for the respective valve is placed in the “Closed” position, the respective lime stabilization system and sludge dewatering equipment shall continue to operate within an adjustable time delay as described in Paragraph 4.9.1.5.
- p. Truck loading conveyor (associated with the system) shut down or fail. If the On/Off switch located in the View Platform in the Truck Loading Building for the respective truck loading conveyor is placed in the “Off” position, the respective lime stabilization system and

sludge dewatering equipment shall continue to operate within an adjustable time delay as described in Paragraph 4.9.1.6.

“Lime Feed Bypassed” Semi-Automatic Shutdown Sequence

- a. Depress lime stabilization system Stop pushbutton in LCP-LS1. (This action seals-in the pre-programmed semi-automatic shutdown sequence.)
- b. A discrete digital output from LCP-LS1 to LCP-BFP1 and LCP-BFP2 reports the system auto stop command to permit the sequence to proceed.
- c. BFPs No. 1 and No. 2, Sludge Feed Pumps No. 1 and No. 2, and Polymer Feed Pumps No. 1 and No. 2 enter a normal shutdown/wash down sequence and report a stop status to the logic resident in the panel LCP-LS1 to permit the sequence to proceed.
- d. Place the BFP Conveyor No. 1A-1B On/Off selector switch in LCP-AE in the “Off” position.
- e. The respective conveyors will stop and a discrete digital output from LCP-AE reports the stop status of BFP Conveyors No. 1A and No. 1B to the LCP-LS1 internal logic. LCP-LS1 internal logic automatically shuts down Sludge/Lime Mixer No. 1 after an operator adjustable time delay.
- f. With the Sludge/Lime Mixer No. 1 shut down, a discrete digital output from sludge/lime mixer VFD to LCP-LS1 reports the stop status of Sludge/Lime Mixer No. 1 to the LCP-LS1 internal logic to permit the sequence to proceed.
- g. Place the Truck Loading Conveyor No. 1 HOR selector switch in LCP-AE in the “Off” position.
- h. Truck Loading Conveyor No. 1 stops and a discrete digital output from LCP-AE to LCP-LS1 reports the stop status of Truck Loading Conveyor No. 1 to the LCP-LS1 internal logic which completes the operator assisted semi-automatic shutdown sequence.

System Shutdown Upon Failure or Shutdown of Individual Process Equipment in “Lime Feed Bypassed Mode of Operation”

The entire respective Sludge Conveyance and Lime Stabilization System will be automatically shut down upon one of the following while in the “Lime Feed Bypassed” mode of operation:

- a. System Stop pushbutton in LCP-LS1 and LCP-LS2 depressed.
- b. System Emergency Stop initiated (Emergency Stop pushbuttons depressed, taglines at lime transfer conveyor or sludge/lime mixer are pulled).

- c. System HOA switch in LCP-LS1 and LCP-LS2 is placed in the “Off” position.
- d. Both of the BFPs (associated with the system) shut down or failed.
- e. BFP conveyors (associated with the system) shut down or failed.
- f. Sludge feed chute plugged.
- g. Sludge/lime mixer failed.
- h. Sludge discharge chute plugged.
- i. Sludge/lime mixer discharge knife gate valve closed. If Open/Closed switch located at the View Platform in the Truck Loading Building for the respective valve is placed in the “Closed” position, the respective lime stabilization system and sludge dewatering equipment shall continue to operate within an adjustable time delay as described in Paragraph 4.9.1.5.
- j. Truck loading conveyor (associated with the system) shut down or fail. If the On/Off switch located in the View Platform in the Truck Loading Building for the respective truck loading conveyor is placed in the “Off” position, the respective lime stabilization system and sludge dewatering equipment shall continue to operate within an adjustable time delay as described in Paragraph 4.9.1.6.

Personnel Safety Emergency Shutdown Sequence

Each Sludge Conveyance and Lime Stabilization System is capable of emergency shutdown sequences triggered by activation of the following safety devices:

- a. Tagline switches and emergency stop pushbuttons of the associated pair of the BFPs.
- b. Tagline switches of the associated BFP conveyors.
- c. Tagline switches of the associated truck loading conveyor.
- d. Tagline switches and emergency stop pushbuttons of the respective lime transfer screw conveyor and sludge/lime mixer.e. The internal logic of PLCs located in the respective panels LCP-LS1, LCP-LS2, LCP-BFP1 - LCP-BFP4, and LCP-AE will initiate an immediate shutdown of the respective unit upon activation of the dedicated safety devices and will trigger an automatic shutdown of the entire system.

Manual Shutdown of Equipment

- a. If the System HOA switch at the respective panel LCP-LS1 (System 1 is described; System 2 has the same shutdown procedures) is in the “Hand” position, the system permits an individual equipment shutdown as identified in Section 4.9.3.2. The order of shutdown for the single units should be as follows:

- Shut down Bin Activator No.1 (see Section 4.9.3.2.2)
 - Shut down Lime Volumetric Feeder No. 1 (see Section 4.9.3.2.3)
 - Shut down Lime Transfer Conveyor No. 1 (see Section 4.9.3.2.3)
 - Shut down Sludge Grinder No. 1 (See Section 4.8.3.2)
 - Shut down BFP Sludge Feed Pump No. 1 and/or No. 2 (see Section 4.8.3.2)
 - Shut down BFP Polymer Feed Pump No. 1 and/or No. 2 (see Section 4.8.3.2.2)
 - Shut down BFP No. 1 and/or No. 2 (see Section 4.8.3.2.3)
 - Shut down BFP Conveyors, No. 1A and No. 1B (see Section 4.9.3.2.1)
 - Shut down Sludge/Lime Mixer No. 1 (see Section 4.9.3.2.4)
 - Close Sludge Discharge Gate Valve No. 1 (see Section 4.9.3.2.4)
 - Shut down Truck Loading Conveyor No. 1 (see Section 4.9.3.2.5)
4. After the Lime Stabilization Facilities are shut down, shut down the Solids Processing Odor Reduction Station according to the procedures presented under Section 4.8.3.2.5.
 5. All the above shutdowns are for the two (2) individual sludge conveyance and lime stabilization systems, that is, shutdown of one system will **not** shut down the remaining system.

4.9.3.2 Individual Equipment Shutdown Procedures

4.9.3.2.1 Dewatering Sludge Conveyance System

BFP Conveyors

Shut down the BFP conveyors according to the procedures listed below:

1. Place the BFP conveyor On/Off switch at LCP-AE in the “Off” position for the selected pair of the BFP conveyors.
2. Verify that both conveyors have stopped.
3. Lock the appropriate ROT switch.

4. If the conveyors are to be out of service for an extended period of time, disconnect the power source and wash down the belts.

4.9.3.2.2 Lime Storage Facilities

Silo Bin Activator

Shut down the silo bin activator according to the procedures listed below:

1. With the System HOA switch in the “Hand” position, push the silo bin activator Stop pushbutton at LCP-LS1 or LCP-LS2.
2. Verify the bin activator has stopped.
3. Lock the appropriate ROT switch.
4. If the silo bin activator is to be out of service for an extended period of time, disconnect the power source.

Silo Dust Collector Shaker

Shut down the silo dust collector shaker according to the procedures listed below:

1. Place the respective HOA switch at LCP-LU1 or LCP-LU2 in the “Off” position.
2. Verify the shaker is not operating.
3. Lock the appropriate ROT switch.
4. If the silo dust collector shaker is to be out of service for an extended period of time, disconnect the power source.

Dust Collector Exhaust Fan

Shut down the dust collector exhaust fan according to the procedures listed below:

1. Place the respective HOA switch at LCP-LU1 or LCP-LU2 in the “Off” position.
2. Verify the exhaust fan is not working.
3. Replace the cap on the lime fill pipe.
4. Lock the appropriate ROT switch.
5. If the silo dust collector exhaust fan is to be out of service for an extended period of time, disconnect the power source.

Equipment Area Ventilation Fan

Shut down the equipment area ventilation fan according to the procedures listed below:

1. Place the respective HOA switch at LCP-LU1 or LCP-LU2 in the “Off” position.
2. Verify that exhaust fan is not operating.
3. Lock the appropriate ROT switch.
4. If the equipment area ventilation fan is to be out of service for an extended period of time, disconnect the power source.

4.9.3.2.3 Lime Conveyance Facilities

Lime Transfer Screw Conveyors

Shut down the lime transfer screw conveyors according to the procedures listed below:

1. With the System HOA switch in the “Hand” position, push the respective lime transfer screw conveyor Stop pushbutton at LCP-LS1 or LCP-LS2.
2. Verify that the lime transfer conveyor has stopped.
3. Lock the appropriate ROT switch.
4. If the line transfer screw conveyor is to be out of service for an extended period of time, disconnect the power source and wash down the unit.

Lime Volumetric Feeder

Shut down the lime volumetric feeder according to the procedures listed below:

1. With the System HOA switch in the “Hand” position, push the lime volumetric feeder Stop pushbutton at LCP-LS1 or LCP-LS2.
2. Verify that the feeder has stopped.
3. Lock the appropriate ROT switch.
4. If the line volumetric feeder is to be out of service for an extended period of time, disconnect the power source and wash down the unit.

4.9.3.2.4 Sludge/Lime Mixing Facilities

Sludge/Lime Mixer

Shut down the sludge/lime mixer according to the procedures listed below:

1. With the System HOA switch in the “Hand” position, push the sludge/lime mixer Stop pushbutton at LCP-LS1 or LCP-LS2.
2. Verify that the mixer has stopped.
3. Lock the appropriate ROT switch.
4. If the mixer is to be out of service for an extended period of time, disconnect the power source and wash down the unit.
5. Close the sludge discharge gate valve according to the procedures listed below:

Remote Mode of Operation

- a. Turn the valve Open/Close switch at the View Platform of the Truck Loading Building to the “Close” position.
- b. Visually verify the valve is closed by observing the local position indicator.

Local Mode of Operation

- a. Depress the actuator located “Close” pushbutton.
 - b. Visually verify the valve is closed by observing the local position indicator.
6. If the sludge discharge gate valve is to be out of service for an extended period of time, disconnect the power source and wash down the unit.

4.9.3.2.5 Stabilized Sludge Conveyance/Truck Loading System

Truck Loading Conveyor

1. Shut down the truck loading conveyors according to the procedures listed below:

Remote Mode of Operation

- a. Place the conveyor On/Off switch at the View Platform of the Truck Loading Building in the “Off” position.

Manual Mode of Operation

- a. Place the respective HOA switch at LCP-AE in the “Off” position.
2. Verify that the truck loading conveyor has stopped.
3. Lock the appropriate ROT switch.
4. If the truck loading conveyor is to be out of service for an extended period of time, disconnect the power source and wash down the belt.

Truck Loading Scales

Shut down the truck loading scales according to the procedures listed below:

1. Remove the weight transaction instrument power cord from the receptacle.
2. Place the power On/Off switch on the ticket printer in the “Off” position.
3. Verify that the unit is off.
4. Shut down the remote display units by disconnecting the power source at DPC-7.

4.9.4 Alarm and Status Annunciation

4.9.4.1 Dewatered Sludge Conveyance System

The following alarm/status annunciation components are associated with the lime stabilization facilities:

BFP Conveyors No. 1A and No. 1B

<u>Alarm/Status</u>	<u>Display Location</u>
BFP Conveyor No. 1A/1B Run Light	LCP-AE
BFP Conveyor No. 1A and No. 1B Failure	LCP-AE
BFP Conveyor No. 1A Tagline	LCP-AE, LCP-SP, PCC
BFP Conveyor No. 1B Tagline	LCP-AE, LCP-SP, PCC

<u>Alarm/Status</u>	<u>Display Location</u>
LCP-AE Failure	LCP-SP
Solids Processing System Failure	PCC

BFP Conveyors No. 2A and 2B

<u>Alarm/Status</u>	<u>Display Location</u>
BFP Conveyor No. 2A/2B Run Light	LCP-AE
BFP Conveyor No. 2A and No. 2B Failure	LCP-AE
BFP Conveyor No. 2A Tagline	LCP-AE, LCP-SP, PCC
BFP Conveyor No. 2B Tagline	LCP-AE, LCP-SP, PCC
LCP-AE Failure	LCP-SP
Solids Processing System Failure	PCC

4.9.4.2 Lime Storage Facilities

The following alarm/status annunciation components are associated with the Lime Storage Facilities.

Lime Storage System No. 1

<u>Alarm/Status</u>	<u>Display Location</u>
Silo Ventilation Fan No. 1 Run/Off Lights	MCC-SP
Silo Dust Collector Fan No. 1 Run/Off Lights	MCC-SP
Silo Dust Collector Shaker No. 1 Run/Off Lights	MCC-SP
Silo Bin Activator No. 1 Run/Off Lights	MCC-SP
Lime Silo High Level	LCP-LS1, LCP-LU1

<u>Alarm/Status</u>	<u>Display Location</u>
Lime Silo Low Level	LCP-LS1
Lime Silo Low Low Level	LCP-LS1
LCP-LU1 Fail	LCP-LS1
Bin Activator Fail	LCP-LS1
Bin On Run Light	LCP-LS1
Fan Alarm Light	LCP-LU1
Exhaust Fan Alarm Light	LCP-LU1
Shaker Alarm Light	LCP-LU1
Differential Pressure Alarm Light	LCP-LU1
North Lime Safety Shower	LCP-SP, PCC
Solids Processing System Failure	PCC

Lime Storage System No. 2

<u>Alarm/Status</u>	<u>Display Location</u>
Silo Ventilation Fan No. 2 Run/Off Lights	MCC-SP
Silo Dust Collector Shaker No. 2 Run/Off Lights	MCC-SP
Silo Dust Collector Fan No. 2 Run/Off Lights	MCC-SP
Silo Bin Activator No. 2 Run/Off Lights	MCC-SP
Lime Silo High Level	LCP-LS2, LCP-LU2
Lime Silo Low Level	LCP-LS2

<u>Alarm/Status</u>	<u>Display Location</u>
Lime Silo Low Low Level	LCP-LS2
LCP-LU1 Fail	LCP-LS2
Bin Activator Fail	LCP-LS2
Bin On Run Light	LCP-LS2
Fan Alarm Light	LCP-LU2
Exhaust Fan Alarm Light	LCP-LU2
Shaker Alarm Light	LPC-LU2
Differential Pressure Alarm Light	LCP-LU2
South Lime Safety Shower	LCP-SP, PCC
Solids Processing System Failure	PCC

4.9.4.3 Lime Conveyance Facilities

The following alarm/status annunciation components are associated with the Lime Conveyance Facilities.

Lime Conveyance System No. 1

<u>Alarm/Status</u>	<u>Display Location</u>
Lime Transfer Conveyor No. 1 Run/Off Lights	MCC-SP
Lime Volumetric Feeder Fail	LCP-LS1
Feeder On Light	LCP-LS1
Lime Transfer Conveyor Fail	LCP-LS1
Lime XFER On Light	LCP-LS1
Lime Transfer Conveyor Hatch Open	LCP-LS1

<u>Alarm/Status</u>	<u>Display Location</u>
LS No. 1 Emergency Stop	LCP-LS1, LCP-SP, PCC
Lime Stabilization No. 1 Failure	LCP-SP
Solids Processing System Failure	PCC

Lime Conveyance System No. 2

<u>Alarm/Status</u>	<u>Display Location</u>
Lime Transfer Conveyor No. 2 Run/Off Lights	MCC-SP
Lime Volumetric Feeder Fail	LCP-LS2
Feeder On Light	LCP-LS2
Lime Transfer Conveyor Fail	LCP-LS2
Lime XFER On Light	LCP-LS2
Lime Transfer Conveyor Hatch Open	LCP-LS2
LS No. 2 Emergency Stop	LCP-LS2, LCP-SP, PCC
Lime Stabilization No. 2 Failure	LCP-SP
Solids Processing System Failure	PCC

4.9.4.4 Sludge/Lime Mixing Facilities

The following alarm/status annunciation components are associated with the Sludge/Lime Mixing Facilities.

Sludge/Lime Mixing System No. 1

<u>Alarm/Status</u>	<u>Display Location</u>
Lime Mixer Run Light	LCP-LS1
LS No. 1 Emergency Stop	LCP-LS1, LCP-SP, PCC LCP-SP, PCC
Sludge/Lime Mixer Fail	LPC-LS1
Sludge/Lime Mixer Hatch Open	LCP-LS1
Lime Feed Chute Plugged	LCP-LS1
Sludge Feed Chute Plugged	LCP-LS1
Sludge Discharge Chute Plugged	LCP-LS1
Sludge Discharge Valve 1 Open/Close Lights	View Platform at Truck Loading Building; Actuator
Solids Processing System Failure	PCC

Sludge/Lime Mixing System No. 2

<u>Alarm/Status</u>	<u>Display Location</u>
Lime Mixer Run Light	LCP-LS2
LS No. 2 Emergency Stop	LCP-LS2, LCP-SP, PCC
Sludge/Lime Mixer Fail	LPC-LS2
Sludge/Lime Mixer Hatch Open	LCP-LS2
Lime Feed Chute Plugged	LCP-LS2
Sludge Feed Chute Plugged	LCP-LS2
Sludge Discharge Chute Plugged	LCP-LS2
Sludge Discharge Valve 2 Open/Close Lights	View Platform at Truck Loading Building; Actuator

<u>Alarm/Status</u>	<u>Display Location</u>
Solids Processing System Failure	PCC

4.9.4.5 Stabilized Sludge Conveyance/Truck Loading System

The following alarm/status annunciation components are associated with the Stabilized Sludge Conveyance/Truck Loading System.

Stabilized Sludge Conveyance/Truck Loading System No. 1

<u>Alarm/Status</u>	<u>Display Location</u>
Truck Loading Conveyor No. 1 Run Light	LCP-AE
Truck Loading Conveyor No. 1 Failure	LCP-AE
Truck Loading Conveyor No. 1 Tagline	LCP-AE, LCP-SP, PCC
LCP-AE Failure	LCP-SP
Scale No. 1 Overload	LCP-SP
Solids Processing System Failure	PCC

Stabilized Sludge Conveyance/Truck Loading System No. 2

<u>Alarm/Status</u>	<u>Display Location</u>
Truck Loading Conveyor No. 2 Run Light	LCP-AE
Truck Loading Conveyor No. 2 Failure	LCP-AE
Truck Loading Conveyor No. 2 Tagline	LCP-AE, LCP-SP, PCC
LCP-AE Failure	LCP-SP
Scale No. 2 Overload	LCP-SP
Solids Processing System Failure	PCC

4.9.5 Daily Operational Checks

4.9.5.1 General

1. Refer to the general daily operation check requirements described in Section 4.0.5.
2. Consult Section 4.9.5.2 and the appropriate manufacturer's operation and maintenance manuals for specific monitoring requirements.
3. Record run time of the sludge conveyance and lime stabilization facilities at panels LCP-LS1 and LCP-LS2.

4.9.5.2 Dewatered Sludge Conveyance System

1. Check the overall condition of the conveyor belts, note any wear on side skirting.
2. Check the belt scrapers and take-up assembly and note the need for mechanical adjustment.
3. Check and record the speed potentiometer setting to satisfy the requirements established by your Operations Supervisor.
4. Inspect the taglines to ensure they are not tangled, hung up, or obstructed in any fashion that may prevent the taglines engaging the switch.
5. Check the conveyor drive roller chains and sprockets for wear and elongation of the chain.
6. Observe the conveyor operation to see that it is operating smoothly and quietly.
7. Check the conveyor drives and gear reducers for leaks, excessive noise and temperature (hand touch).
8. Check the conveyor drive control settings both locally and at the LCP-AE.
9. Check that the belts are "tracking properly" during operation.
10. Check the inlet and discharge of each conveyor for proper alignment and that dewatered sludge is properly entering the sludge/lime mixers.

11. Consult the Manufacturers O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the dewatered sludge conveyor facility.

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Sludge Conveyance and Lime Stabilization Equipment (Section 11075) Prepared by Taunton Engineering Company, 1997.

4.9.5.3 Lime Storage Facilities

Lime Storage Silos

1. Visually observe each lime storage silo and all connections for cracking, any signs of leaks, and any other unusual problems.
2. Visually observe the roof of each lime storage silo, and all roof equipment, pipes, valves, and manways for any signs of damage or improper installation weekly. All man ways should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the positions of the manually operated valves, and dampers for each element of the silos to confirm the requirements of your Operations Supervisor.
4. Observe the equipment operation to see that it is operating smoothly and quietly.
5. Check the equipment drives for leaks, excessive noise and temperature (hand touch).
6. Check control settings of each element of the silo to confirm the requirements of your Operations Supervisor.
7. Check and record high, low, or low low lime levels in the silos locally and at LCP-LU1, LCP-LS1 or LCP-LU2, LCP-LS2 to satisfy the requirements established by your Operations Supervisor.
8. Consult the manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the lime storage silos.

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Sludge Conveyance and Lime Stabilization Equipment (Section 11075). Prepared by Taunton Engineering Company, 1997.

Silo Bin Activators

1. Check the silo bin activator to see if it is operating smoothly and quietly. The bin activator may run continuously or cycle based upon an adjustable timer.
2. Check the operation of the silo bin activator for any unusual noise, leaks, excessive temperature (hand touch), or other irregularities.
3. Check timer setting of the silo bin activator to confirm requirements of your Operations Supervisor.
4. Check the rubber-bushed hangers and flexible sleeves for signs of leaks and unusual operation.
5. Check the silo bin activator discharge gates and their flexible connections for any signs of leaks or improper installation.
6. Check and record run time of the bin activators.
7. Consult the manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the silo bin activators.

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Sludge Conveyance and Lime Stabilization Equipment (Section 11075). Prepared by Taunton Engineering Company, 1997.

Silo Ventilation Fans

1. Check the silo ventilation fan to see if it is operating smoothly and quietly. The ventilation fan operates based upon thermostat control.
2. Check the silo ventilation fan for leaks, excessive noise and temperature (hand touch).
3. Check temperature settings of the silo ventilation fan thermostat to confirm the requirements of your Operations Supervisor.
4. Check the safety guards, intake louvers, and inset screens for any signs of damage or improper installation.
5. Check and clean the silo ventilation fan's filters by using the specially provided fine dust vacuum cleaner weekly.
6. Check and record run times of the solo ventilation fans.

7. Consult the manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the silo ventilation fans.

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Sludge Conveyance and Lime Stabilization Equipment (Section 11075). Prepared by Taunton Engineering Company, 1997.

Silo Dust Collector Shakers and Exhaust Fans

1. Check the operation of the silo dust collector exhaust fan and the shaker weekly by removing the quick disconnect coupling cap and tripping the spring loaded limit switch, observe the exhaust fan for any leaks, unusual noise or other irregularities and listen for the shaker to be activated after the exhaust fan completes its operation cycle in the automatic mode of operation. Make sure the exhaust fan and the shaker operate smoothly and quietly. Reconnect lime quick disconnect coupling cap.
2. Check and record any high differential pressure or motor overload conditions.
3. Check time settings of the dust collector exhaust fan and shaker to confirm the requirements of your Operations Supervisor.
4. Check and record run times of the silo dust collectors and exhaust fans.
5. Consult the manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for silo dust collector shakers and exhaust fans.

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Sludge Conveyance and Lime Stabilization Equipment (Section 11075). Prepared by Taunton Engineering Company, 1997.

4.9.5.4 Lime Conveyance Facilities

Lime Volumetric Feeders

1. Observe the lime volumetric feeder to see that it is operating smoothly and quietly.
2. Check the lime volumetric feeder for leaks, excessive noise and temperature (hand touch).
3. Check and record volumetric feeder rpm.

4. Check the manually adjustable unstabilized, under watered sludge feed concentration (mg/l) and the manually adjustable lime dosage (percent on dry weight basis) in panels LCP-LS1 and LCP-LS2 to confirm the requirements of the Operations Supervisor.
5. Consult the manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the lime volumetric feeders.

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Sludge Conveyance and Lime Stabilization Equipment (Section 11075). Prepared by Taunton Engineering Company, 1997.

Lime Transfer Screw Conveyors

1. Check the lime transfer screw conveyor to see that they it is operating smoothly and quietly.
2. Check the overall condition of the lime transfer screw conveyor, its motor and reducer, note any leakage, unusual noise or excessive temperature (hand touch).
3. Inspect the taglines to ensure they are not tangled, hung up, or obstructed in any fashion that may prevent the taglines engaging the switch.
4. Make sure the conveyor hatches are closed.
5. Check the conveyor drive V-belts for alignment, wear, and belt tension.
6. Check the conveyor motor and gear reducer for leaks, excessive noise and temperature (hand touch).
7. Check the inlet and discharge chute to the conveyor for proper alignment.
8. Check and record run times of the lime transfer conveyors.
9. Consult the manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the lime transfer screw conveyors.

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant-Sludge Conveyance and Lime Stabilization Equipment (Section 11075). Prepared by Taunton Engineering Company, 1997.

4.9.5.5 Sludge/Lime Mixing Facility

1. Check the sludge/lime mixer to see that it is operating smoothly and quietly.
2. Check the overall condition of the sludge/lime double screw mixers, its motors and reducers, note any leakage, unusual noise, excessive temperature (hand touch).
3. Inspect the taglines to ensure they are not tangled, hung up, or obstructed in any fashion that may prevent the taglines engaging the switch.
4. Make sure the mixer hatches are closed.
5. Check the mixer drive V-belts for alignment, wear, and belt tension.
6. Check the conveyor motor and gear reducer for leaks, excessive noise, and temperature (hand touch).
7. Check the sludge and lime inlet chutes and the mixed sludge discharge chute for proper alignment.
8. Verify that the sludge discharge knife gate valve is completely open.
9. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the sludge lime mixers.

Operations and Maintenance Manual-South Bay International Wastewater Plant-Sludge Conveyance and Lime Stabilization Equipment (Section 11075). Prepared by Taunton Engineering Company, 1997.

4.9.5.6 Stabilized Sludge Conveyance/Truck Loading System

Truck Loading Conveyor

1. Check the overall condition of the conveyor belts, note any wear on side skirting.
2. Check the belt scrappers and take-up assembly and note need for mechanical adjustment.
3. Check and record the speed potentiometer setting to satisfy the requirements established by your Operations Supervisor.

4. Inspect the taglines to ensure they are not tangled, hung up, or obstructed in any fashion that may prevent the taglines engaging the switch.
5. Check the conveyor drive roller chains and sprockets for wear and elongation of the chain.
6. Observe the conveyor operation to see that it is operating smoothly and quietly.
7. Check the conveyor drives and gear reducers for leaks, excessive noise, and temperature (hand touch).
8. Check the conveyor drive control settings both locally and at the LCP-AE.
9. Check that the belts are “tracking properly” during operation.
10. Check the inlet and discharge chutes to the conveyor belts for proper alignment and that stabilized sludge is landing on the belts.
11. Consult the manufacturer’s O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the truck loading conveyors.

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant Sludge Conveyance and Lime Stabilization Equipment (Section 11075). Prepared by Taunton Engineering Company, 1997.

Truck Loading Scales

1. Visually observe each truck loading scale and the associated weight transaction instrument, ticket printer, and digital readout for any signs of damage, improper installation or any other unusual problems.
2. Check and record the readout of the two (2) digital weight transaction instruments in the North SP-LCC.
3. Check the scale control settings both locally and at the SP-LCC.
4. Visually check that the two (2) remote weight display units located at the View Platform in the Truck Loading Building are operating.
5. Verify that ticket printer is electrically energized by observing the “On” indicator light.

6. Consult the manufacturer's O&M Manuals for trouble shooting and test procedures. The following O&M Manual should be consulted for the truck loading scales.

Operations and Maintenance Manual - South Bay International
Wastewater Treatment Plant - Truck Loading Scales (Section 11080).
Prepared by Fairbanks Scales, 1997.

4.9.6 Training Record

The following record should be used by the Operator to ensure a complete understanding of the Sludge Dewatering Facilities:

4.9.6.1 Reading Assignment

1. Chapter 9, 24, 29, Operation of Wastewater Treatment Plants - MOP 11. Water Environment Federation, 1990.
2. Chapter 3, Advanced Waste Treatment - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1991.

4.9.6.2 Field Instruction

The Operator should review and know the location and purpose of each of the following items:

<u>Item</u>	<u>Operator Initials</u>
BFP Conveyor Nos 1A, 1B, 2A, 2B	
Belts and Drives	_____
Belt Scrapers	_____
Emergency Stop Buttons	_____
Tagline Switches	_____
Motion Detectors	_____
Zero Speed Switches	_____
Local Controls	_____

<u>Item</u>	<u>Operator Initials</u>
LCP-AE Controls	_____
LCP-AE Alarms	_____
LCP-SP Alarms	_____
PCC Alarms	_____
Lime Storage Silos	
Silo Level Switches	_____
Dust Collector Exhaust Fans	_____
Dust Collector Shakers	_____
Dust Collector Differential Pressure Switches	_____
Equipment Area Ventilation Fans	_____
Silo Bin Activators	_____
Local Controls	_____
LCP-LU1 and LCP-LU2 Controls and Alarms	_____
LCP-SP Alarms	_____
PCC Alarms	_____
Lime Volumetric Feeders	
Screws and Drives	_____
Zero Speed Switches	_____
Motion Detectors	_____
Local Controls	_____
LCP-LS1 and LCP-LS2 Controls	_____

<u>Item</u>	<u>Operator Initials</u>
LCP-LS1 and LCP-LS2 Alarms	_____
LCP-SP Alarms	_____
PCC Alarms	_____
Lime Transfer Conveyors	
Screws and Drives	_____
Emergency Stop Buttons	_____
Tagline Switches	_____
Motion Detectors	_____
Zero Speed Switches	_____
Hatches and Hatch switches	_____
Local Controls	_____
LCP-LS1 and LCP-LS2 Controls	_____
LCP-LS1 and LCP-LS2 Alarms	_____
LCP-SP Alarms	_____
PCC Alarms	_____
Sludge/Lime Mixers	
Screws and Drives	_____
Emergency Stop Buttons	_____
Tagline Switches	_____
Motion Detectors	_____
Zero Speed Switches	_____

<u>Item</u>	<u>Operator Initials</u>
Hatches and Hatch Switches	_____
Local Controls	_____
LCP-LS1 and LCP-LS2 Controls	_____
LCP-LS1 and LCP-LS2 Alarms	_____
LCP-SP Alarms	_____
PCC Alarms	_____
Stabilized Sludge Conveyance/Truck Loading System	
Belts and Drivers	_____
Belt Scrapers	_____
Emergency Stop Buttons	_____
Tagline Switches	_____
Motion Detectors	_____
Zero Speed Switches	_____
Local Controls	_____
LCP-AE Controls	_____
LCP-AE Alarms	_____
LCP-SP Alarms	_____
PCC Alarms	_____
Truck Loading Scales	
Weighing Elements	_____
Weight Transaction Instruments	_____

<u>Item</u>	<u>Operator Initials</u>
Ticket Printers	_____
Remote Indicators	_____
Local Controls	_____
LCP-SP Alarms	_____
PCC Alarm	_____

4.10 PRIMARY EFFLUENT STRUCTURES

4.10.1 Description of Controls and Operation

4.10.1.1. General

Refer to the general control and operational philosophy description presented in Section 4.0.1. A schematic for the Primary Effluent Structure process is presented in Figure 3.10-1, and a schematic for the Primary Effluent Chlorination process is presented in Figure 3.10-2.

4.10.1.2 Primary Effluent Channel and Primary Effluent Bypass Structure

The primary effluent bypass structure drain pump is installed north of the Primary Effluent Bypass Structure. The pump is provided with a field-mounted ROT switch and with an HOA switch located at LCP-PEB. In the “Hand” position, the pump operates continuously. In the “Off” position, the pump operates only in the “Test” position of the ROT switch. In the “Auto” position, the pump starts and stops based on the level in the Primary Effluent Bypass Structure.

An elapsed time meter and Run/Off lights are provided for the pump at the MCC-NaOC1. An additional run light is provided at LCP-PEB for the pump. Failure of the pump as detected by a limit switch on the discharge check valve annunciates a “PEBDP FLOW FAILURE” alarm at LCP-PEB. A motor fail alarm is also provided at LCP-PEB. The two failure alarms are input to a common alarm which is transmitted to the PCC as “PRIMARY EFFLUENT BYPASS SYSTEM FAILURE”. Once the limit switch has detected pump failure, a reset button must be pressed to restart the pump.

The level in the Primary Effluent Channel is monitored by a Bubbler Level Control Panel which sends a signal to the Primary Effluent Bypass Metering Control Valves (see part 4.10.1.3). Level is indicated locally and at LCP-PEB. A high high level float switch transmits an alarm to LCP-PEB, which is input to the common “PRIMARY EFFLUENT BYPASS SYSTEM FAILURE” alarm at the PCC.

A primary effluent sampler takes samples of the effluent based on a flow signal from the influent flowmeter. Plant influent flow is also indicated at LCP-PEB.

4.10.1.3 Primary Effluent Bypass Metering Structure

Two magnetic flow meters are located in the Primary Effluent Bypass Metering Structure on the 24-inch and 48-inch primary effluent lines. Each flowmeter has a local flow indicator. Each flowmeter transmits an analog signal to the LCP-PEB. The PLC outputs instantaneous flow, which is indicated separately for each flowmeter on the face of LCP-PEB.

Two motor operated butterfly valves are located in the Primary Effluent Bypass Metering Structure. The first valve is an 18-inch control valve which modulates to control the level in the Primary Effluent Channel when the primary effluent flows are less than 18 MGD. The second valve is a 42-inch control valve which modulates to control the level in the Primary Effluent Channel when flows are greater than 18 MGD.

The original operation of the 18-inch and 42-inch flow control valves is depicted in the logic flow diagram shown in Figure 4.10-1. However, with the addition of the Secondary Treatment Facilities, this control strategy is no longer in service.

Each of the motor operated butterfly valves is provided with a Local/Remote switch located at the valve. In the “Local” position, the valve is controlled by open and close pushbuttons located at the valve. A Lock-Out-Stop switch is provided at the valve, and overrides all other controls. In the “Remote” position, the valve is operated by a level signal from the Primary Effluent Channel.

A valve position indicator and “Auto” and “Closed” indicating lights are provided at LCP-PEB. If a valve fails to open or close when called for in the automatic mode of operation, a position switch sends a “VALVE FAILURE” alarm signal to LCP-PEB. This signal is input to a common “PRIMARY EFFLUENT BYPASS SYSTEM FAILURE” alarm at the PCC.

Two sump pumps are provided in the Primary Effluent Bypass Metering Structure. The pumps operate as duty and standby, as selected by a Pump 1/Alternate/Pump 2 selector switch in LCP-BMSSP. In the “Alternate” position, the lead pump automatically alternates. Each pump is provided with an HOA switch in LCP-BMSSP. In the “Hand” position, a pump runs continuously. In the “Auto” position, the pumps are operated by mercury bulb float-type level switches. A low low level switch acts as a back-up to stop the operating pump, while a high high level switch triggers an alarm at both LCP-BMSSP and at LCP-PEB.

The pumps are disabled when high motor winding temperature is sensed by temperature switches. Moisture elements are provided for each pump, and trigger a local alarm. Moisture detection and high temperature detection are combined in a “BMSSP FAILURE” alarm at LCP-PEB. These failure conditions, plus high high sump level, are input to the common “PRIMARY EFFLUENT BYPASS SYSTEM FAILURE” alarm at the PCC.

4.10.1.4 Primary Effluent Bypass Junction Structure

Sodium hypochlorite from the Advanced Primary Chlorination Facility is injected into the Primary Effluent Bypass Junction Structure for disinfection. The primary chlorination dilution water pump injects primary effluent with the sodium hypochlorite line into the Primary Effluent Bypass Junction Structure to provide mixing of the chlorine with the primary effluent. The primary chlorination dilution water pump is provided with a field mounted ROT switch and with an On/Off switch at LCP-PEB. A limit switch on the pump’s discharge check valve senses failure, and sends a flow failure signal to an annunciator at LCP-PEB. A motor failure alarm is also annunciated at LCP-PEB. Both alarms are input to the common “PRIMARY EFFLUENT BYPASS SYSTEM FAILURE” alarm at the PCC. Once the limit switch has detected pump failure, a reset button must be pressed to restart the pump. The pump is also provided with a run light at LCP-PEB.

A primary effluent residual sample pump provides a sample to an oxidation reduction potential (ORP) type chlorine residual analyzer. *This ORP remains but is no longer in service.* The pump is provided with a local ROT switch and with an On/Off switch at LCP-PEB. LCP-PEB also contains a run light, a motor fail annunciator, and a flow failure annunciator. Flow failure is detected by a flow switch on the pump’s discharge. Both failure alarms are input to a common “PRIMARY EFFLUENT BYPASS SYSTEM FAILURE” alarm at the PCC. Once the limit switch has detected pump failure, a reset button must be pressed to restart the pump.

For proper operation of the ORP analyzer, a pH controller is used to maintain the pH of the sample at 7.5. Failure of the pH controller is input to a “pH CONTROL SYSTEM FAIL ALARM” and a “LOW PRIMARY EFFLUENT CHLORINE RESIDUAL” alarm at LCP-PEB and is input to the common “PRIMARY EFFLUENT BYPASS SYSTEM FAILURE” alarm at the PCC.

The ORP analyzer indicates the ORP value locally, and inputs the signal to the PLC-PEB, which outputs an ORP signal to LCP-PEB, where it is indicated and recorded. The ORP value is converted to chlorine residual by the PLC-NaOCl at LCP-NaOCl where the primary effluent chlorine residual is indicated and recorded.

4.10.2 Step by Step Start-Up Procedures

4.10.2.1 General System Start-Up Procedures

The Primary Effluent Structures should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Visually inspect all structures for any signs of damage.
3. Ensure that LCP-PEB and LCP-BMSSP are energized.
4. Ensure that the circuit breakers at MCC-NaOCl in the NaOCl-LCC are energized for all equipment to be operated.
5. Ensure that slide gates are in the proper position for the selected direction of flow (generally, this will be from the Primary Effluent Channel through the Primary Effluent Bypass Metering Structure).
6. Ensure that the flow meters are energized and operational.
7. Verify that the Final Effluent Structures are operational.
8. Start the following equipment according to the procedures described in Section 4.10.2.2 in the following order:
 - a. Primary Bypass Metering Control Valves
 - b. Primary Effluent Bypass Drain Pump
 - c. Primary Effluent Bypass Metering Structure Sump Pumps
 - d. Primary Chlorination Dilution Water Pump (if primary effluent is to be chlorinated)
 - e. Primary Effluent Residual Sample Pump (if primary effluent is to be chlorinated)
9. Open the slide gates from the operating Primary Sedimentation Tanks to direct flow to the Primary Effluent Structures.

4.10.2.2 Individual Equipment Start-Up Procedures

4.10.2.2.1 Primary Effluent Channel and Primary Effluent Bypass Structure

Primary Effluent Bypass Drain Pump

Start-up the primary effluent bypass drain pump according to the procedures listed below:

1. Verify that the suction and discharge isolation valves are opened.
2. Place the ROT switch in the “Remote” position.
3. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the HOA switch at LCP-PEB in the “Auto” position. The LCP-PEB is no longer in service.
- b. In the “Auto”, the pump operates as called for by level signals from PLC-PEB. Under normal conditions, the pump will start upon a high level signal after a 0 to 180 second delay, and will operate until a low level signal from PLC-PEB calls for it to shut down.

Manual Mode of Operation

- a. Place the HOA switch at LCP-PEB in the “Hand” position. The LCP-PEB is no longer in service.
 - b. After a 0 to 180 second delay, the pump will start and will run continuously.
4. Visually verify that the pump is operating.

4.10.2.2.2 Primary Effluent Bypass Metering Structure

Primary Bypass Metering Control Valves

Start up the primary bypass metering control valves according to the procedures listed below:

1. Verify that the isolation valves upstream and downstream of each control valve are in the “Open” position.
2. Place each valve’s Local/Remote switch in the “Remote” position.
3. Verify that the valves modulate automatically in response to level signals from PLC-PEB. The LCP-PEB is no longer in service.

Primary Effluent Bypass Metering Structure Sump Pumps

Start up the primary effluent bypass metering structure sump pumps according to the procedures listed below:

1. Open each pump's discharge isolation valve.
2. Determine the pump that will be in service, or select to automatically alternate the pumps.
3. Place the Pump 1/Alternate/Pump 2 selector switch at LCP-BMSSP in the appropriate position.
4. Place each pump's ROT switch in the "Remote" position.
5. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the HOA switch at LCP-BMSSP in the "Auto" position.
- b. In the "Auto", the pump operates as called for by level signals from float switches. Under normal conditions, the pump will start upon a high level signal after a 0 to 180 second delay, and will operate until a low level signal calls for it to shut down.

Manual Mode of Operation

- a. Place the HOA switch at LCP-BMSSP in the "Hand" position.
 - b. After a 0 to 180 second delay, the pump will start and will run continuously until a low low level switch calls for it to shut down.
6. Visually verify that the pump is operating.

4.10.2.2.3 Primary Effluent Bypass Junction Structure

Primary Chlorination Dilution Water Pump

The Primary Chlorination Dilution Water Pump is no longer in service. Start up the primary chlorination dilution water pump according to the procedures listed below:

1. Verify that the suction isolation valve is open.
2. Place the ROT switch in the “Remote” position.
3. Place the pump into operation as follows:
 - a. Place the On/Off switch at LCP-PEB in the “On” position.
 - b. After a 0 to 180 second delay, the pump will start and will run continuously.
4. Visually verify that the pump is operating.

Primary Effluent Residual Sample Pump

Start up the primary effluent residual sample pump according to the procedures listed below:

1. Verify that the pH controller and ORP analyzer are energized and operational.
2. Place the ROT switch in the “Remote” position.
3. Place the pump into operation as follows:
 - a. Place the On/Off switch at LCP-PEB in the “On” position.
 - b. After a 0 to 180 second delay, the pump will start and will run continuously.
4. Visually verify that the pump is operating.

4.10.3 Step by Step Shutdown Procedures

4.10.3.1 General System Shutdown Procedures

The Primary Effluent Structures should be shut down according to the following procedures:

1. Refer to the General Shutdown Procedures presented in Section 4.0.3.
2. Shut down the Primary Effluent Channel (PEC) and Primary Effluent Bypass Structure (PEBS) according to the procedures presented in Section 4.10.3.2.1.

3. Shut down the Primary Effluent Bypass Metering Structure according to the procedures presented in Section 4.10.3.2.2.
4. Shut down the Primary Effluent Bypass Junction Structure according to the procedures presented in Section 4.10.3.2.3.

4.10.3.2 Individual Equipment Shutdown Procedures

4.10.3.2.1 Primary Effluent Channel and Primary Effluent Bypass Structure

Shut down the Primary Effluent Channel and Primary Effluent Bypass Structure according to the procedures listed below:

1. Close the appropriate isolation gates to prevent flow to the PEC and PEBS.
2. Drain the PEBS to the PEC by using the PEBS drain pump.
3. Hose down the channel and structures. Any liquid which does not drain to the Final Effluent Structures by gravity must be pumped out using a portable submersible pump and safely disposed of.

Primary Effluent Bypass Drain Pump

Shut down the primary effluent bypass drain pump according to the procedures listed below:

1. Turn the pump's HOA switch at LCP-PEB to the "Off" position.
2. Verify the pump is stopped.
3. Lock the pump's ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect its power source and close the isolation valves on the inlet and discharge of the pump.

4.10.3.2.2 Primary Effluent Bypass Metering Structure

Primary Bypass Metering Control Valves

Shut down the primary bypass metering control valves according to the procedures listed below:

1. Close the isolation valves both upstream and downstream of each control valve.
2. Place each modulating valve's Local/Remote switch in the "Local" position.

3. Manually close each modulating valve by use of the actuator-mounted Close pushbutton.
4. If the system is to be out of service for an extended period of time, disconnect its power source.

Primary Bypass Metering Structure Sump Pumps

Shut down the primary bypass metering structure sump pumps according to the procedures listed below:

1. Turn the pump's HOA switch at LCP-BMSSP to the "Off" position.
2. Verify the pump is stopped.
3. Lock the pump's ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect the power source and close the isolation valve on the discharge of the pump.

4.10.3.2.3 Primary Effluent Bypass Junction Structure

Primary Chlorination Dilution Water Pump

Shut down the primary chlorination dilution water pump according to the procedures listed below:

1. Turn the pump's On/Off switch at LCP-PEB to the "Off" position.
2. Verify the pump is stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source and close the isolation valve on the pump suction line.

Primary Effluent Residual Sample Pump

Shut down the primary effluent residual sample pump according to the procedures listed below:

1. Shut down the pH/ORP controller.
2. Turn the pump On/Off switch at LCP-PEB to the "Off" position.

3. Verify the pump is stopped.
4. Lock the appropriate ROT switch.
5. If the pump is to be out of service for an extended period of time, disconnect power source and close the isolation valves on pump suction and discharge lines.

4.10.4 Alarm and Status Annunciation

4.10.4.1 Primary Effluent Channel and Primary Effluent Bypass Structure

The following alarm/status annunciation and indication components are associated with the Primary Effluent Channel and Primary Effluent Bypass Structures:

<u>Alarm/Status</u>	<u>Display Location</u>
General	
PEB Level Indicator/Transmitter	SCADA, Field
LCP-PEB Primary Failure Annunciator	SCADA, LCP-PEB
LCP-PEB Back-Up Failure Annunciator	SCADA, LCP-PEB
Plant Influent Flow Indicator	SCADA, LCP-PEB
PEB Structure Level Indicator	SCADA, LCP-PEB
PEB Structure High Level Annunciator	SCADA, LCP-PEB
PEB Structure High High Level Annunciator	SCADA, LCP-PEB
Primary Effluent Bypass System Failure Annunciator	SCADA, PCC
Primary Effluent Bypass Drain Pump	
PEBDP Flow Failure Annunciator	SCADA, LCP-PEB

PEBDP Motor Failure Annunciator	SCADA, LCP-PEB
PEBDP Run/Off Lights	SCADA, MCC-NaOC1
PEBDP Run Light	SCADA, LCP-PEB

4.10.4.2 Primary Effluent Bypass Metering Structure

The following alarm/status annunciation and indication components are associated with the Primary Effluent Bypass Metering Structure:

<u>Alarm/Status</u>	<u>Display Location</u>
Flowmeter	
Flowmeter No. 1 Flow Indicator/Transmitter	Field
Flowmeter No. 2 Flow Indicator/Transmitter	Field
Control Valves	
Bypass Metering Control Valve No. 1 Flow Indicator	LCP-PEB
Bypass Metering Control Valve No. 2 Flow Indicator	LCP-PEB
Bypass Metering Control Valve No. 1 Position Indicator	LCP-PEB
Bypass Metering Control Valve No. 2 Position Indicator	LCP-PEB
Bypass Metering Control Valve No. 1 Auto Indicating Light	LCP-PEB
Bypass Metering Control Valve No. 2 Auto Indicating Light	LCP-PEB
Bypass Metering Control Valve No. 1 Closed Indicating Light	LCP-PEB
Bypass Metering Control Valve No. 2 Closed	LCP-PEB

Indicating Light	
Bypass Metering Control Valve No. 1 Failure Annunciator	LCP-PEB
Bypass Metering Control Valve No. 2 Failure Annunciator	LCP-PEB

Primary Effluent Bypass Metering Structure Sump Pumps

PEBMS Sump Pump No. 1 Moisture Detection Light	LCP-PBMSSP
PEBMS Sump Pump No. 2 Moisture Detection Light	LCP-PBMSSP
PEBMS Sump Pump No. 1 Temperature Detection Light	LCP-PBMSSP
PEBMS Sump Pump No. 2 Temperature Detection Light	LCP-PBMSSP
PEBMS Sump Pump No. 1 Run Light	LCP-PBMSSP
PEBMS Sump Pump No. 2 Run Light	LCP-PBMSSP
PEBMS Sump High High Level Light	LCP-PBMSSP
BMS Sump High High Level Alarm Annunciator	LCP-PEB
BMSSP Failure Annunciator	LCP-PEB

4.10.4.3 Primary Effluent Bypass Junction Structure

The following alarm/status annunciation and indication components are associated with the Primary Effluent Bypass Junction Structure:

<u>Alarm/Status</u>	<u>Display Location</u>
General	
Primary Effluent Chlorine Residual (ORP) Indicator	LCP-PEB

Primary Effluent Chlorine Residual Low Annunciator	LCP-PEB
Primary Chlorination Dilution Water Pump	
PCDWP Flow Failure Annunciator	LCP-PEB
PCDWP Motor Failure Annunciator	LCP-PEB
PCDWP Run Light	LCP-PEB
PCDWP Run/Off Lights	MCC-NaOC1
Primary Effluent Residual Sample Pump	
PERSP Flow Failure Annunciator	LCP-PEB
PERSP Motor Failure Annunciator	LCP-PEB
PERSP Run Light	LCP-PEB
pH Control System Fail Annunciator	LCP-PEB
PERSP Run/Off Lights	MCC-NaOC1
pH Indicator/Transmitter	Field

4.10.5 Daily Operational Checks

4.10.5.1 General

1. Refer to the general daily operation checks requirements described in Section 4.0.5.
2. Visually inspect all structures for any signs of damage.
3. Consult Sections 4.10.5.2 through 4.10.5.4 and the appropriate manufacturer's operation and maintenance manuals for specific monitoring requirements.

4.10.5.2 Primary Effluent Channel and Primary Effluent Bypass Structure

General

1. Check the level in the Primary Effluent Channel to verify that it is within the established operating range.
2. Check the level in the Primary Effluent Bypass Structure. During normal operation, it should be empty. Should liquid be present in this structure, verify that the primary effluent bypass drain pump is operating.
3. Verify that the primary effluent sampler is operating.

Primary Effluent Bypass Drain Pump

1. Check the position of the manually operated valves on the pump suction and discharge lines to verify that they are opened.
2. Should the pump be operating, verify that it is operating smoothly and quietly.
3. Check the pump, if operating, for leaks, excessive noise, and temperature (hand touch).
4. Check that the lever weighted check valves on the pump are opened, if the pump is operating. If the check valve is closed, then check and open the discharge and suction isolation valves. If both discharge and suction isolation valves are opened, and the associated check valve is in the closed position, then the pump should be taken out of service by locking the ROT switch in the “Off” position.
5. Check the control settings of the pump to confirm the requirements of your Operations Supervisor.
6. Check and record run time for the pump at the MCC-NaOCl.
7. Consult the manufacturer’s O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the primary effluent bypass drain pump:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Self-Priming Centrifugal Pumping Equipment (Section 11404). Prepared by Gorman-Rupp Company, 1998.

4.10.5.3 Primary Effluent Bypass Metering Structure

General

1. Check the position of all manually operated isolation valves to verify that they are opened.
2. Check the reading of the local flow indicator. Verify that it is within the established flow range for its operation, and that its readout corresponds to the readout at LCP-PEB.

Primary Bypass Metering Control Valves

1. Verify that the valves are operating in the “Remote” position.
2. Check the valve actuators to see that they are operating smoothly and quietly.
3. Verify that the operating modulating valve is open and is modulating in response to the level signal, and that the other modulating valve is closed.
4. Check control settings of the flow control valves to confirm the requirements of your Operations Supervisor.
5. Consult the manufacturer’s O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the primary bypass metering control valves:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Valve and Appurtenances (Section 15099) Prepared by DeZurik, 1998.

Primary Effluent Bypass Metering Structure Sump Pumps

1. Check the position of the manually operated valves on the pump suction and discharge lines to confirm the requirements of your Operations Supervisor.
2. Visually inspect the sump level. If it is above the pump’s operating level, verify that the pumps are operating.
3. Check the pump operation to verify that operating pumps are operating smoothly and quietly.
4. Check the pumps for leaks, excessive noise, and temperature.

5. Check control settings of the sump pumps at LCP-BMSSP to confirm the requirements of your Operations Supervisor.
6. Check and record run time for the pump at the MCC-NaOCl.
7. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the sump pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant -Sump Pump (Section 11016). Prepared by Barnes Pump, Inc., 1998.

4.10.5.4 Primary Effluent Bypass Junction Structure

Primary Chlorination Dilution Water Pump

1. Check the position of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check the discharge pressures using the local pressure gauge.
5. Check control settings of the pump at LCP-PEB to confirm the requirements of your Operations Supervisor.
6. Check and record run time for the pump and at the NaOCl.
7. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the primary chlorination dilution water pump:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Self-Priming Centrifugal Pumping Equipment (Section 11404) Prepared by Gorman-Rupp Company, 1998.

Primary Effluent Residual Sample Pump

1. Check the position of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.

2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperatures (hand touch).
4. Check the pump's discharge pressure using the local pressure gauge.
5. Verify that the pH controller is operational and that the pH reading is as set (generally, the pH should be 7.5).
6. Verify that the ORP chlorine residual analyzer is operational, and that the chlorine reading is as set by PLC-NaOCl.
7. Verify that spent sample is draining as appropriate.
8. Check control setting of the pump at LCP-PEB to confirm the requirements of your Operations Supervisor.
9. Check and record run time for the pump at the MCC-NaOCl.
10. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the primary effluent residual sample pump:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Self-Priming Centrifugal Pumping Equipment (Section 11404). Prepared by Gorman-Rupp Company, 1998.

4.10.6 Training Record

The following record should be used by the Operator to ensure a complete understanding of the Primary Effluent Structures:

4.10.6.1 Reading Assignment

1. Chapters 8, 14, 23 - Operation of Wastewater Treatment Plants - MOP 11. Water Environment Federation, 1990.
2. Chapter 13, Operation of Wastewater Treatment Plants - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1993.

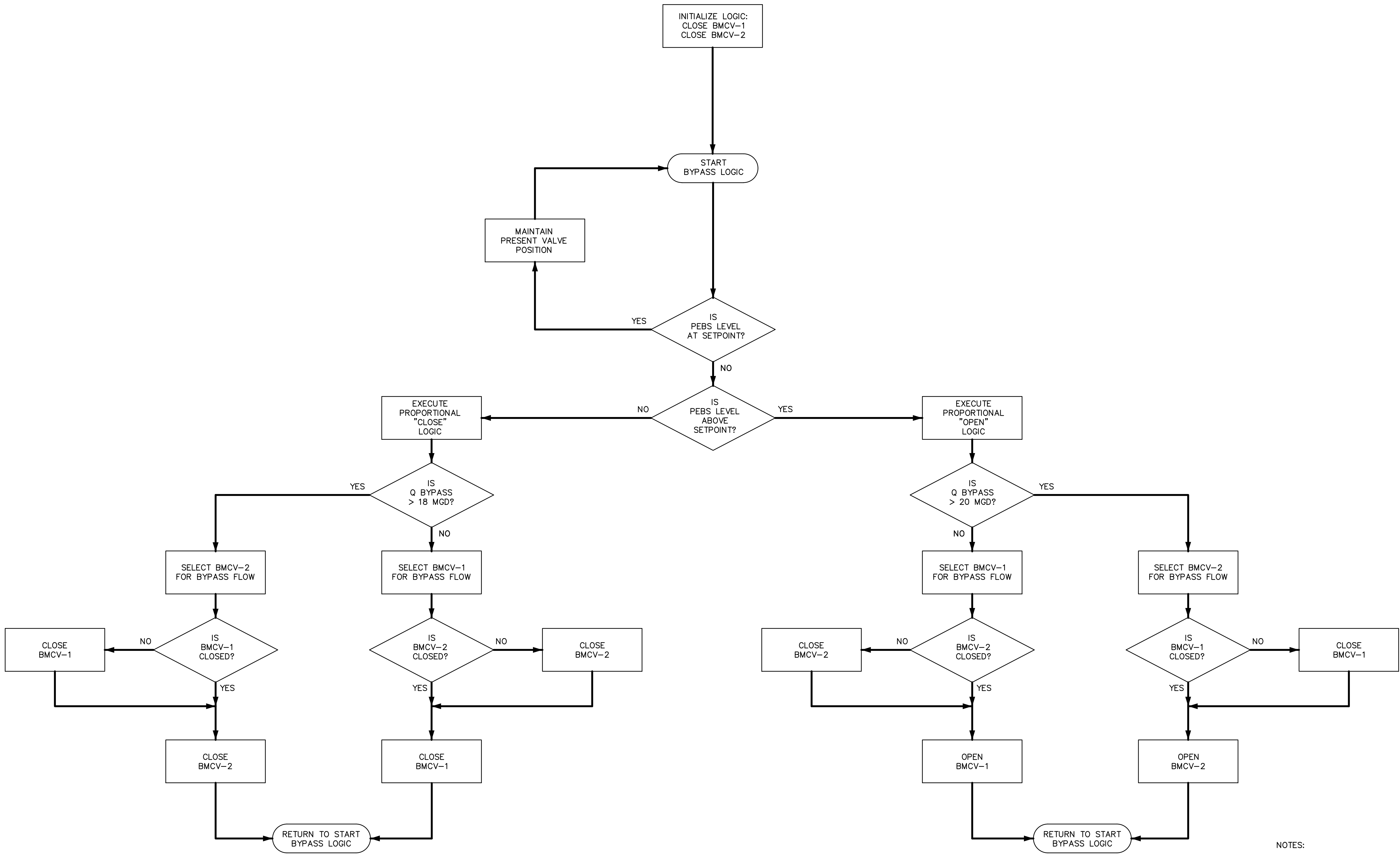
4.10.6.2 Field Instruction

The operator should review and know the location and purpose of each of the following items:

<u>Item</u>	<u>Operator Initials</u>
General	
PLC-PEB	_____
LCP-PEB	_____
PCC Alarm	_____
Primary Effluent Sampler	_____
Primary Effluent Channel and Bypass Structure	_____
Overflow Weir	_____
Level Sensor	_____
PEB Drain Pump	_____
Isolation Valves	_____
Level Controls	_____
LCP-PEB Controls and Alarms	_____
Primary Effluent Bypass Metering Structures	_____
48-inch Flowmeter	_____
24-inch Flowmeter	_____
42-inch Metering Control Valve	_____

18-inch Metering Control Valve	_____
Isolation Valves	_____
Sump Pumps	_____
LCP-BMSSP	_____
Local Controls	_____
LCP-PEB Controls and Alarms	_____
Primary Effluent Bypass Junction Structure	_____
Primary Chlorination Dilution Water Pump	_____
Isolation Valves	_____
Sodium Hypochlorite Injection Piping/Valves	_____
Local Controls	_____
LCP-PEB Controls and Alarms	_____
Primary Effluent Residual Sample Pump	_____
Isolation Valves	_____
Suction Strainer	_____
Oxidation Reduction Potential Chlorine Analyzer	_____
pH Controller	_____
Local Controls	_____
LCP-PEB Controls and Alarms	_____

XREFS: \\TLBUK.dwg IMAGES:None
User:CARSON Spec:Pirnie STANDARD File:c:\proj\1991037\3&M schematics\130M FIG 4.10-1.DWG Scale:1:1 Date:03/17/2011 Time:15:41 Layout:Blank



NOTES:

1. PEBS IS THE ABBREVIATION FOR PRIMARY EFFLUENT BYPASS STRUCTURE.

2. PEBS LEVEL SETPOINT SHALL BE AN OPERATOR ADJUSTABLE SETPOINT IN PLC-PEB VIA THE PLC WORK STATION IN LCP-PEB. THEORETICAL SETPOINT SHALL BE FIELD ADJUSTED DURING START UP.

NOTE:

LOGIC FLOW DIAGRAM NO LONGER APPLIES DUE TO ADDITION OF SECONDARY TREATMENT FACILITIES. BMCV-1 AND BMCV-2 STILL REMAIN, BUT NO LONGER IN SERVICE.

**MALCOLM
PIRNIE**

REVISIONS				REMARKS
NO.	BY	DATE		

DES MP
DWN PAL
CKD LDT



INTERNATIONAL BOUNDARY & WATER COMMISSION
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
South Bay International Wastewater Treatment Plant

OPERATION AND MAINTENANCE MANUAL
PRIMARY EFFLUENT STRUCTURES
PRIMARY EFFLUENT BYPASS
LOGIC FLOW DIAGRAM

NOT TO SCALE

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DATE MARCH 2011
FIGURE 4.10-1
CAD REF. NO. 130M FIG 4.10-1

4.11 FINAL EFFLUENT STRUCTURES

4.11.1 Description of Controls and Operation

4.11.1.1 General

Refer to the general control and operational philosophy description presented in Section 4.01.

The Final Effluent Structures include the Effluent Blending Structure (EBS), the Effluent metering Structure (EMS) and the Effluent Distribution Structure (EDS). As identified in Chapter 3, Section 1.5.11, the EBS receives primary effluent flow via the PE By-Pass Structure (PEBPS) and the PE By-Pass Junction Structure (PEBPJS) under a bypass event when the plant flow exceeds roughly 48.75 MGD and receives secondary effluent flow secondary sedimentation tanks effluent channel.

The blended primary effluent flows (under a by-pass event) and secondary effluent flows are discharged via gravity to the EMS, then by gravity to the EDS and ultimately to the South Bay Land Outfall (SBLO) and South Bay Ocean Outfalls (SBOO).

A schematic for the Final Effluent Structures is presented in Figure 3.11-1. The schematic for sodium hypochlorite addition to the Final Effluent Structures, including the Chemical Dilution Water Pump, is presented in Figure 3.11-2.

4.11.1.2 Effluent Blending Structure

The Effluent Blending Structure (EBS) is equipped with three motor-operated slide gates. These are:

- Primary Effluent Bypass Gate 1 (66”) that is feed from the PEBJS.
- Secondary Effluent Gate 1 (84”) that is feed from the secondary effluent channel.
- Blended Effluent Gate 1 (96”) that allows discharge from the EBS to EMS.

All of the above gates remain open during normal operation. All gate controls are local. Each gate is provided with a Lock-Out-Stop (LOS) switch, and with Open and Close pushbutton switches, all at the gate location for local, manual control. The position of the gate is indicated locally by “Open” and “Closed” indicating lights and on SCADA.

Each gate is provided with motor overload and over-torque indicator lights at the motor location.

Sodium hypochlorite from the Chlorination facility is injected into the plant effluent line at the EBS for disinfection. Chlorination Dilution Water Pumps (CDWP1 and CDWP2) provide mixing of the sodium hypochlorite with the final effluent. The dilution water pumps (CDWP1 and CDWP2) are each provided with a field mounted ROT switch and with an On/Off switch at LCP-ES. A limit switch on the pump's discharge check valve senses failure, and sends a flow failure signal to LCP-ES and to SCADA. A motor failure alarm is also annunciated at LCP-ES and on SCADA. Both alarms are input to the common "EFFLUENT STRUCTURE SYSTEM FAILURE" alarm at the PCC. Once the limit switch has detected pump failure, a reset button must be pressed to restart the pump. The pump is also provided with a run light at LCP-ES.

A primary bisulfate dilution water pump from an existing dechlorination system is located at the EBS. Under the current operational strategy, this existing de-chlorination feed control system will **not** be used to dechlorinate secondary effluent, but remains functional in the field. The primary bisulfite dilution water pump can be operated from a field mounted ROT switch and with an On/Off switch at LCP-ES. A limit switch on the pump's discharge check valve will sense pump failure, and can send a signal to an annunciator at LCP-ES. A motor failure alarm is also annunciated at LCP-ES. Both alarms are input to the common "EFFLUENT STRUCTURE SYSTEM FAILURE" alarm at the PCC. Once the limit switch has detected pump failure, a reset button must be pressed to restart the pump. The pump is also provided with a run light at LCP-ES. Currently, this bisulfate dilution water pump is locked out of service and will not be used.

4.11.1.3 Effluent Metering Structure

A 48" magnetic flow meter is located in the Effluent Metering Structure (EMS) to measure total plant flow. A local flow indicator/transmitter is provided at the flow meter. A flow signal is sent to LCP-ES and SCADA where instantaneous flow is indicated and recorded. The flow signal is also used to control the plant effluent sampler located at the EMS.

A plant effluent chlorine residual analyzer located on the west wall of the EMS is provided with a final effluent sample via a sample pump also located on the west wall of the EMS. The pump is provided with a local ROT switch and with an On/Off switch at LCP-ES. LCP-ES also contains a run light, a motor fail annunciator, and a flow failure annunciator. Flow failure is detected by a flow switch on the pump's discharge. Both failure alarms are input to the common "EFFLUENT STRUCTURE SYSTEM FAILURE" alarm and on SCADA. Once the limit switch has detected pump failure, a reset button must be pressed to restart the pump.

The chlorine analyzer indicates chlorine residual locally and inputs the signal to the PLC-PEB which outputs the signal to LCP-ES and SCADA where it is indicated and recorded, and to LCP-NaOC1 for indication of chlorine residual, recording, and alarm at LCP-NaOC1, and for control of the Effluent Chlorination Pumps as described in Section 4.5.

An "EFFLUENT CHLORINE RESIDUAL LOW" alarm is provided at LCP-ES and on SCADA.

A sump pump is provided in the Effluent Metering Structure. The pump is provided with an HOA switch in LCP-EMSSP. In the "Hand" position, the pump runs continuously. In the "Auto" position, the pump is operated by mercury bulb float-type level switches. A high-high level switch triggers an alarm at both LCP-EMSSP, at LCP-ES and on SCADA.

The pump is disabled when high motor winding temperature is sensed by temperature switches. Moisture elements are provided for the pump, and trigger a local alarm. Moisture detection and high temperature detection are combined in a "EMSSP FAILURE" alarm at LCP-ES. These failure conditions, plus high high sump level, are input to the common "EFFLUENT STRUCTURE SYSTEM FAILURE" alarm on SCADA.

4.11.1.4 Canyon Collector Meter Vault

Although not part of the Final Effluent Structures, two magnetic flow meters are located in the Canyon Collector Meter Vault on the 16-inch and 30-inch canyon collector pipelines to measure influent wastewater flows from the Hollister Street Pump Station to the tank drain system. Each flow meter has a local flow indicator. Each flow meter transmits an analog signal to LCP-ES and to SCADA. Chart recorders at LCP-ES individually record

flows through the 16-inch and the 30-inch force mains. Flows from the two meters are summed at LCP-ES and on SCADA. A corresponding analog signal is transmitted to LCP-PEB and SCADA to record and display instantaneous and totalized flow from the two Hollister Street Pump Station force mains.

Four buried plug valves are located outside the Canyon Collector Meter Vault to isolate the force mains from the tank drain system and the flow meters.

A sump pump is provided in the Canyon Collector Meter Vault. The pump is provided with an HOA switch in LCP-CCSP. In the “Hand” position, the pump runs continuously. In the “Auto” position, the pump is operated by mercury bulb float-type level switches. A high high level switch triggers an alarm at LCP-CCSP, LCP-ES and on SCADA.

The pump is disabled when high motor winding temperature is sensed by temperature switches. Moisture elements are provided for each pump, and trigger a local alarm. Moisture detection and high temperature detection are combined in a “CCMVSP FAILURE” alarm at LCP-ES. These failure conditions, plus high high sump level, are input to the common “CCMVSP FAILURE” on SCADA.

4.11.2 Step by Step Start-Up Procedures

4.11.2.1 General System Start-Up Procedures

The Final Effluent Structures should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Visually inspect all structures for any signs of damage.
3. Ensure that control panels LCP-ES, LCP-EMSSP, and LCP-CCSP are energized.
4. Ensure that the circuit breakers at the panel of Substation T16 are energized for all equipment to be operated.
5. Ensure that the gates at the EBS are in their position.
6. Ensure that the flow meters are energized and operational.

4.11.2.2 Individual Equipment Start-Up Procedures

4.11.2.2.1 Effluent Blending Structure

Primary Effluent Bypass and Blended Effluent Gates

Start up the primary effluent bypass and blended effluent gates according to the procedures listed below:

1. Verify that the gates are energized.
2. Press the Open pushbutton for each gate.
3. Verify that each gate has opened fully.

Chlorination Dilution Water Pumps

Start up the chlorination dilution water pumps (CDWP1 and CDWP 2) according to the procedures listed below:

1. Verify that the suction and discharge isolation valves are opened.
2. Place the ROT switch in the “Remote” position.
3. Place the pump into operation as follows:
 - a. Place the On/Off switch at LCP-ES in the “On” position.
 - b. After a 0 to 180 second delay, the pump will start and will run continuously.
4. Visually verify that the pump is operating.

Primary Bisulfite Dilution Water Pump

Start up the primary bisulfite dilution water pump according to the procedures listed below:

1. Verify that the suction and discharge isolation valves are opened.
2. Place the ROT switch in the “Remote” position.
3. Place the pump into operation as follows:
 - a. Place the On/Off switch at LCP-ES in the “On” position.
 - b. After a 0 to 180 second delay, the pump will start and will run continuously.
4. Visually verify that the pump is operating.

4.11.2.2.2 Effluent Metering Structure

Plant Effluent Residual Sample Pump

Start up the plant effluent residual sample pump according to the procedures listed below:

1. Verify that the chlorine residual analyzer is energized and operational.
2. Place the ROT switch in the “Remote” position.
3. Place the pump into operation as follows:
 - a. Place the On/Off switch at LCP-ES in the “On” position.
 - b. After a 0 to 180 second delay, the pump will start and will run continuously.
4. Visually verify that the pump is operating.

Effluent Metering Structure Sump Pump

Start up the effluent metering structure sump pump according to the procedures listed below:

1. Open the pump’s discharge isolation valve.
2. Place the pump’s ROT switch in the “Remote” position.
3. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the HOA switch at LCP-EMSSP in the “Auto” position.
- b. In the “Auto” mode, the pump operates as called for by level signals from float switches. Under normal conditions, the pump will start upon a high level signal after a 0 to 180 second delay, and will operate until a low level signal calls for it to shut down.

Manual Mode of Operation

- a. Place the HOA switch at LCP-EMSSP in the “Hand” position.
- b. After a 0 to 180 second delay, the pump will start and will run continuously until manually shut down.
4. Visually verify that the pump is operating.

4.11.2.3 Canyon Collector Meter Vault

Canyon Collector Meter Vault Sump Pump

Start up the canyon collector meter vault sump pump according to the procedures listed below:

1. Open the pump's discharge isolation valve.
2. Place each pump's ROT switch in the "Remote" position.
3. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the HOA switch at LCP-CCSP in the "Auto" position.
- b. In the "Auto" mode, the pump operates as called for by level signals from float switches. Under normal conditions, the pump will start upon a high level signal after a 0 to 180 second delay, and will operate until a low level signal calls for it to shut down.

Manual Mode of Operation

- a. Place the HOA switch at LCP-CCSP in the "Hand" position.
 - b. After a 0 to 180 second delay, the pump will start and will run continuously until manually shut down.
4. Visually verify that the pump is operating.

4.11.3 Step by Step Shutdown Procedures

4.11.3.1 General System Shutdown Procedures

The Effluent Structures are normally always in operation. IF A SHUTDOWN OF THE EFFLUENT STRUCTURES IS REQUIRED IT NEEDS TO BE COORDINATED BY THE IBWC-US SECTION WITH THE IBWC-MEXICO SECTION. If a shutdown is required it should be done according to the following general procedures:

1. Refer to the General Shutdown Procedures presented in Section 4.0.3.
2. Shut down the Effluent Blending Structure according to the procedures presented in Section 4.11.3.2.1.
3. Shut down the Effluent Metering Structure according to the procedures presented in Section 4.11.3.2.2.

4. Shut down the Canyon Collector Meter Vault according to the procedures presented in Section 4.11.3.2.3.

4.11.3.2 Individual Equipment Shutdown Procedures

4.11.3.2.1 Effluent Blending Structure

Shut down the Effluent Blending Structure according to the procedures listed below:

1. Hose down the structure, and allow the structure to drain to the effluent discharge structure.
2. Close the primary effluent bypass gate and plant effluent gate by pressing the Close pushbuttons located at each gate's motor operator.
3. Verify that both gates are fully closed.
4. Any liquid remaining in the structure must be pumped out using a portable submersible pump and safely disposed of.

Primary Bisulfite Dilution Water Pump

Shut down the primary bisulfite dilution water pump according to the procedures listed below:

1. Turn the pump's On/Off switch at LCP-ES to the "Off" position.
2. Verify the pump has stopped.
3. Lock the appropriate ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect power source and close the isolation valves on the pump suction line.

Chlorination Dilution Water Pumps

Shutdown the chlorination dilution water pumps (CDWP1 and CDWP 2) according to the procedures listed below:

1. Turn the On/Off switch(es) to the "Off" position for CDWP1 and/or CDWP2 at LCP-ES.
2. Verify pump operation has stopped.
3. Lock the appropriate ROT switch(es).

4. If the pump(s) is/are to be out of service for an extended period of time, disconnect from power source and close the isolation valves on the pump suction and discharge lines.

4.11.3.2.2 Effluent Metering Structure

Plant Effluent Residual Sample Pump

Shut down the plant effluent residual sample pump according to the procedures listed below:

1. Shut down the chlorine residual analyzer.
2. Turn the pump On/Off switch at LCP-ES to the “Off” position.
3. Verify the pump has stopped.
4. Lock the appropriate ROT switch.
5. If the pump is to be out of service for an extended period of time, disconnect power source and close the isolation valves on pump suction and discharge lines.

Effluent Metering Structure Sump Pump

Shut down the effluent metering structure sump pump according to the procedures listed below:

1. Turn the pump’s HOA switch at LCP-EMSSP to the “Off” position.
2. Verify the pump has stopped.
3. Lock the pump’s ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect the power source and close the isolation valve on the discharge of the pump.

4.11.3.2.3 Canyon Collector Meter Vault

Canyon Collector Meter Vault Sump Pumps

Shut down the canyon collector meter vault sump pump according to the procedures listed below:

1. Turn the pump's HOA switch at LCP-CCSP to the "Off" position.
2. Verify the pump has stopped.
3. Lock the pump's ROT switch.
4. If the pump is to be out of service for an extended period of time, disconnect the power source and close the isolation valve on the discharge of the pump.

4.11.4 Alarm and Status Annunciation

4.11.4.1 Effluent Blending Structure

The following alarm/status annunciation and indication components are associated with the Effluent Blending Structures:

<u>Alarm/Status</u>	<u>Display Location</u>
General	
Effluent Structure System Failure	SCADA
Effluent Distribution System Failure	SCADA
Motor Operated Gates	
Primary Effluent Bypass Gate 1 Open Light	Field
Primary Effluent Bypass Gate 1 Closed Light	Field
Primary Effluent Bypass Gate 1 Overload Alarm Light	Field
Primary Effluent Bypass Gate 1 Over-torque Alarm Light	Field
Plant Effluent Gate Open Light	Field
Plant Effluent Gate Closed Light	Field
Plant Effluent Gate Overload Alarm Light	Field
Plant Effluent Gate Overtorque Alarm Light	Field
Secondary Effluent Gate 1 Open Light	Field
Secondary Effluent Gate 1 Closed Light	Field

Secondary Effluent Gate 1 Overload Alarm Light	Field
Secondary Effluent Gate 1 Overtorque Alarm Light	Field
Chlorine Dilution Water Pumps	
CDWP1 Run Light	LCP-ES and SCADA
CDWP1 Flow Failure Annunciator	LCP-ES
CDWP1 Motor Failure Annunciator	LCP-ES
CDWP2 Run Light	LCP-ES and SCADA
CDWP2 Flow Failure Annunciator	LCP-ES
CDWP2 Motor Failure Annunciator	LCP-ES
Primary Bisulfite Dilution Water Pump	
PBDWP Run/Off Lights	Motor Starter
PBDWP Flow Failure Annunciator	LCP-ES and SCADA
PBDWP Motor Failure Annunciator	LCP-ES and SCADA
PBDWP Run Light	LCP-ES and SCADA

4.11.4.2 Effluent Metering Structure

The following alarm/status annunciation and indication components are associated with the Effluent Metering Structure:

<u>Alarm/Status</u>	<u>Display Location</u>
General	
Plant Effluent Chlorine Residual Level	Field
Plant Effluent Chlorine Residual Low	LCP-NaOC1 and SCADA
Flowmeter	

Plant Effluent Flow	Field
Plant Effluent Flow Indicator/Recorder	LCP-ES and SCADA
Plant Effluent Flow Totalizer	LCP-ES and SCADA
Plant Effluent Flow	SCADA
Plant Effluent Residual Sample Pump	
Plant Effluent Residual Sample Pump Run/Off Lights	Motor Starter
Plant Effluent Residual Sample Pump Flow Failure Annunciator	LCP-ES and SCADA
Plant Effluent Residual Sample Pump Motor Failure Annunciator	LCP-ES and SCADA
Plant Effluent Residual Sample Pump Run Light	LCP-ES and SCADA
Sump Pump	
Sump Pump Moisture Detection Light	LCP-EMSSP
Sump Pump Temperature Detection Light	LCP-EMSSP
Sump Pump Run Light	LCP-EMSSP
EMS Sump High High Level Light	LCP-EMSSP
EMS Sump High High Level Alarm Annunciator	LCP-ES
EMSSP Failure Annunciator	LCP-ES

4.11.4.3 Canyon Collector Meter Vault

Flowmeters

Flowmeter 1 Flow Indicator/Transmitter	Field
Flowmeter 2 Flow Indicator/Transmitter	Field

Flowmeter 1 Flow Indicator/Recorder	LCP-ES and SCADA
Flowmeter 2 Flow Indicator/Recorder	LCP-ES and SCADA
Flow 1 & 2 Combined Indicator/Recorder	SCADA
Flow 1 & 2 Combined Totalizer	SCADA
Canyon Collector Meter Vault Sump Pump	
Sump Pump Moisture Detection Light	LCP-CCSP and SCADA
Sump Pump Temperature Detection Light	LCP-CCSP and SCADA
Sump Pump Run Light	LCP-CCSP and SCADA
CCMV Sump High High Level Light	LCP-CCSP and SCADA
CCMV Sump High High Level Alarm Annunciator	LCP-ES and SCADA
CCMVSP Failure Annunciator	LCP-ES and SCADA

4.11.5 Daily Operational Checks

4.11.5.1 General

1. Refer to the general daily operation checks requirements described in Section 4.0.5.
2. Visually inspect all structures for any signs of damage.
3. Consult Section 4.11.5.2 and 4.11.5.4 and the appropriate manufacturer's operation and maintenance manuals for specific monitoring requirements.

4.11.5.2 Effluent Blending Structure

General

1. Check the level in the Effluent Blending Structure to verify that it is within the established operating range.
2. Verify that primary effluent bypass and the plant effluent gates are opened.
3. Verify that Secondary Effluent Gate 1 is closed.

Chlorine Dilution Water Pumps

1. Check the position of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check the discharge pressures using the local pressure gauge.
5. Check control settings of the pump at LCP-ES to confirm the requirements of your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the chlorine dilution water pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Self-Priming Centrifugal Pumps – Chlorine Dilution Water Pumps (Section 11 82 20). Prepared by Gierlich Mitchell, Inc., 2010.

Primary Bisulfite Dilution Water Pump

1. Check the position of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check the discharge pressures using the local pressure gauge.

5. Check control settings of the pump at LCP-ES to confirm the requirements of your Operations Supervisor.
6. Check and record run time at Substation T16.
7. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the primary bisulfite dilution water pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Self-Priming Centrifugal Pumping Equipment (Section 11404). Prepared by Gorman-Rupp Company, 1998.

4.11.5.3 Effluent Metering Structure

General

1. Verify that the flow meter is operating properly, and that the local flow reading corresponds to the readout at LCP-ES and on SCADA.
2. Verify that the plant effluent sampler is operating properly.

Plant Effluent Residual Sample Pump

1. Check the position of the manually operated valves on the pump suction, discharge, and interconnection lines to confirm the requirements of your Operations Supervisor.
2. Check the pump operation to see that it is operating smoothly and quietly.
3. Check the pumps for leaks, excessive noise, and temperature (hand touch).
4. Check the pump's discharge pressure using the local pressure gauge.
5. Verify that the chlorine residual analyzer is operational, and that the chlorine reading is as set by PLC-NaOC1.
6. Verify that spent sample is draining as appropriate.
7. Check control settings of the pump at LCP-ES to confirm the requirements of your Operations Supervisor.
8. Check and record run time at Substation T16.
9. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the plant

effluent residual sample pump:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Self - Priming Centrifugal Pumping Equipment (Section 11404). Prepared by Gorman-Rupp Company, 1998.

Plant Effluent Metering Structure Sump Pump

1. Check the position of the manually operated valves on the pump discharge line to confirm the requirements of your Operations Supervisor.
2. Visually inspect the sump level. If it is above the pump's operating level, verify that the pump is operating.
3. Check the pump operation to verify that the pump is operating smoothly and quietly.
4. Check the pump for leaks, excessive noise, and temperature (hand touch).
5. Check control settings of the sump pump at LCP-EMSSP to confirm the requirements of your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the sump pump:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Sump Pumps (Section 11016). Prepared by Barnes Pumps, Inc. 1998.

4.11.5.4 Canyon Collector Meter Vault

General

1. Check the position of all buried plug valves to verify that they are opened.
2. Verify that the flow meters are operating properly, and that the local flow reading corresponds to the readout at LCP-ES and on SCADA.

Canyon Collector Meter Vault Sump Pump

1. Check the positions of the manually operated valve on the pump discharge line to confirm the requirements of your Operations Supervisor.
2. Visually inspect the sump level. If it is above the pump's operating level, verify that the pumps are operating.

3. Check the pump operation to verify that operating pump is operating smoothly and quietly.
4. Check the pump for leaks, excessive noise, and temperature (hand touch).
5. Check control settings of the sump pump at LCP-CCSP to confirm the requirements of your Operations Supervisor.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the sump pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant -Sump Pump (Section 11016). Prepared by Barnes Pump, Inc., 1998.

4.11.6 Training Record

The following record should be used by the Operator to ensure a complete understanding of the Effluent Structures:

4.11.6.1 Reading Assignment

1. Chapters 8, 14 - Operation of Wastewater Treatment Plants - MOP 11. Water Environment Federation, 1996.
2. Chapter 13, Operation of Wastewater Treatment Plants - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1993.

4.11.6.2 Field Instruction

The operator should review and know the location and purpose of each of the following items:

<u>Item</u>	<u>Operator Initials</u>
General	
PLC-PEB	_____
LCP-ES	_____

Plant Effluent Sampler	_____
PCC Alarm	_____
Effluent Blending Structure	_____
Primary Effluent Bypass Gate	_____
Primary Effluent Bypass Gate Motor Operator	_____
Plant Effluent Bypass Gate	_____
Plant Effluent Bypass Gate Motor Operator	_____
Secondary Effluent Bypass Gate	_____
Secondary Effluent Bypass Gate Motor Operator	_____
Primary Bisulfite Dilution Water Pump	_____
Chlorine Dilution Water Pumps (CDWP 1 and 2)	_____
Isolation Valves	_____
Sodium Hypochlorite Injection Piping/Valves	_____
Local Controls	_____
LCP-ES Controls and Alarms	_____
Effluent Metering Structure	_____
Plant Effluent Sampler	_____
Plant Effluent Flow meter	_____
Plant Effluent Residual Sample Pump	_____
Isolation Valve	_____
Suction Strainer	_____

Total Chlorine Residual Analyzer	_____
LCP-ES Controls and Alarms	_____
Sump Pump	_____
Isolation Valves	_____
LCP-EMSSP Controls and Alarms	_____
Local Controls	_____
LCP-ES Controls and Alarms	_____
Canyon Collector Meter Vault	_____
30-inch Flow meter	_____
16-inch Flow meter	_____
Isolation Valves	_____
Suction Strainer	_____
Sump Pump	_____
Isolation Valves	_____
Local Controls	_____
LCP-CCSP Controls and Alarms	_____

4.12 STANDBY POWER GENERATION FACILITIES

4.12.1 General Description of Controls and Operation

4.12.1.1 General

Refer to the general control and operational philosophy description presented in Section 4.0.1. The Standby Power Partial One-Line Diagram is shown in Figure 2.12-3. The Plant Power Block Diagram is shown in Figure 2.12-4.

Two 2000 kVA, 2500 kVA, 12 kV, 3 Phase, 60 Hz diesel generators are located in containers adjacent to the GEN-LCC Building. The engine control panels LCP-ENG-1 and LCP-ENG-2 are located in their respective container.

The 12 kV generator switchgear SG-GDB with generator VCB-G1, VCB-G2, and tie VCB's AGT and BGT is located in the GEN-LCC. The LCP-G1, LCP-G2 and MCP-GEN generator control panels are located in the GEN-LCC.

Generator G1 fuel oil system control panel FCP-FOS1 is located in GEN-LCC. Generator G2 fuel oil system control panel FCP-FOS2 is located at Generator No. 2 day tank adjacent to the container.

The 48 VDC battery and charger for operation of the SG-GDB vacuum circuit breakers (VCB) is located in the GEN-LCC.

Generated 12 kV power is fed from SG-GDB via underground conduits to VCB's A7 and/or B7 in the plant main 12 kV switchgear MS-1 located in the plant main switchgear building. See Figure 2.12-3 Standby Power Partial One-Line Diagram.

Generator status, alarm and control operations are available at the LCP-G1, LCP-G2 and MCP-GEN panels located in the GEN-LCC.

When utility power is lost, generators G1 and G2 automatically start and synchronize and connect via generator breakers G1 and G2 onto generator switchgear SG-GDB bus. MS-1 main breaker A opens and AGT or BGT closes energizing MS-1 bus via main switchgear breakers A7 and/or B7. When utility power is restored, the generator controls synchronize the generator output with the utility and an over-lapping stepless re-transfer to utility power takes place, with MS-1 main breaker closing and AGT or BGT tripping immediately after.

4.12.1.2 Containerized Generators

The South Bay IWTP is fed power by San Diego Gas & Electric (SDG&E) through their San Ysidro (SYO) utility feeder. Startup of the generators is automatic upon failure of utility power. Return to utility power is stepless and automatic after utility power restoration is confirmed. Refer to Section 7.1.4 for a detailed description of the equipment automatic and manual start-ups when on generator power, after a utility failure.

Engine Control Panel (LCP-ENG)

The engine control panels (LCP-ENG) are located inside their respective generator containers. Each LCP-ENG contains the following pushbuttons, switches, meters, and/or screens:

- Engine Control Switch (Auto/Manual/Test/Maintenance)
- Emergency Stop Pushbutton (aborts cool down)
- Voltage adjust rheostat
- Starting aid switch
- Governor switch
- Panel light and switch
- Upper display panel shows AC voltage, current, and frequency
- Lower display panel shows battery voltage, engine hours, engine speed, engine oil pressure, and engine coolant temperature
- Lamp test pushbutton
- Key pad to control the upper and lower display panels

Indicating alarm lights are provided at the LCP-ENG for the following alarms on which shutdown of the generator will occur: “HIGH WATER TEMPERATURE”, “LOW COOLANT LEVEL”, “LOW OIL PRESSURE”, “ENGINE OVERCRANK”, “ENGINE OVERSPEED”, and “EMERGENCY STOP”. When one of the faults occurs, the engine is shutdown if it is running and it is not allowed to start. Additionally when a “FAULT SHUTDOWN” indicating light illuminates, the engine is shutdown, and a diagnostic fault code is immediately shown on the upper display of the LCP-ENG.

Other alarms are provided at the LCP-ENG to warn of engine conditions before they become severe enough to shutdown the engine. The “FAULT ALARM” indicating light will illuminate to indicate a fault but the engine will continue to operate. Other specific lights which will not shutdown the engine include: “HIGH COOLANT TEMP”, “LOW COOLANT LEVEL”, “LOW OIL PRESSURE”, and “LOW FUEL OIL”.

Status lights are provided at the LCP-ENG and include: System Not in Auto, Low Battery Voltage, Battery Charger Failure, and Air Damper Closed.

The manual starting and stopping of the engine from the LCP-ENG should not be done unless the master control switch located at the MCP-GEN has been placed in the “Maintenance” position, which blocks operation of the automatic generator paralleling and VCB-G1, VCB-G2 closing.

Generator Control Panels (LCP-G1 and LCP-G2)

The Generator control panels are located in the GEN-LCC. The generators can be manually and automatically controlled from the LCP's. Control and monitoring status are provided.

Mounted on the door is a touch screen HMI which displays the following graphics:

- One-Line Diagram
- Manual Parallel
- Engine Status Setup
- Metering
- Alarm Status
- KW Trending
- Event Data Log

Also mounted on the door is a generator control operation and alarm sub-panel containing the following:

- System Fail indicating light
- Not In Auto indicating light
- Engine Locked Out indicating light
- Engine Run indicating light
- Emergency Stop pushbutton
- Four position selector switch for “Reset-Off”, “Off-Cooldown”, “Automatic”, and “Manual” operation

Note: All alarms at the LCP-G1 and LCP-G2 will send a common alarm signal to the MCP-GEN as a “SYSTEM ALARM”.

Generator Switchgear SG-GDB

The 12 kV generator switchgear line-up consists of the three structures located in the GEN-LCC. One structure contains 12 kV breakers AGT and BGT. The second and third structures contain generator breakers G1 and G2.

VCB-AGT and VCB-BGT Circuit Breakers

Either breaker AGT or BGT in structure No. 1 must be selected to feed power from SG-GDB to the main switchboard MS-1. Selection is made with a lockable switch located on the front of the generator MCP-GEN.

When utility power is lost the generators start and the generator breakers G1 and G2 synchronize to the GDB bus and close, energizing GDB bus. The pre-selected breaker AGT or BGT closes, energizing main switchgear MS-1 via main switchgear breaker A7 and/or B7.

Located on front of the AGT and BGT compartments are the following devices and relays:

- Trip Relay reset handle (Device 86)
- Open/Close/Trip control switch
- Closing Spring charged
- Open indicating light
- Closed indicating light
- Phase Over Current Relays (3) (Device 50/51)
- Ground Fault Relay (1) (Device 50G)

The opening and closing of AGT and BGT is automatically controlled by the program residing in the MCP-GEN PLC.

Generator Breaker G1

Generator No. 1 circuit breaker VCB-G1 in structure No. 2 has the following devices mounted on the door:

- Trip Relay reset handle (Device 86)
- Differential Relay (3) (Device 87)
- Revere Power Relay (1) (Device 32)
- Phase Over Current Relay (1-3 ph) (Device 51)
- Ground Fault Relay (1) (Device 50G)
- Open Indicating Light
- Closed Indicating Light
- Breaker Locked Out Indicating Light
- Closing Spring Charged Indicating Light

Generator breaker VCG-G1 is automatically controlled for tripping and closing by the generator PLC program. Closing in automatic mode occurs when connecting to the GDB dead bus. When automatically paralleling with G2, the breaker closing is

controlled by the synchronizer.

Generator G2

Generator No. 2 circuit breaker VCB-G2 in structure No. 3 has the following devices mounted on the door:

- Trip Relay reset handle (Device 86)
- Ground Fault Relay (Device 50G)
- Open Indicating Light
- Closed Indicating Light
- Breaker Locked Out indicating light
- Closing Spring Charged Indicating Light
- Generator Management Relay SR489 (Provides Devices 87, 50G, 32, 46, 51)

Generator breaker VCB-G2 is automatically controlled for tripping and closing by the generator program. Closing in automatic mode occurs when connecting to the GDB dead bus. When automatically paralleling with G1, the breaker closing is controlled by the synchronizer.

Generator Control Panels LCP-G1 and LCP-G2

The generator control panels are located in the GEN-LCC and provide automatic and manual control of the generators.

Mounted on the door of each panel are the following:

- Generator control sub-panel with indicating lights for system failure, controls not in auto, engine locked out, engine running, a push-button for emergency stop and a selector switch with off/reset-off cool down-automatic-manual positions.
- Manual control graphic touch screen display.

The four position selector switch provides selection of generator operating mode.

The touch screen provides the following graphics:

- One-Line Diagram
- Engine Set-Up Status
- Metering
- Alarm Status
- KW Trending
- Event Data Log

The One-Line Diagram graphic shows the open/closed status of A7, B7, AGT, BGT, G1 and G2 breakers, presence of utility voltage.

The Engine Status setup graphic displays engine parameters, and allows adjustments.

The metering graphic displays all electrical values for voltage, AMP's, kilowatts, VAR, etc.

The alarm status graphic displays the following monitored parameters:

- Hi Coolant Temp
- Low Coolant Temp
- Low Oil Pressure
- Generator Emergency STDP Button
- Generator Failure to Synchronize
- Generator VCB-G1 Close Failure
- Generator VCB-G1 Lockout Alarm Trip
- Generator Reverse Power Shutdown
- Generator Over Voltage Shutdown
- Over Crank
- Over Speed
- ECS NIA Alarm
- Network Fault
- CAN Bus Error
- Charger Fault
- Sync NIA Alarm
- ACM HB Failure
- I/O Error
- Generator Under Frequency
- Generator Over Frequency
- Generator Under Voltage
- Generator Over Voltage
- Generator Phase Unbalance
- Generator Active Power
- Generator Reverse Power
- Generator Timed Over Current
- Generator Instant Over Current
- Generator V/A Unbalance
- Generator Inductive Reactive Overload
- Generator Capacitive Reactive Overload

Generator Master Control Panel MCP-GEN

The MCP-GEN is located in the GEN-LCC Building and provides status and system control for the Standby Generation System.

Mounted on the door of the panel are the following:

- Digital Paralleling Control Panel with Auto Mode On, Manual Mode On and Maintenance Mode On indicating lights and a four position selector switch Off-Maintenance-Manual-Auto and a three position selector switch AGT-Normal-BGT. The normal position shall not be used.
- Digital Paralleling Control Panel with an Alarm Silence Pushbutton, an Alarm Horn and System Failure and System Alarm indicating lights.
- Manual Control Touch Screen Display

The four position selector switch provides selection of System Operation as Off-Maintenance-Manual-Automatic. Maintenance Mode allows startup of the generator at the Engine Control Panel in the generator container. Manual Mode allows startup from the touch screen. **OPERARTOR SHALL CONSULT MANUFACTURERS O&M MANUALS PRIOR TO ANY/ALL MANUAL OPERATION.**

The touch screen provides the following graphics:

- One-Line Diagram
- Utility Status
- System Status
- Metering
- Alarm Status
- KW Trending
- Event Data Log
- System Setup Control
- Certified Service Tech

No control is available at the MCP-GEN touch screen display. Status only is provided per the preceding list. The event data log provides a historical record of all automatic and manual operations and status changes.

The alarm status graphic displays the following monitored parameters:

- Control Breaker MCB2 Open
- Control Breaker MCB3 Open
- Ethernet No. 1 Fault
- Master ACM 1 Heartbeat Failure
- AGT Generator Bus Fail to Synchronize
- BGT Generator Bus Fail to Synchronize
- AGT Tripped/Lockout
- BGT Tripped/Lockout
- AGT Fail to Close
- BGT Fail to Close
- System Bus Under Frequency
- System Bus Overload

- Fuel Oil Storage System Failure
- Utility Feeder San Ysidro Outage Alarm
- Battery Charger 24V DC Failure
- 48V DC Power to Breakers
- Generator No. 1 Common Alarm
- Generator No. 2 Common Alarm

4.12.1.3 Diesel Fuel Storage Tanks

Each fuel storage tank is furnished with high and low level switches.

Standby Generator No.1 Fuel Storage Tank

For Standby Generator No. 1 Fuel Storage Tank, the high level switch activates a “TANK HIGH LEVEL” alarm (pilot light and horn) at the Warrick supplied fuel oil storage tank control panel FCP-FOST1 at the tank to alert the fuel delivery person that the tank is full. The horn is silenced by a reset pushbutton. The alarm pilot light remains illuminated until the level falls below the setpoint. A fuel storage tank leak detector (inner tank leak) activates an alarm pilot light “TANK LEAK DETECTION” at FCP-FOST1. The alarm pilot light remains illuminated until the leak is no longer detected.

The low level switch activates a “TANK LOW LEVEL” alarm at the FCP-FOST1, and a “FUEL OIL STORAGE TANK LOW LEVEL” alarm at the LCP-FOS1 located in the GEN-LCC. The low level alarm for the fuel storage tank sends a signal to the common “FUEL OIL STORAGE SYSTEM NO. 1 FAIL” on the MCP-GEN touch screen.

Standby Generator No.2 Fuel Storage Tank

For Standby Generator No. 2 Fuel Storage Tank, the high level switch activates a “TANK HIGH LEVEL” alarm (pilot light and horn) when the tank has risen to its set elevation. FCP-FOST2 activates an alarm horn and illuminates its “TANK HIGH LEVEL” ALARM LIGHT. The horn is silenced by a reset pushbutton; however, the alarm pilot light remains illuminated until the level in the tank falls below the setpoint. This alarm is to inform the fuel delivery person that the tank is full.

A fuel storage tank leak detector (inner tank leak) activates an alarm pilot light “TANK LEAK DETECTION” at FCP-FOST2. The alarm is silenced by a reset

pushbutton; however, the alarm pilot light remains illuminated until the leak is no longer detected.

The low level switch activates a “TANK LOW LEVEL” alarm at the FCP-FOST2, and a “FUEL OIL STORAGE TANK LOW LEVEL” alarm at the LCP-FOS2 located in the GEN-LCC. The low level alarm for the fuel storage tank sends a signal to the common “FUEL OIL STORAGE SYSTEM NO. 2 FAIL” on the MCP-GEN touch screen.

4.12.1.4 Diesel Fuel Transfer Pump Stations

Diesel Fuel Transfer Pumps

Each standby generator is provided with two diesel fuel transfer pumps. Each of the transfer pumps are provided with a field-mounted ROT switch at the pump location. In “Remote”, the diesel fuel transfer pumps for Standby Generator No.1 operate as determined in LCP-FOS1 and the diesel fuel pumps for Standby Generator No.2 operate as determined in LCP-FOS2. In “Test”, each pump runs momentarily until the switch is released and spring returns to OFF. The “Off” position is lockable and overrides all controls.

Each transfer pump is provided with a HOA switch mounted on LCP-FOS1 located in the GEN-LCC for Standby Generator No.1 and LCP-FOS2 located on the day tank for Standby Generator No. 2. In the “Hand” mode, the respective pump operates continuously. In the “Off” mode, the pump does not operate except in the “Test” position of the ROT switch. The normal operation is for each HOA switch to be in the AUTO mode. When called to operate, the in-service duty transfer pump is automatically alternated between the two (2) pumps. In the “Auto” position, the pumps for Generator No. 1 are controlled by relays in LCP-FOS1. In “Auto” position the pumps for Generator No. 2 are controlled by signals from its PLC located in the LCP-FOS2.

Failure of the duty pump for Generator No. 1 as detected by a motor overload relay initiates individual “FUEL OIL TRANSFER PUMP FOTP1A OVERLOAD” and “FUEL OIL TRANSFER PUMP FOTP1B OVERLOAD” alarms at LCP-FOS1 in the GEN-LCC and starts the standby pump for Standby Generator No.1. Similarly, failure of the duty pump as detected by a motor overload relay initiates individual “FUEL OIL TRANSFER PUMP FOTP2A OVERLOAD” AND “FUEL OIL TRANSFER PUMP FOTP2B

OVERLOAD” alarms at LCP-FOS2 located at Generator No. 2 day tank and starts the standby pump.

Each of the Standby Generator No.1 diesel fuel transfer pumps are provided with “Run” and “Off” indicating lights and elapsed time meter at LCP-FOS1. Each pump is also provided with an elapsed time meter at LCP-FOS1. Similarly, each of the Standby Generator No.2 diesel fuel transfer pumps are provided with “Run” and “Off” indicating lights and an elapsed time meter at LCP-FOS2.

For Standby Generator No.1, a common “FUEL OIL STORAGE SYSTEM NO.1 FAIL” is annunciated at MCP-GEN and for Standby Generator No.2; a common “FUEL OIL STORAGE SYSTEM NO.2 FAIL” is annunciated at MCP-GEN.

Diesel Fuel Day Tanks

Each diesel fuel day tank is provided with four level switches; low-low level, low level, high level, and high-high level. When the level in the diesel fuel day tank falls to low level, the duty pump starts and operates until the diesel fuel day tank reaches the high level. If the duty pump fails, the standby pump is called to operate. LCP1-FOS1 initiates pump failure alarms for Standby Generator No.1 and LCP1-FOS2 initiates pump failure alarms for Standby Generator No.2.

The low-low level switch for Standby Generator No.1’s diesel fuel tank activates a “FUEL OIL DAY TANK LOW LEVEL” alarm at the field panel FCP-DT1 and at the LCP-FOS1 located in the GEN-LCC and the low-low level switch for Standby Generator No.2’s diesel fuel tank activates a “FUEL OIL DAY TANK LOW LEVEL” alarm at the field panel FCP-DT2 and at the LCP-FOS2 and starts the standby pump. The high-high level switch activates a “FUEL OIL DAY TANK HIGH LEVEL” alarm at the field panel FCP-DT1 and at the LCP-FOS1 for Standby Generator No.1. Similarly, the high-high level switch activates a “FUEL OIL DAY TANK HIGH LEVEL” alarm at the field panel FCP-DT2 and at the LCP-FOS2. A “FUEL OIL DAY TANK LEAK” alarm indicating light at the FCP-DT1 and the LCP-FOS1 for Standby Generator No.1 and a ‘FUEL OIL DAY TANK LEAK” alarm is annunciated at the LCP-DT2 and the LCP-FOS2 for Standby Generator No.2. “FUEL OIL STORAGE SYSTEM NO. 1 FAIL” and “FUEL OIL STORAGE SYSTEM NO.2 FAIL” common alarms are annunciated at MCP-GEN.

Diesel Fuel Overflow Tank

Each diesel fuel overflow tank is provided with two level switches; low level and high level. The low and high level switches stop and start, respectively, the diesel fuel return pump.

Diesel Fuel Return Pump

The diesel fuel return pump for Generator No. 1 is provided with a field-mounted ROT switch and with a HOA switch on LCP-FOS1. For LCP-FOS2 for Standby Generator No.2 the switch is located at the day tank. In the “Hand” mode, the pump operates continuously. In the “Off” mode, the pump does not operate except in the “Test” position of the ROT switch. For Generator No. 1 in the “Auto” position, the pump is controlled by signals from LCP-FOS1 located in GEN-LCC. For Generator No. 2 in the “Auto” position, the pump is controlled by a PLC in LCP-FOS2

Failure of the pump detected by a motor overload relay initiates a “FUEL OIL RETURN PUMP FORP1 OVERLOAD” alarm at LCP-FOS1 for Standby Generator No.1 and “FUEL OIL RETURN PUMP FORP2 OVERLOAD” alarm at LCP-FOS2 for Standby Generator No.2.

For Standby Generator No.1, the pump is provided with “Run” and “Off” indicating lights at LCP-FOS1. The pump is also provided with an elapsed time meter at LCP-FOS1. Similarly, for Standby Generator No.2, the pump is provided with “Run” and “Off” indicating lights and at LCP-FOS2 an elapsed time meter.

4.12.2 General Step by Step Start-Up Procedures

4.12.2.1 General System Start-Up Procedures

The standby generator is designed to start-up automatically when power from the San Ysidro (SYO) utility feeder provided by San Diego Gas & Electric (SDG&E) is interrupted. The Standby Power Generation Facilities should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Ensure that Field Control Panels, FCP-FOST1, FCP-FOST2, FCP-DT1, LCP-FOS2 and FCP-DT2; Local Control Panels LCP-ENG1 and LCP-ENG2 located inside their respective container housings; Local

Control Panels LCP-FOS1, LCP-G1 and LCP-G2 located at the GEN-LCC; and Main Control Panel MCP-GEN located at the GEN-LCC are energized.

3. Ensure that the isolation valves of the diesel fuel oil storage tanks and diesel fuel oil pump stations are open.
4. Ensure that each diesel fuel oil storage tank is in the standby position (See Section 4.12.2.2.2).
5. Ensure that the diesel fuel oil transfer pumps and diesel fuel oil return pumps are in “Auto” (See Section 4.12.2.2.3).
6. Place the standby generators into operation as follows:

Automatic Mode of Operation

- a. If the control switches and pushbuttons are placed in the correct positions for automatic start-up as described in Section 4.12.2.2.1, the standby generators will start-up automatically by signals from the PLC-MPC-GEN located at the GEN-LCC.

Manual Mode of Operation

- a. If the diesel fuel pump stations have failed to operate automatically, manually operate the diesel fuel transfer pumps (See Section 4.12.2.2.3) to keep the day tanks full.
7. Verify that the generators and engines are operating within normal parameters: power output, oil pressure, and oil temperature.
8. Verify that the diesel fuel transfer pumps are operating based on signals from the level indicator in the diesel fuel day tanks.
9. Continuously monitor generators to ensure proper operation and that the generators are not overloaded.
10. The plant will continue to operate on generator power. Monitor generators until power from SDG&E is restored. Transfer to normal utility power is automatic and without interruption (See Shutdown Procedures Section 4.12.3.1).

4.12.2.2 Individual Equipment Start-Up Procedures

4.12.2.2.1 Standby Generators

1. Start-up the standby generators according to the procedures listed below:

Automatic Mode of Operation:

- a. For automatic sequenced MS1 VCB operation and start-up of the generator and plant equipment on loss of SDG&E power the control switches and pushbutton **must be** in the positions indicated in Table 4.12-1.
- b. On SDG&E power fail the following automatic sequence occurs:
 - 12 KV Main Circuit Breaker “A” remains closed.
 - 12 KV Feeder Breaker “A1” and/or “B1” remain closed.
 - 12KV Generator Feeder Breaker “A7” and/or “B7” remain closed.
 - All remaining 12 KV Feeder Breakers open.
 - Generator 1 and Generator 2 start.
 - Main Circuit Breaker “A” opens.
 - Generator 1 or Generator 2 reaches specified speed & voltage.
 - First Generator Circuit Breaker closes on dead bus.
 - Second Generator reaches specified speed & voltage.
 - Generator Circuit Breaker closes when second Generator is in synch with first Generator.
 - Generator Tie Breaker AGT or BGT (pre-selected by switch) closes to energize main 12 KV switchgear with standby power.
 - The following previously opened 12 KV Feeder Breakers automatically close in 3 second intervals in the following order: “A4”, “B4”, “A2”, “B2”, “A3”, “B3”, “A5”, “B5”, “A6”, “B6”.
 - Specific equipment is enabled in a timed sequence to permit manual starting of equipment to gradually increase load on the generators (See Emergency Response Section 7.1.4). Enabled equipment includes the following:
 - NPWPS -2 Lead Jockey Pump (PLC)
 - NPWPS-2 Lead Pump (PLC)
 - NPWPS-2 Lag Pump (PLC)
 - NPWPS 1 – Lead Pump (PLC – NaOCl)
 - NPWPS 1 – Lag Pump (PLC – NaOCl)
 - Lead Variable Speed Influent Pump (PLC – HWE)
 - Lag Variable Speed Influent Pump (PLC – HWE)
 - Lead Constant Speed Influent Pump (PLC – HWE)
 - Lag Constant Speed Influent Pump (PLC – HWE)
 - Standby Process Air Blower (PLC – ASTN)
 - Lead Secondary Channel Air Blower (PLC – ASTN)
 - Lead VS RAS Pump (PLC)
 - Lag VS RAS Pump (PLC)
 - Lead CS RAS Pump (PLC)
 - Lag CS RAS Pump (PLC)

- IMLR Pumps for AST Tanks 1 thru 7 (PLC – ASTN)
- Mixers for AST Tanks 1 thru 7 (PLC – ASTN)
- Lead ORHW Exhaust Fan (PLC – ORHW)
- Lead ORPST Exhaust Fan (PLC – ORPST)
- Lead ORHW Recirculation Pump (PLC – ORHW)
- Lead ORPST Recirculation Pump (PLC – ORPST)
- Primary Sludge Pump Program (PLC – PSTE)

**TABLE 4.12-1
GENERATOR CONTROL SETTINGS FOR
AUTOMATIC MODE OF OPERATION**

Item No.	Switch/Pushbutton Type	Position	Location	Function
1	Auto/Manual Selector Switch	Auto	Structure #2 MS1 Bus B Line-up in Switchgear Bldg	Puts MS1 VCB Control on MS1-PLC Program
2	Generator Emergency Stop Pushbutton	Pulled Out	Front Door LCP-G1 and LCP-G2 in GEN-LCC	Locks out Generator (Trips Generator VCB-G1 & VCB – G2)
3	Generator Emergency Stop Pushbutton	Pulled Out	LCP-ENG in Generator Housing	Locks out Generator (Trips Gen. VCB-G1 & VCB – G2)
4	Engine Auto/Manual Selector Switch	Auto	Front Door LCP-G1 & LCP-G2 in GEN-LCC	Puts Engine in Auto Start Mode
5	AGT/BGT Selector Switch	Either	Front Door MCP in GEN-LCC	Selects Generator tie VCB feed to MS1 Bus “A” via VCB-B7
6	Synchronizing Mode Switch Off-Perm-Check-Run	Run	Inside LCP-G1 & LCP-G2 on Back Sheet	Enables Auto Synchronize Mode
7	Auto/Manual/Test/Maintenance Selector Switch	Auto	LCP-ENG1 and LCP-ENG2 in Generator Housings	Enables Auto Start of Engine

4.12.2.2.2 Diesel Fuel Storage Tank

1. Fill diesel fuel oil storage tank according to the following procedures:
 - a. Energize the fill station panel FCP-FOST1 and/or FCP-FOST2.
 - b. Attach fuel supply truck hose to the quickconnect located in the ground-level spill containment box adjacent to the tank.
 - c. Open the isolation valve.

- d. Pump the ordered amount of diesel fuel oil No. 2 into the storage tank. If tank is to be filled to full capacity, stop delivering the fuel when the high level alarm is activated at the field control panel.
- e. When pumping is completed purge the feed pipe with air. Close the isolation valve. Disconnect the supply hose and cap the fill pipe.

WARNING: In case the high level alarm horn sounds, stop fuel pumping immediately. (A high level alarm is designed to activate before the tank overflows.) Silence the alarm by pressing the Acknowledge pushbutton. Alarm light will stay illuminated until the fuel level in the tank is below the high level.

2. Put the diesel fuel storage tank in operation according to the procedures listed below:
 - a. Verify that there is sufficient fuel in the tank.
 - b. Verify that the diesel fuel oil storage tank fill station panel FCP-FOST1 and/or FCP-FOST2 is energized.

4.12.2.2.3 Diesel Fuel Transfer Pump Station

Diesel Fuel Transfer Pump

Start up the diesel fuel transfer pumps according to the procedures listed below:

1. Verify that the suction and discharge isolation valves are opened.
2. Place the ROT switch in the “Remote” position.
3. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the appropriate HOA switch at the LCP-FOS1 in the “Auto” position for Standby Generator No.1 and at the LCP-FOS2 in the “Auto” position for Standby Generator No.2.
- b. The pumps are now in standby mode and operates based on signals from the PLC-GEN located at the GEN-LCC as described in Section 4.12.1.3. The transfer pump will start up when the level in the diesel fuel day tank reaches the “low” level. When the level in the day tank reaches the “high” level, the transfer pump stops.

Manual Mode of Operation

- a. Place the appropriate HOA switch at the LCP-FOS1 in the “Hand” position for Standby Generator No.1 and at the LCP – FOS2 in the “Hand” position for Standby Generator No.2.

- b. The transfer pump will operate continuously and will fill the 300 gallon day tank.
4. Visually verify that the pump is operating.

Diesel Fuel Return Pump

Start up the diesel fuel return pump according to the procedures listed below:

1. Verify that the suction and discharge isolation valves are opened.
2. Place the ROT switch in the “Remote” position.
3. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the appropriate HOA switch at the LCP-FOS1 in the “Auto” position for Standby Generator No.1 and at the LCP – FOS2 in the “Auto” position for Standby Generator No.2.
- b. The pumps are now in standby mode and will automatically operate based on signals from their respective local control panels LCP-FOS1 and LCP-FOS2. The return pump will start up when the level in the diesel fuel overflow tank reaches the “high” level. When the level in the overflow tank reaches the “low” level, the return pump stops.

Manual Mode of Operation

- a. Place the appropriate HOA switch at the LCP-FOS1 in the “Hand” position for Standby Generator No.1 and at the LCP – FOS2 in the “Hand” position for Standby Generator No.2.
 - b. The transfer pump will operate continuously and will empty the 25 gallon overflow tank, and shutdown automatically.
4. Visually verify that the pump is operating.

4.12.3 Step by Step Shutdown Procedures

4.12.3.1 General System Shutdown Procedures

The Standby Power Generation Facilities should be shut down according to the following procedures:

1. Refer to the General Shutdown Procedures presented in Section 4.0.3.
2. Shutdown the standby generator according to the procedures below:

Automatic Mode of Operation

- a. The transfer back to normal utility power will occur automatically and without interruption to plant operations (See Section 4.12.3.2.1).

4.12.3.2 Individual Equipment Shutdown Procedures

4.12.3.2.1 Standby Generator

1. Shut down the standby generator according to the procedures listed below:

Automatic Return to Restored SDG&E Power

- a. On restoration of power the following automatic sequence occurs:
 - Time delay
 - Main VCB-A closes when GDB Bus is in synchronization with SDG&E.
 - VCB-AGT or VCB-BGT, VCB-G1 and VCB-G2 in SG-GDB open within a few cycles to result in a stepless re-transfer.
 - Plant continues to operate.
 - Generator runs through cooldown period.

4.12.3.2.2 Diesel Fuel Storage Tank

Shut down the diesel fuel storage tank according to the procedures listed below:

1. Ensure the diesel fuel transfer pumps are shutdown. (See Section 4.12.3.2.3)

4.12.3.2.3 Diesel Fuel Transfer Pump Station

Diesel Fuel Transfer Pump

Shut down the diesel fuel transfer pump according to the procedures listed below:

1. Turn the pump's HOA switch at LCP-FOS1 to the "Off" position for Standby Generator No.1 and at LCP-FOS2 to the "Off" position for Standby Generator No.2.
2. Verify the pump is stopped.

3. If the pump is to be out of service for an extended period of time, lock the appropriate ROT switch, disconnect power source and close the isolation valves on the pump suction line.

Notes: For normal operation, the diesel transfer pumps should be placed in “Auto” mode ready for automatic operation if plant power fails.

The pumps will also automatically shut down on motor overload.

Diesel Fuel Return Pump

Shut down the diesel fuel return pump according to the procedures listed below:

1. Turn the pump’s HOA switch at LCP-FOS1 to the “Off” position for Standby Generator No.1 and at LCP-FOS2 to the “Off” position for Standby Generator No.2.
2. Verify the pump is stopped.
3. If the pump is to be out of service for an extended period of time, lock the appropriate ROT switch, disconnect power source and close the isolation valves on the pump suction line.

Notes: For normal operation, the diesel return pump should be placed in auto mode ready for automatic operation if the day tank overfills.

The pumps will also automatically shut down on motor overload.

4.12.4 Alarm and Status Annunciation

4.12.4.1 Standby Generators G1 and G2

The following alarm/status annunciation and indication components are associated with the mobile standby generators:

Generator containers No. 1 and No. 2

<u>Alarm/Status</u>	<u>Display Location</u> Generator No. 1	<u>Display Location</u> Generator No. 2
High Coolant Temperature Pre-alarm	LCP-ENG1	LCP-ENG2
Low Coolant Level Pre-alarm	LCP-ENG1	LCP-ENG2
Low Oil Pressure Pre-alarm	LCP-ENG1	LCP-ENG2
Low Fuel Oil Pre-alarm	LCP-ENG1	LCP-ENG2
Fault Alarm	LCP-ENG1	LCP-ENG2

High Water Temperature Alarm	LCP-ENG1	LCP-ENG2
Low Coolant Level Alarm	LCP-ENG1	LCP-ENG2
Low Oil Pressure Alarm	LCP-ENG1	LCP-ENG2
Engine Overcrank Alarm	LCP-ENG1	LCP-ENG2
Engine Overspeed Alarm	LCP-ENG1	LCP-ENG2
Emergency Stop	LCP-ENG1	LCP-ENG2
Fault Shutdown	LCP-ENG1	LCP-ENG2
System Not in Auto	LCP-ENG1	LCP-ENG2
Low Battery Voltage	LCP-ENG1	LCP-ENG2
Battery Charger Failure	LCP-ENG1	LCP-ENG2
Air Damper Closed	LCP-ENG1	LCP-ENG2

LCP-G1 and LCP-G2

High Coolant Temperature Pre-Alarm	LCP-G1	LCP-G2
Low Coolant Level Pre-Alarm	LCP-G1	LCP-G2
Low Oil Pressure Pre-Alarm	LCP-G1	LCP-G2
24 VDC Battery Charger Fail	LCP-G1	LCP-G2
High Coolant Temperature Shutdown	LCP-G1	LCP-G2
Low Coolant Level Shutdown	LCP-G1	LCP-G2
Generator Timed Overcurrent	LCP-G1	LCP-G2
Low Oil Pressure Shutdown	LCP-G1	LCP-G2
Generator Instant Overcurrent	LCP-G1	LCP-G2
Overcrank Lockout	LCP-G1	LCP-G2
Generator Over/Under Frequency	LCP-G1	LCP-G2
Overspeed Shutdown	LCP-G1	LCP-G2

Generator Phase Imbalance	LCP-G1	LCP-G2
Reverse Power Shutdown	LCP-G1	LCP-G2
Generator Over Voltage Shutdown	LCP-G1	LCP-G2
Power On	LCP-G1	LCP-G2
Generator Breaker Fail to Close	LCP-G1	LCP-G2
Generator Run	LCP-G1	LCP-G2
Generator Fail to Synchronize	LCP-G1	LCP-G2
Circuit Breaker Open	LCP-G1	LCP-G2
Generator Breaker Lockout Alarm/Trip	LCP-G1	LCP-G2
Circuit Breaker Closed	LCP-G1	LCP-G2
Power On	LCP-G1	LCP-G2
Generator Run Light	LCP-G1	LCP-G2

Generator Switchgear VCB's, AGT, BGT, G1, G2

VCB-G1 Circuit Breaker Open	LCP-G1
VCB-G1 Circuit Breaker Closed	LCP-G1
VCB-G1 Open Indicative Light	SG-GDB
VCB-G1 Closed Indicative Light	SG-GDB
VCB-G1 Charging Spring Charged Indicative Light	SG-GDB
VCB-G1 Auto Trip Indicative Light	SG-GDB
VCB-G2 Open Indicative Light	SG-GDB
VCB-G2 Closed Indicative Light	SG-GDB
VCB-G2 Charging Spring Charged Indicative Light	SG-GDB
VCB-G2 Auto Trip Indicative Light	SG-GDB
VCB-AGT Open Indicative Light	SG-GDB

VCB-AGT Closed Indicative Light	SG-GDB
VCB-AGT Charging Spring Charged Indicative Light	SG-GDB
VCB-AGT Auto Trip Indicative Light	SG-GDB
VCB-BGT Open Indicative Light	SG-GDB
VCB-BGT Closed Indicative Light	SG-GDB
VCB-BGT Auto Trip Light	SG-GDB
VCB-BGT Charging Spring Charged Indicative Light	SG-GDB

Generator Main Control Panel MCP-GEN

No. 1 Generator Common Alarm	MCP-GEN
No.2 Generator Common Alarm	MCP-GEN
VCB-AGT Tripped/Lockout	MCP-GEN
System Not In Auto	MCP-GEN
VCB-BGT Tripped/Lockout	MCP-GEN
48 VDC Battery Charger Failure	MCP-GEN
VCB-AGT Bus Fail to Synchronize	MCP-GEN
Utility Feeder SYO Outage	MCP-GEN
VCB-BGT Bus Fail to Synchronize	MCP-GEN
SYO Utility Power Available	MCP-GEN
Standby Power Tie Breaker BGT Trip/Lockout	MCP-GEN
System Bus Overload	MCP-GEN
System Bus Under Frequency	MCP-GEN
DC Power Available Light	MCP-GEN
Auto Light	MCP-GEN
Manual Light	MCP-GEN

Maintenance Light	MCP-GEN
VCB-AGT Fail to Close	MCP-GEN
VCB-BGT Fail to Close	MCP-GEN
Fuel Oil Storage System No.1 Fail	MCP-GEN
Fuel Oil Storage System No.2 Fail	MCP-GEN
Generator No. 1 Control Alarm	MCP-GEN
Generator No. 2 Control Alarm	MCP-GEN
Generator No. 1 Fail	PCC
Generator No. 2 Fail	PCC

4.12.4.2 Diesel Fuel Storage Tanks

The following alarm/status annunciation and indication components are associated with the diesel fuel storage tank:

<u>Alarm/Status</u>	<u>Display Location</u> Generator No. 1	<u>Display Location</u> Generator No. 2
Tank High Level	FCP-FOST1	FCP-FOST2
Tank Low Level	FCP-FOST1	FCP-FOST2
Tank Leak Detection	FCP-FOST1	FCP-FOST2
Tank High Level	FCP-FOST2	FCP-FOST2
Tank Low Level	FCP-FOST2	FCP-FOST2
Tank Leak Detection	FCP-FOST2	FCP-FOST2
Fuel Oil Storage Tank High Level	LCP-FOS1	LCP-FOS2
Fuel Oil Storage Tank Low Level	LCP-FOS1	LCP-FOS2
Fuel Oil Storage System Failure	MCP-GEN	MCP-GEN
Generator Fail Annunciator	PCC	PCC
Fuel Oil Storage Tank High Level	LCP-FOS2	

4.12.4.3 Diesel Fuel Transfer Pump Stations

The following alarm/status annunciation and indication components are associated with the diesel fuel transfer pump stations:

Diesel Fuel Transfer Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
<i>Generator No. 1</i>	
Fuel Oil Transfer Pump #1A Off Indicating Light	LCP-FOS1
Fuel Oil Transfer Pump #1A Run Indicating Light	LCP-FOS1
Fuel Oil Transfer Pump #1B Off Indicating Light	LCP-FOS1
Fuel Oil Transfer Pump #1B Run Indicating Light	LCP-FOS1
Fuel Oil Transfer Pump FOTP1A Overload Annunciator	LCP-FOS1
Fuel Oil Transfer Pump FOTP1B Overload Annunciator	LCP-FOS1
Fuel Oil Storage System No. 1 Fail	MCP-GEN
<i>Generator No. 2</i>	
Fuel Oil Transfer Pump #2A Controls Off Indicating Light	LCP-FOS2
Fuel Oil Transfer Pump #2A Controls Run Indicating Light	LCP-FOS2
Fuel Oil Transfer Pump #2B Controls Off Indicating Light	LCP-FOS2
Fuel Oil Transfer Pump #2B Controls Run Indicating Light	LCP-FOS2
Fuel Oil Transfer Pump FOTP2A Overload Indicating Light	LCP-FOS2

Fuel Oil Transfer Pump FOTP2B Overload
Indicating Light

LCP-FOS2

Fuel Oil Storage System No. 2 Fail

MCP-GEN

Generator 2 Fail

PCC

Diesel Fuel Day Tank

Display Location

Display Location

Generator 1

Generator 2

High Level Alarm Indicating Light

FCP-DT1

FCP-DT2

Low Level Alarm Indicating Light

FCP-DT1

FCP-DT2

Leak Detection Indicating Light

LCP-FOS1

LCP-FOS2

Fuel Oil Day Tank Low Level

LCP-FOS1

LCP-FOS2

Fuel Oil Day Tank High Level

LCP-FOS1

LCP-FOS2

Day Tank Leak Annunciator

LCP-FOS1

LCP-FOS2

Fuel Oil Storage System Failure Annunciator

MCP-GEN

MCP-GEN

Generator Fail Annunciator

PCC

PCC

Diesel Fuel Overflow Pump

Display Location

Display Location

Generator 1

Generator 2

Fuel Oil Return Pump Run Indicating Light

LCP-FOS1

LCP-FOS2

Fuel Oil Return Pump Run Indicating Light

LCP-FOS1

LCP-FOS2

Fuel Oil Return Pump Overload

LCP-FOS1

LCP-FOS2

4.12.5 Daily Operational Checks

4.12.5.1 General

1. Refer to the general daily operation checks requirements described in Section 4.0.5.
2. Visually inspect all equipment for any signs of damage or improper installation.
3. Consult Section 4.12.5.2 to 4.12.5.4 and the appropriate manufacturer's operation and maintenance manuals for specific monitoring requirements.

4.12.5.2 Standby Generator

1. Check standby generator controls to ensure that generators are in automatic mode or as required by the Operations Supervisor. See Table 4.12-1 in Section 4.12.2.2.1 for detailed description of control settings.
2. During an emergency when standby generators are operational, perform the following checks:
 - a. Check each standby generator to verify that it is within the established operating range.
 - b. Check each engine/power generator operation to see that it is operating smoothly and quietly.
 - c. Check each engine/power generator for leaks, excessive noise, and temperature.
3. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the mobile standby generator:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Mobile Standby Generator (Section 16203). Prepared by Hawthorne, Inc. 1998.

Operations and Maintenance Manual for Mobile Standby Power Generator (Section 26.32.00)- South Bay International Wastewater Treatment Plant -. Prepared by MTU Onsite Energy. 2010.

4.12.5.3 Diesel Fuel Storage Tank

Diesel Fuel Storage Tank

1. Visually observe the tanks and all piping and connections for leaks.
2. Check the level in each of the fuel tanks.
3. Check control settings of the fuel tank at FCP-FOST1 for Standby Generator No.1 and at FCP-FOST2 for Standby Generator No.2 to confirm the requirements of your Operations Supervisor.
4. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the diesel fuel storage tank:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Diesel Fuel Storage Tank (Section 11.30.1), Prepared by The Quickest Organization. 1998.

Convault Owner's Manual - South Bay International Wastewater Treatment Plant - Diesel Fuel Storage Tank (Section 11.82.14), Prepared by Convault, Inc. 2010.

4.12.5.4 Diesel Fuel Transfer Pump Station

Diesel Fuel Transfer Pump

1. Check the positions of the pump suction and discharge valves to confirm the requirements of your Operations Supervisor.
2. Test each pump operation to verify that the pumps are operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check control status of the pump at LCP-FOS1 for Standby Generator No.1 and at LCP-FOS2 for Standby Generator No.2 to confirm the requirements of your Operations Supervisor.
5. Record run time of each of the transfer pumps.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the diesel fuel transfer pump:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Gear Pump (Section 11020). Prepared by Oberdofer Pumps, Inc. 1998.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Gear Pump (Section 11.82.09). Prepared by Haight Pumps. 2009.

Diesel Fuel Day Tank

1. Visually observe each of the tanks and all piping and connections for leaks.
2. Check the level in each of the fuel tank and ensure that each day tank is full with diesel fuel.

CAUTION: DAY TANK SHOULD ALWAYS BE FULL WITH FUEL TO PROVIDE ADEQUATE FUEL TO THE ENGINE DURING EMERGENCY START-UP.

3. Verify that the fuel tanks are operating properly. Confirm Low level switch in day tanks signals a transfer pump to operate and a high level switch in day tanks signals the transfer pump to shutdown.
4. Check the control settings of the tank at LCP-FOS1 for Standby Generator No.1 and at LCP-FOS2 for Standby Generator No.2 to confirm the requirements of the Operations Supervisor.
5. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the diesel fuel day tank:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Diesel Fuel System Day Tank (Section 11303). Prepared by Pryco, Inc. 1998.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Diesel Fuel System Day Tank (Section 11.82.15). Prepared by Simplex, Inc. 2009.

Diesel Fuel Overflow Tank

1. Visually observe each of the tanks and all piping and connections for leaks.
2. Check the level in each of the fuel tanks.

3. Verify that the fuel tanks are operating properly. Confirm high level in overflow tanks signals the return pump to operate and low level in the overflow tanks signals the return pump to shutdown.
4. Check the control settings of the tanks at LCP-FOS1 for Standby Generator No.1 and at LCP-FOS2 for Standby Generator No.2 to confirm the requirements of your Operations Supervisor.
5. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the diesel fuel overflow tank:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Diesel Fuel System Day Tank (Section 11303). Prepared by Pryco, Inc. 1998.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Diesel Fuel System Day Tank (Section 11.82.15). Prepared by Simplex, Inc. 2009.

Diesel Fuel Return Pump

1. Check the positions of the pump suction and discharge valves to confirm the requirements of your Operations Supervisor.
2. Test each of the pumps operation to verify that the pump is operating smoothly and quietly.
3. Check the pumps for leaks, excessive noise, and temperature (hand touch).
4. Check control settings of the pumps at LCP-FOS1 for Standby Generator No.1 and at LCP-FOS2 for Standby Generator No.2 to confirm the requirements of your Operations Supervisor.
5. Record run time of each of the return pumps.
6. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the diesel fuel return pump.

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant - Gear Pump (Section 11020). Prepared by Oberdorfer Pumps, Inc. 1998.

4.12.6 Training Record

The following record should be used by the Operator to ensure a complete understanding of the Standby Power Generation Facilities.

4.12.6.1 Reading Assignment

1. Chapter 10 - Operation of Wastewater Treatment Plants - MOP 11. Water Environment Federation, 1990.

4.12.6.2 Field Instruction

The operator should review and know the location and purpose of each of the following items:

<u>Item</u>	<u>Operator Initials</u>
General	
SG-GDB	_____
MS1 A Bus	_____
MS1 B Bus	_____
Structure #2 MS1 Bus B-VCB Line-Up	_____
48 VDC Battery and Charger	_____
MCP-GEN Controls and Alarms	_____
PCC Alarm	_____
Mobile Standby Generator No.1	
Diesel Driven Engine	_____
Standby Generator	_____
LCP-ENG Controls and Alarms	_____

LCP-G1 Controls and Alarms	_____
LCP-G2 Controls and Alarms	_____
MCP-GEN Controls and Alarms	_____
Mobile Standby Generator No.2	
Diesel Driven Engine	_____
Standby Generator	_____
LCP-ENG Controls and Alarms	_____
LCP-G2 Controls and Alarms	_____
MCP-GEN Controls and Alarms	_____
Diesel Fuel Storage Tank No.1	
Tank Field Panel (FCP-FOST1) Alarms	_____
Tank Level Sensors	_____
Atmospheric Vents	_____
Emergency Pressure Relief Vents	_____
Tank Leak Detector	_____
FCP-FOS1 Controls and Alarms	_____
Diesel Fuel Storage Tank No.2	
Tank Field Panel (FCP-FOST2) Alarms	_____
Tank Level Sensors	_____
Atmospheric Vents	_____
Emergency Pressure Relief Vents	_____

Tank Leak Detector	_____
FCP-FOS2 Controls and Alarms	_____
Diesel Fuel Transfer Pumps (Tank No.1)	
Isolation Valves	_____
Local Controls	_____
LCP-FOS1 Controls and Alarms	_____
Diesel Fuel Transfer Pumps (Tank No.2)	
Isolation Valves	_____
Local Controls	_____
LCP-FOS2 Controls and Alarms	_____
Diesel Fuel Day Tank No.1	
Tank Field Control (FCP-DT1) Alarms	_____
Tank Level Sensors	_____
Atmospheric Vents	_____
Emergency Pressure Relief Vents	_____
Tank Leak Detector	_____
LCP-FOS1 Controls and Alarms	_____
Diesel Fuel Day Tank No.2	
Tank Field Control (FCP-DT2) Alarms	_____
Tank Level Sensors	_____
Atmospheric Vents	_____

Emergency Pressure Relief Vents	_____
Tank Leak Detector	_____
LCP-FOS2 Controls and Alarms	_____
Diesel Fuel Overflow Tank No.1	
Tank Level Sensors	_____
Atmospheric Vents	_____
Emergency Pressure Relief Valves	_____
Tank Leak Detector	_____
LCP-FOS1 Controls and Alarms	_____
Diesel Fuel Overflow Tank No.2	
Tank Level Sensors	_____
Atmospheric Vents	_____
Emergency Pressure Relief Valves	_____
Tank Leak Detector	_____
LCP-FOS2 Controls and Alarms	_____
Diesel Fuel Overflow Pump No.1	
Isolation Valves	_____
Local Controls	_____
LCP-FOS1 Controls and Alarms	_____
Diesel Fuel Overflow Pump No.2	
Isolation Valves	_____

Local Controls

LCP-FOS2 Controls and Alarms

4.13 COLLECTION AND CONVEYANCE FACILITIES

4.13.1 Diversion Structures

The concrete diversion structures and associated weirs provide hydraulic control of transboundary sewage flows conveyed to the pump stations and to the plant Headworks. There are no automated controls or telemetry associated with these facilities. Flow control is a function of the physical design of the structures themselves. Start-up and shutdown procedures are not required.

The concrete diversion structures have no mechanical equipment associated with their operation. Periodic maintenance is limited to cleaning of the side inlet weirs, the under drain area, and the diversion box, to ensure that capture of transboundary sewage is not impeded.

At the time of the development of this manual, no history of required maintenance frequency exists. Moreover, maintenance frequencies are likely to change with the yearly seasons. Results of the daily operational checks will serve as a historical database for developing appropriate maintenance frequency strategies in the future. Low flow conditions, high flow overflow conditions, and seasonal conditions can be thoroughly documented with the daily checks.

Goat Canyon Diversion Structure

1. Record weather conditions.
2. Visually observe the structure for any sign of damage or improper installation.
3. Inspect the facilities for any unusual conditions, (e.g., unusual flows, debris, etc.). Record any unusual conditions and notify maintenance and/or your Supervisor as necessary.
4. Record whether the diversion structure is under normal low flow or high flow conditions. Under high flow conditions, water overflows the flood weir that crosses the wash.
5. Inspect the flood weir and record if the flood weir is buried in sediment. Notify the Maintenance Supervisor to remove excess sediment and debris as necessary.

6. Inspect the side inlet weir and record depth of the sediment in relation to the side inlet weir. If large debris or excess sediment blocks the side weir grating, notify Maintenance Supervisor to remove.
7. Inspect diversion box Chamber No. 1 and perform the following:
 - 1) Record the depth of sediment in the Chamber No.1 using a dipstick through the manhole.
 - 2) Record if the flange of the 90-degree elbow is buried in that sediment. Notify Maintenance Supervisor if cleaning is necessary.
8. Inspect diversion box Chamber No. 2. Record the depth of sediment in the Chamber No.2 using a dipstick. Notify Maintenance Supervisor if cleaning is necessary.
9. Inspect the DIP culvert under the road, north of the diversion structure. Record depth of sediment. If large debris or excess sediment blocks the flow, notify Maintenance Supervisor to clean.

Smugglers Gulch Diversion Structure and Stewart's Drain Diversion Structure

1. Record weather conditions.
2. Visually observe the structure for any sign of damage or improper installation.
3. Inspect the facilities for any unusual conditions, (e.g., unusual flows, debris, etc.). Record any unusual conditions and notify maintenance and/or your Supervisor as necessary.
4. Record whether the diversion structure is under normal low flow or high flow conditions. Under high flow conditions, water overflows the flood weir that crosses the wash.
5. Inspect the flood weir and record if the flood weir is buried in sediment. Notify the Maintenance Supervisor to remove excess sediment and debris as necessary.
6. Inspect the side inlet weir and record depth of the sediment in relation to the side inlet weir. If large debris or excess sediment blocks the side weir grating, notify Maintenance Supervisor to remove.
7. Inspect diversion box Chamber No. 1 and perform the following:
 - 1) Record the depth of sediment in the Chamber No.1 using a dipstick through the manhole.

- 2) Record if the flange of the 90-degree elbow is buried in that sediment. Notify Maintenance Supervisor if cleaning is necessary.
8. Inspect diversion box Chamber No. 2. Record the depth of sediment in the Chamber No.2 using a dipstick. Notify Maintenance Supervisor if cleaning is necessary.

Canyon Del Sol Diversion Structure and Silva's Drain Diversion Structure

1. Record weather conditions.
2. Visually observe the structure for any sign of damage or improper installation.
3. Inspect the facilities for any unusual conditions, (e.g., unusual flows, debris, etc.). Record any unusual conditions and notify maintenance and/or your Supervisor as necessary.
4. Record whether the diversion structure is under normal low flow or high flow conditions. Under high flow conditions, water overflows the flood weir that crosses the wash.
5. Inspect the flood weir and record if the flood weir is buried in sediment. Notify the Maintenance Supervisor to remove excess sediment and debris as necessary.
6. Inspect the side inlet weir and record depth of the sediment in relation to the side inlet weir. If large debris or excess sediment blocks the side weir grating, notify Maintenance Supervisor to remove.
7. Inspect diversion box Chamber No. 1. Perform the following:
 - 1) Record the depth of sediment in the Chamber No.1 using a dipstick through the manhole.
 - 2) Record if the flange of the 90-degree elbow is buried in that sediment. Notify Maintenance Supervisor if cleaning is necessary.
8. Inspect diversion box Chamber No. 2. Perform the following:
 - 1) Record the depth of sediment in the Chamber No.2 using a dipstick. Notify Maintenance Supervisor if cleaning is necessary.
 - 2) Inspect the vortex valve. If large debris or excess sediment block the vortex valve, notify Maintenance Supervisor to clean as necessary.

4.13.2 Conveyance Pipelines

The conveyance pipelines are sized to convey sewage flows from diversion structures to their respective termination points. There are no automated controls or telemetry associated with the pipelines. Daily operating checks are not necessary.

4.13.3 Goat Canyon Pump Station

4.13.3.1 Description of Controls and Operation

Refer to the general control and operation philosophy description presented in Section 4.0.1. The Goat Canyon Pump Station Process Schematic is presented in Figure 3.13-1. The Goat Canyon Pump Station Odor Reduction System Process Schematic is presented in Figure 3.13-2.

The controls, status, and annunciators for the Goat Canyon Pump Station consist of field controls and local control panels (LCPs) located at the pump station or at the South Bay IWTP. The main local control panel (LCP-GCPS) is located in the MCC Room of the MCC/Generator Building at the pump station. LCP-GCPS is provided with an operator interface workstation mounted on the swing out panel to allow the operator to view and change PLC-GCPS set points, timers, and counters. The MCC Room also houses switchboards, motor control centers and variable frequency drives.

PLC-PCC, located at the Solids Processing LCC at the South Bay IWTP, receives data from GCPS via telephone lines. PLC-PCC combines all alarms (with the exception of safety shower and fire alarms) at the Goat Canyon Pump Station into a single alarm which illuminates the “GOAT CANYON PUMP STATION SYSTEM FAILURE” annunciator.

Pump Station Isolation Valve

Influent control valve (MOV-1) is installed on the 24-inch pump station influent line. This electrically operated isolation valve is normally open to allow flow into the wetwell and is closed when a high water level occurs in the wetwell.

Locally, the influent valve is equipped with a Lock/Out/Stop (LOS) switch, open and close pushbuttons, and a Local/Remote selector switch. The LOS switch is lockable and overrides all other controls. When the Local/Remote switch at the valve is in the “Local”

position, MOV-1 is controlled by “Open” and “Close” pushbutton switches at the valve. Valve position is indicated locally by “Open” and “Closed” indicating lights. When the Local/Remote switch at the valve is placed in the “Remote” position, MOV-1 is controlled by signals from LCP-GCPS.

At LCP-GCPS, MOV-1 can be operated either manually or automatically. Valve controls at LCP-GCPS include a spring-loaded Open/Auto/Close selector switch, a Reset pushbutton, and “Open” and “Closed” indicator lights. When the Open/Auto/Close selector switch at LCP-GCPS is held in the “Open” position, the valve travels open. When the switch is held in the “Close” position, the valve travels closed. The valve only travels while the switch is held in place. When the switch is released, valve travel stops and the switch spring-returns to the “Auto” position. Pushing the “Reset” pushbutton puts the valve into automatic control.

For automatic operation, the Local/Remote switch at the valve must be in the “Remote” position and the Open/Auto/Close selector switch at LCP-GCPS must be in the “Auto” position. When water level in the wetwell reaches an elevation of 17.75 ft, a high level float switch in the wetwell signals the valve to close. A “WETWELL HIGH LEVEL” alarm is then annunciated at LCP-GCPS. This condition is included in the common “GOAT CANYON PUMP STATION SYSTEM FAILURE” alarm at PCC. A Reset pushbutton is provided at LCP-GCPS to reset the high water alarm logic.

“INFLUENT VALVE FAILURE” alarm is annunciated at LCP-GCPS upon motor overload, whenever the Local/Remote switch is in “Local”, or whenever PLC-GCPS logic commands the valve to close and after an adjustable time period the valve does not confirm a closed position via a closed limit switch.

Wetwell Level Control System

Raw sewage is collected at the Goat Canyon inlet structure and discharged by gravity into the Goat Canyon wetwell. Bubbler panel (BCP-GCPS) is provided at the wetwell to monitor the wetwell level. The wetwell level is continuously measured by a bubbler level sensor and is used as the basis for controlling sewage lift pumps. Dual air compressors are provided for operation of the wetwell bubbler system. Dual drop tubes and valves are provided to allow monitoring of either half of the split wetwell.

BCP-GCPS is provided with a Compressor No. 1 On/Off selector switch, a Compressor No. 2 On/Off selector switch, a Compressor 1/Auto/Compressor 2 selector switch, a Reset pushbutton switch, and a Manual Purge pushbutton switch. Operation of the bubbler system is automatic. No manual control is provided.

For automatic operation, both compressors On/Off selector switches must be in the “On” position. If a compressor On/Off selector switch is in the “Off” position, the respective compressor will not operate. When the Compressor 1/Auto/Compressor 2 selector switch is placed in the “Auto” position, the compressors alternate lead operation after each air fill cycle. When the selector switch is placed in the “Compressor 1” or “Compressor 2” position, the corresponding compressor will operate as lead. The two compressors are set up to maintain a normal receiver tank pressure of 30 to 50 psi. When tank pressure drops to 30 psi the lead compressor starts. If tank pressure drops below 25 psi the lag compressor starts. If tank pressure drops below 20 psi the “Low Air” indicator and door-mounted alarm horn at BCP-GCPS are energized.

Indicator lights are provided at BCP-GCPS to annunciate the bubbler system status. When a compressor is running, a corresponding “Running” indicator light is illuminated. If Compressor No. 1 or Compressor No. 2 fails, the respective “Fail” indicator light is illuminated. BCP-GCPS is also provided with a local indication of wetwell level.

If one or more of the “Compressor No. 1 Fail”, “Compressor No. 2 Fail”, or “Low Air” indicator lights are illuminated at BCP-GCPS, a common alarm “BCP-GCPS BUBBLER FAILURE” annunciator is activated at LCP-GCPS. This condition is included in the common “GOAT CANYON PUMP STATION SYSTEM FAILURE” alarm at PCC.

The pump station is provided with a combustible gas sensor/analyzer to continuously monitor the wetwell atmosphere to detect the presence of combustible gases or vapors. The sensor is duct-mounted at the odor control facility. In the event the combustible gas concentration reaches its high level set point of 25% LEL, a signal activates an alarm “WETWELL HIGH COMBUSTIBLE GAS” at LCP-GCPS. This condition is included in the common “GOAT CANYON PUMP STATION SYSTEM FAILURE” alarm at PCC.

Sewage Lift Pumps

Four submersible sewage lift pumps are provided at the wetwell. Each pump is started by a variable frequency drive (VFD) programmed to ramp to 100% speed and operate at constant speed. Smaller capacity Pump Nos. P-1 and P-2 operate in a LEAD-STANDBY mode and pump into a 12-inch force main. Larger capacity Pump Nos. P-3 and P-4 operate in a LEAD-STANDBY mode and pump into a 16-inch force main.

Each pump is furnished with a locally-mounted Remote/Off/Test (ROT) selector switch. The “Remote” position arms controls located at LCP-GCPS. The “Off” position is lockable and prevents the pump from operating, overriding all other controls. The “Test” position is spring-loaded and is used to test the operation of the pump.

Each pump is provided with a Hand/Off/Auto (HOA) selector switch at LCP-GCPS inside the MCC Building. The HOA switch is only functional when the respective ROT switch is in the “Remote” position. In the “Hand” mode the pump runs continuously. In the “Auto” mode the pump is controlled via a bubbler level control system at the wetwell. With both respective switches in “Auto”, Pump Nos. P-1 and P-2 operate in a LEAD-STANDBY mode. A Lead Select switch is provided at LCP-GCPS to dictate which of the two pumps is lead and which is standby. With both respective switches in “Auto”, Pump Nos. P-3 and P-4 operate in a LEAD-STANDBY mode. A Lead Select switch is provided at LCP-GCPS to dictate which of the two pumps is lead and which is standby.

Automatic starting and stopping of pumps is dictated by operator adjustable wetwell level set points. Set points can be adjusted through a PLC work station mounted to the front of LCP-GCPS. The PLC set points are determined by subtracting the wetwell invert elevation (5.50 ft) and the distance from the bottom of the bubbler to the wetwell invert (2.0 ft), from the desired set point. Initial set points are shown on the following table:

Action	Initial Set point Elevation/Water Column Above Bubbler	Operator Revised Set point
High Alarm	El 17.25 ft/10.25 ft W.C.	
Start P-3/P-4 Lead	El 15.5 ft/8.0 ft W.C.	
Start P-1/P-2 Lead	El 13.5 ft/6.0 ft W.C.	
Stop P-3/P-4 Lead	El 9.5 ft/2.0 ft W.C.	
Stop P-1/P-2 Lead	El 8.5 ft/1.0 ft W.C.	
Low Low Alarm, Stop all pumps	El 8.0 ft/0.5 ft W.C.	
Bottom of Bubbler	El 7.5 ft/0.0 ft W.C.	
Wetwell Bottom	El 5.5 ft/-2.0 ft	

Loss of flow for each pump is detected by a discharge check valve limit switch. If flow is not detected after an adjustable time delay when a pump is called on to operate, PLC-GCPS will shut down and lock out the pump and initiate alarm annunciation “LIFT PUMP NO. X FAILURE” at LCP-GCPS. This condition is included in the common “GOAT CANYON PUMP STATION SYSTEM FAILURE” alarm at PCC. The lift pump failure alarm is also initiated upon sensing of high motor temperature or moisture via the VFD. Failure of the selected lead pump will automatically initiate operation of its associated standby pump after an adjustable time delay. A Reset button is provided at LCP-GCPS for each pump to allow resetting of PLC pump control logic. Each pump is provided with a run light at LCP-GCPS.

Sump Pumps

The Goat Canyon Pump Station area is provided with a duplex sump pump station that includes two submersible pumps with duplex control, to handle site drainage.

The duplex pump station control panel, LCP-GCPSS, located in the field at the pumps, is provided with a lockable Auto/Off/On selector switch for each pump and a Pump 1/Alternating/Pump 2, duty pump selector switch.

For manual operation, the appropriate Auto/Off/On selector switch is placed in the “On” position. The respective pump will run until shut off manually or by the low low level float switch. If a pump Auto/Off/On selector switch is placed in the “Off” position, the position is lockable and disables all controls for the pump.

For automatic operation, the Auto/Off/On selector switches for both pumps are placed in the “Auto” position. When the Pump1/Alternating/Pump2 duty pump selector switch is placed in the “Alternating” position, the pumps alternate automatically as duty and standby pump on each pump down cycle. In the “Auto” mode, the pumps run as called for by float level switches. A high level switch starts the duty pump and activates a “High Level Alarm” light at LCP-GCPSS. A high-high level switch starts the standby pump, activates a beacon strobe light at LCP-GCPSS, and activates an “AREA SUMP HIGH HIGH LEVEL” alarm at LCP-GCPS. A low level switch stops the duty pump. A low-low level switch shuts down any pump operating and serves as a backup to the low level switch. If a duty selected or alternate selected pump fails, the standby pump operates in its place.

Indicator lights are provided at LCP-GCPSS to annunciate pump status. When a pump is running, its corresponding “Running” light is illuminated. LCP-GCPSS is also provided with an elapsed time meter for each pump. The sump pumps are equipped with high temperature switches installed in the motor windings to prevent operation on winding high temperature. In the event of high temperature detection, the corresponding “High Temperature Alarm” light illuminates at LCP-GCPSS. The sump pumps are also equipped with moisture sensing elements for motor winding moisture detection. In the event of winding moisture detection; the corresponding “Moisture Detection Alarm” light illuminates at LCP-GCPSS. In the event of either condition, a sump pump failure alarm “AREA SUMP PUMP FAILURE” is activated at the LCP-GCPS.

Well Water Supply

The Goat Canyon Pump Station is provided with a Well Water Supply System that includes a submersible pump and a hydropneumatic tank. The well system is currently the only water source for the site. The well water system is provided with a local control panel

(LCP). The panel is provided with a power disconnect switch, a Hand/Off/Auto selector switch, and a Reset pushbutton.

For manual operation of the pump, the HOA selector switch at the LCP is placed in the “Hand” position, and the pump runs continuously.

For automatic operation, the HOA selector switch must be in the “Auto” position. The water supply well operates on pressure control in the hydropneumatic bladder tank. When the pressure falls below 60 psig, the pump is called to run. When the pressure exceeds 80 psi, the pump is deactivated. Failure of the pump is detected by a drop in pressure in the hydropneumatic tank below 55 psi.

Indicator lights are provided at the local control panel to annunciate pump and tank pressure. When the pump is running, the “Run” light is illuminated. If the pressure in the tanks falls below 55 psi, the “Low Pressure” light illuminates.

Surge Arrestors

The surge arrestor tanks provide surge control for the pump station 12-inch and 16-inch force mains. Tank water levels are set by adjusting the elevation of an air relief valve on the side of each tank. Prior to pump start-up, the tanks are approximately half full of water. As the pumps run, the air in the tanks is compressed. As the pumps shut down, the water in the tanks is released under pressure to prevent column separation.

Odor Reduction Station

The GCPS wetwell off-gas is treated by a packaged odor reduction system which draws air from the wetwell through 12-inch PVC ducts. The odor reduction system consists of a three-stage, factory-packaged unit with counter-current flow, inducted draft blower, and sodium hydroxide (NaOH) and sodium hypochlorite (NaOCl) solution chemical feed systems. Operation of the odor reduction system is intermittent, as dictated by the Air Pollution Control Permit. Starting and stopping the facility is manual. Once started, chemical feed control is automatic.

Circuit breakers, blower On/Off switches, recirculation pumps On/Off switches, chemical pumps Hand/Off/Auto (HOA) selector switches, panel fan On/Off switch, status indicator lights, pH/ORP controllers, an alarm bypass Override/Normal selector switch and a Phase Reset pushbutton switch are located at LCP-GCORS. In the event of an odor reduction system failure, LCP-GCORS initiates a “ODOR REDUCTION SYSTEM

FAILURE” alarm at LCP-GCPS, provided the Alarm Bypass switch is in the “Normal” position. This condition is included in the common “GOAT CANYON PUMP STATION SYSTEM FAILURE” alarm at PCC.

Portable emergency eyewash stations are provided inside the Odor Reduction Facility. The emergency eyewash stations are provided with local mushroom pushbutton panic switches. Activation of the alarm switches annunciate “SAFETY SHOWER” alarm at LCP-GCPS and “GOAT CANYON PUMP STATION SAFETY SHOWER” alarm at PCC.

Odor Reduction Blower

Under normal conditions, the blower operates continuously, drawing odorous air from the Goat Canyon Pump Station wetwell. Blower controls at LCP-GCORS consist of an Off/On selector switch. Operating status of the blower is indicated by Blower “On” and “Off” lights in LCP-GCORS. A flow switch is installed on the suction side of the blower to indicate motor failure or blocked ductwork. Activation of the switch activates a “ODOR REDUCTION SYSTEM FAILURE” alarm at LCP-GCPS.

Odor Reduction Scrubber

The odor reduction scrubbers treat odorous air from the pump station wetwell. Each of the three stages is provided with a packed bed where odors are removed by contact with recirculated scrubbant solution. A differential pressure manometer is installed across the three scrubbers to provide local indication of pressure loss across the scrubber packing.

Odor Reduction pH Control

pH control is provided by a pH sensor and a controller to measure pH and control the NaOH chemical metering pump. The pH sensor is installed in the suction line of Recirculation Pump No. 2. The pH reading is displayed at the pH controller mounted at LCP-GCORS. The pH operating range is between 0 and 14, with a target set point of 10.5. pH set point is maintained by automatically starting and stopping the NaOH metering pump. If the pH is not in range, a pH “Out of Range” alarm light is illuminated at LCP-GCORS.

Odor Reduction ORP Control

ORP control is provided by an ORP sensor and a controller to measure ORP and control the NaOCl chemical metering pump. The ORP sensor is installed in the suction line of Recirculation Pump No. 3. The ORP operating range is between 0 and 1000 mv. ORP set point is maintained by automatically starting and stopping the NaOCl metering pump. If the

ORP is not in the desired range, an ORP “Out of Range” alarm light is illuminated at LCP-GCORS.

Odor Reduction Recirculation Pumps

Each of the three scrubber stages is provided with a recirculation pump to provide continuous recirculation of scrubbing solution from the sump to the packed bed spray nozzles. Recirculation pump controls at LCP-GCORS consist of an On/Off selector switch for each pump. “Pump Run” and “Pump Off” indicator lights are provided at LCP-GCORS to annunciate pump status. Failure of a recirculation pump activates an “ODOR REDUCTION SYSTEM FAILURE” alarm at LCP-GCPS.

Odor Reduction NaOH Metering Pump

One chemical metering pump is provided for metering of industrial grade, 20 to 25% NaOH from the NaOH storage tank to stage two of the scrubber system. Pump capacity is manually controlled by adjusting the stroke length at the pump.

NaOH pump controls at LCP-GCORS consist of a “Chem Pump #1” HOA selector switch. When the HOA selector switch is placed in the “Hand” position, the pump runs continuously. When the selector switch is placed in the “Auto” position, the pump turns on and off, as dictated by the pH controller to maintain pH set point. A “Pump Run” indicator light is provided at LCP-GCORS to annunciate pump status. Failure of the NaOH pump activates an “ODOR REDUCTION SYSTEM FAILURE” alarm at LCP-GCPS.

Odor Reduction NaOCl Metering Pump

One chemical metering pump is provided for metering of industrial grade, 10 to 15% NaOCl from the NaOCl storage tank to stage three of the scrubber system. Pump capacity is manually controlled by adjusting the stroke length at the pump.

NaOCl pump controls at LCP-GCORS consist of a “Chem Pump #2” HOA selector switch. When the HOA selector switch is placed in the “Hand” position, the pump runs continuously. When the selector switch is placed in the “Auto” position, the pump turns on and off, as dictated by the ORP controller to maintain ORP set point. A “Pump Run” indicator light is provided at LCP-GCORS to annunciate pump status. Failure of the NaOCl pump activates an “ODOR REDUCTION SYSTEM FAILURE” alarm at LCP-GCPS.

Odor Reduction NaOH and NaOCl Storage Tanks

Two bulk chemical storage tanks, one dedicated for NaOH and one for NaOCl, are provided at the Odor Reduction Station. Each tank is equipped with a sight tube for determining the level of chemical in the tank. There are no other controls associated with the NaOH and NaOCl storage tanks.

Odor Reduction Make-Up Water System

A water conditioning system is installed to provide continuous conditioned water to the packed bed scrubber system to minimize scaling of the system. The water conditioner is an ion-exchange type system consisting of a twin tank resin system and a third brine solution tank for onsite regeneration of the resin.

An area-meter is installed on the discharge of the water softening system to indicate flowrate. The water conditioner is equipped with local automatic controls that facilitate backwash/regeneration/rinse cycles, based on the volume of water treated. The power valve timer/tank alternator is provided to switch tanks when the preset volume of water has been treated. The second tank is used as the system automatically regenerates the first tank using the brine solution and soft water from the second tank.

An anti-scaling (sequestering agent) media dosing system is also installed to continuously treat make-up water to the packed bed scrubber to help minimize scaling of the packing. The system is a cartridge-type system consisting of a fully self contained unit requiring no external power sources or adjustments. Media delivery is accomplished by the combination of solubility pressure differential created by two small ports within the media delivery head. As water passes through the media delivery head, a small amount of water enters the media sump wetting the media and slowly dissolving it. Delivery amounts are factory preset, requiring no field adjustment.

Standby Generator

The Goat Canyon Pump Station is fed power by San Diego Gas & Electric (SDG&E) through their Imperial Beach (IB) utility feeder. Startup of the generator is automatic upon failure of utility power. When a utility power failure occurs, an automatic transfer switch (ATS) located in the MCC Room signals the generator to start, and provides a discrete input to local control panel LCP-GCPS indicating a "UTILITY POWER FAILURE" alarm. This condition is included in the common "GOAT CANYON PUMP STATION SYSTEM

FAILURE” alarm at PCC. A low-low level switch shuts down any pump operating and serves as a backup to the low level switch. A standby generator running light is provided at LCP-GCPS located in the MCC Room. After the generator reaches approximately 90 percent of rated voltage, the transfer switch transfers the pump station facility to standby generator power. After the return of utility power and after an adjustable time delay, the transfer switch returns to its normal position, transferring the facility back to utility power. The engine will continue to run in a cool down mode for an adjustable time before shutting off. The ATS is also capable of facilitating maintenance testing of the generator set with or without loads.

Generator control panel (LCP-GEN) is located inside the generator housing. LCP-GEN contains the controls, instruments, lights, and other devices necessary to manually and automatically start, stop, and protect the engine generator unit. Controls and alarms operate from battery power. LCP-GEN contains the following pushbuttons, switches, and meters:

- Generator master switch (Run/Off-reset/Auto)
- Emergency stop pushbutton (aborts cool down)
- Frequency Meter
- AC Voltmeter
- AC Ammeter
- Scale Lamps (Upper/Lower)
- DC Voltmeter for 24 VDC engine batteries
- Hour meter
- Voltage adjustment
- Alarm horn and silence pushbutton switch
- Lamp test pushbutton
- Engine oil pressure gauge
- Oil temperature gauge
- Water temperature gauge

Status indicator lights at the LCP-GEN are:

- Air Damper
- System Ready
- Generator Switch Not in Auto

Alarm lights are provided at the LCP-GEN for the following alarms in which shutdown of the generator will occur:

- “EMERGENCY STOP”
- “HIGH ENGINE TEMPERATURE”
- “LOW OIL PRESSURE”
- “OVERCRANK”
- “OVERSPEED”
- “AUXILIARY FAULT”

Alarm lights are provided for the following alarms in which shutdown will not occur:

- “PRE-ALARM HIGH ENGINE TEMPERATURE”
- “PRE-ALARM LOW OIL PRESSURE”
- “LOW WATER TEMPERATURE”
- “LOW FUEL”
- “AUXILIARY PRE-ALARM”
- “BATTERY CHARGER FAULT”
- “LOW BATTERY VOLTAGE”
- “HIGH BATTERY VOLTAGE”

All alarms at LCP-GEN will send a common alarm signal to the LCP-GCPS as a “STANDBY GENERATOR FAILURE.” This condition is included in the common “GOAT CANYON PUMP STATION SYSTEM FAILURE” alarm at PCC.

A base mounted diesel fuel tank is provided for the generator with a low level switch which initiates a “Low Fuel” alarm at LCP-GEN. The fuel tank is also provided with an inner tank leak detection system. Leak detection initiates a “STANDBY GENERATOR DIESEL TANK LEAK” alarm at LCP-GCPS.

Support Systems

The MCC Room is provided with a temperature gauge and switch to monitor the adequacy of the cooling and ventilation system. Upon reaching an adjustable high temperature setting, a “MCC ROOM HIGH TEMPERATURE” alarm will annunciate at LCP-GCPS. This condition is included in the common “GOAT CANYON PUMP STATION SYSTEM FAILURE” alarm at PCC.

The MCC/Generator Building is provided with a fire alarm system. When the fire alarm system is triggered by either a smoke detector or a pull station, “BUILDING FIRE ALARM” will annunciate at LCP-GCPS and initiate a “GOAT CANYON PUMP STATION FIRE ALARM” at PCC.

4.13.3.2 Step by Step Start-Up Procedures

4.13.3.2.1 General System Start-Up Procedures

The Goat Canyon Pump Station Facilities should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Ensure that circuit breakers at the Motor Control Center in the MCC Room are energized for all equipment to be operated.
3. Ensure that control panel LCP-GCPS and the automatic transfer switch (ATS) located in the MCC Room of the MCC Generator Building; BCP-GCPS located at the pump station wetwell; LCP-GCPSS located at the sump pump station; LCP-GCORS located at the Odor Reduction Station; and LCP-GEN located at the generator are energized.
4. Ensure that all isolation valves on the sump pump discharge lines are all fully open.
5. Ensure the duplex sump pumps are operational, according to the procedures presented in Section 4.13.3.2.2.
6. Ensure the standby emergency generator is in the standby position, according to the procedures presented in Section 4.13.3.2.2.
7. Ensure the well water supply system is operational, according to the procedures presented in Section 4.13.3.2.2.
8. Ensure that the surge arrestors are operational, according to the procedures in Section 4.13.3.2.2.
9. Ensure that the wetwell level control system is in operation, according to the procedures presented in Section 4.13.3.2.2.
10. Ensure that all isolation valves on the lift pump discharge lines are open.
11. Ensure the sewage lift pumps are operational, according to the procedures presented in Section 4.13.3.2.2.
12. Start the GCPS Odor Reduction Station according to the procedures described in Sections 4.13.3.2.2 in the following order:
 - a. Make-Up Water Conditioning System
 - b. Scrubber
 - c. Recirculation Pumps

- d. pH and ORP Controllers
 - e. NaOCl Storage Tank
 - f. NaOCl Metering Pump
 - g. NaOH Storage Tank
 - h. NaOH Metering Pump
 - i. Blower
13. After normal operation of the Odor Reduction Station is established, start to introduce influent flow by opening the pump station isolation valve, according to the procedures presented in Section 4.13.3.2.2.
14. pH and ORP of the odor control scrubber solution should be continuously monitored. The optimum set points (pH and ORP) should be in accordance with the Odor Reduction Station Air Permit and your Operations Supervisor's direction based on operating experience.

4.13.3.2.2 Individual Equipment Start-Up Procedures

Pump Station Isolation Valve

Open the pump station isolation valve according to the procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize the isolation valve controls.
2. At the control valve, ensure the Lock/Out/Stop switch is disengaged.
3. At LCP-GCPS, push the Reset pushbutton.
4. Open the valve according to the procedures listed below.

CAUTION: IF THE ISOLATION VALVE IS CLOSED, THE UPSTREAM GRAVITY LINE MAY BE FULL. THE VALVE SHOULD INITIALLY BE PARTIALLY OPENED IN MANUAL FROM LCP-GCPS WHILE MONITORING WETWELL LEVEL. ENSURE THAT THE PUMPS ARE KEEPING UP WITH THE FLOW BEFORE OPENING THE VALVE FURTHER AND ULTIMATELY PLACING IT INTO AUTOMATIC OPERATION. THIS WILL PREVENT POTENTIAL FLOODING OF THE WETWELL IF THE GRAVITY LINE IS FULL.

Automatic Mode of Operation

- a. At LCP-GCPS, place the Open/Auto/Close selector switch in the "Auto" position.

- b. At the control valve, place the Local/Remote selector switch into the “Remote” position.
- c. At this time, the operation of the valve is controlled by a float switch in the wetwell. The valve is normally open. The position of the valve is indicated at LCP-GCPS.

Note: If the level in the wetwell rises to the elevation of the high float switch, the valve automatically closes.

Manual Mode of Operation - Remotely Controlled

- a. At the control valve, place the Local/Remote selector switch into the “Remote” position.
- b. Open the valve by holding the Open/Auto/Close selector switch at LCP-GCPS in the “Open” position.
- c. The valve travels open and remains open. The “Open” indicator light at LCP-GCPS should be illuminated.

CAUTION: MONITOR THE WATER ELEVATION IN THE WETWELL. IF THE WATER ELEVATION IN THE WETWELL REACHES HIGH LEVEL, THE VALVE WILL NOT BE CLOSED AUTOMATICALLY IN THE MANUAL MODE OF OPERATION.

Manual Mode of Operation - Locally Controlled

- a. At the control valve, place the Local/Remote selector switch into the “Local” position.
- b. Open the valve by depressing the “Open” pushbutton.
- c. The valve travels open and remains open. The “Open” indicator light at LCP-GCPS should be illuminated.

CAUTION: MONITOR THE WATER ELEVATION IN THE WETWELL. IF THE WATER ELEVATION IN THE WETWELL REACHES HIGH LEVEL, THE VALVE WILL NOT BE CLOSED AUTOMATICALLY IN THE MANUAL MODE OF OPERATION.

Wetwell Level Control System

- 1. Ensure that the circuit breaker in MCC Room power panel PP-GC is positioned to energize the bubbler system.
- 2. Ensure that all appropriate isolation valves inside BCP-GCPS are open.
- 3. Bubbler air can be directed to either of two drop tubes into the wetwell. Ensure that one of the two isolation valves on top of the wetwell are open.

4. Start up the bubbler system according to the procedures below:

Automatic Mode of Operation

- a. At BCP-GCPS, place Compressor 1/Auto/Compressor 2 selector switch in the “Auto” position.
- b. For both compressors, place the On/Off selector switches in the “On” position. At this time, the compressors alternate operation after each air fill cycle. If a compressor is running, the respective compressor “Running” light at BCP-GCPS should be illuminated.

Manual Mode of Operation

- a. Manual operation is not provided.
5. Visually verify compressor is operating smoothly without excess noise or vibration.
6. Confirm that local level indication reflects level in wetwell.

Sewage Lift Pumps

Start up the sewage lift pumps according to the procedures below:

1. Ensure that the local electrical disconnect is positioned to energize the lift pump controls.
2. Ensure that associated variable frequency drives (VFDs) are operational.
3. Verify that pump discharge valves in the valve vaults are open.
4. At the pumps, place the respective ROT switches in the “Remote” position.
5. At LCP-GCPS, reset the pumps by depressing the “Reset” pushbuttons for each pump.
6. At LCP-GCPS, select the lead pumps by placing the Pump 1/Pump 2 and Pump 3/Pump 4 selector switches in the desired positions.
7. Start up the lift pumps according to the procedures listed below:

Automatic Mode of Operation

- a. At LCP-GCPS, place the HOA selector switches for all pumps in the “Auto” position. At this time, the pumps are controlled by the bubbler level control panel.

- b. Lead pump (1 or 2) starts when the water levels in the wetwell reaches an operator adjustable set point. The VFD will start the pump and ramp it to 100 percent speed. If level continues to rise and reaches an operator adjustable set point, lead pump (3 or 4) starts. Pumps are shut down upon falling level, at adjustable set points, in the reverse order they were started. See Section 4.13.3.1, ***Sewage Lift Pumps***, for control points and their respective elevations. If a pump is running, the respective pump “Run” indicator light at LCP-GCPS should be illuminated.

Note: If the water elevation in the wetwell reaches a low low set point level pumps will be shut down and locked out, and an alarm initiated.

Manual Mode of Operation

- a. At LCP-GCPS, place the HOA selector switch for the selected pump in the “Hand” position. The VFD will start the pump and ramp it to 100 percent speed and the pump will run continuously. The pump “Run” indicator light at LCP-GCPS should be illuminated.

CAUTION: MONITOR THE WATER ELEVATION IN THE WETWELL. DO NOT RUN PUMPS UNDER DRY CONDITIONS. IF THE WATER ELEVATION IN THE WETWELL REACHES LOW LOW LEVEL, THE PUMPS WILL NOT BE SHUTDOWN AND LOCKED OUT AUTOMATICALLY WHILE IN THE MANUAL MODE OF OPERATION.

8. Visually verify pump is operating smoothly without excessive noise or vibration.

Sump Pumps

Start up the sump pump, according to the procedures listed below:

1. Ensure that the circuit breakers in the MCC and power panel PP-GC are closed to energize the sump pumps and associated controls.
2. Verify the associated pump discharge valves in the valve vault are open.
3. At LCP-GCPSS, reset the pumps by depressing the “Reset” pushbuttons for each selected pump.
4. Start up the sump pumps according to the procedures listed below:

Automatic Mode of Operation

- a. Place the Pump 1/Alternating/Pump 2 selector switch in the “Alternating” position.
- b. Place the Auto/Off/On switch at LCP-GCPSS in the “Auto” position. If both pumps are to be operational, then both pumps Auto/Off/On switches must be in the “Auto” position.
- c. The pumps run as called for by float level switches in the sump. The pumps alternate cycles automatically as duty and standby pump on each pump down cycle. If the water level reaches the high level float, the duty pump starts automatically. If the water level reaches the high high level float, the standby pump starts automatically. If a pump is running, the respective pump “Run” indicator light at LCP-GCPSS should be illuminated.

Note: If the water elevation in the sump reaches the low low level float, any pump running will be shut down automatically.

Manual Mode of Operation

- a. For the pump selected, place the Auto/Off/On switch at LCP-GCPSS in the “On” position.
 - b. The pump motor starts and the pump runs until shut off manually or by the low low level float. The respective pump “Run” indicator light at LCP-GCPSS should be illuminated.
5. Visually verify pump is operating smoothly, without excessive noise and vibration.

Well Water Supply

Start up the well water supply system according to the procedures listed below:

1. Ensure that the electrical disconnect on the local control panel is positioned to energize the well water supply system controls.
2. Verify the associated valving is in the proper orientation.
3. At the LCP, reset the pump by depressing the “Reset” pushbutton.
4. Start up the well water pump according to the procedures listed below.

Automatic Mode of Operation

- a. At the LCP, place the Hand/Off/Auto selector switch in the “Auto” position.

- b. The pump will be called to run when the pressure in the hydropneumatic tank falls to 60 psig. When the pressure in the tank reaches 80 psig, the pump will be shut down automatically.

Manual Mode of Operation

- a. At the LCP, place the Hand/Off/Auto selector switch in the “Hand” position.
 - b. The pump motor starts and the pump runs continuously. The pump “Run” indicator light at the LCP should be illuminated.
5. Visually verify pump is running smoothly, without excessive noise and vibration.

Surge Arrestors

Start up the surge arrestors according to the procedures listed below:

1. Verify that the drain valve for the tank to be put in service is closed.
2. Verify that isolation valves at the air relief valves and the vacuum relief valve are open.
3. Verify that isolation valves at level sight gauge are open.

Odor Reduction Station

This section provides an overview of the startup procedure for the scrubber system. Follow the start up instructions provided for each individual component, as described in the sections that follow. Start up the odor reduction station according to the procedures listed below:

1. Ensure that the local electrical disconnect on panel LCP-GCORS is positioned to energize the odor reduction station systems controls. Reconnect all piping and tubing that was disconnected at the scrubber, if necessary.
2. Start up the water well and water conditioning systems to provide continuous supply of conditioned make-up water.
3. Ensure the NaOH and NaOCl tanks have adequate chemical.
4. Fill the scrubber sump to the proper level using the make-up water feed system. Open the appropriate valves and allow the water to run until it begins to flow out the scrubber drain.

5. Adjust the make-up water rotometer to the proper rate (approximately 0.5 gpm).
6. Activate the recirculation pumps. Inspect the nozzles to be sure they are distributing water evenly.
7. Reset the pH/ORP sensors, if necessary. Calibrate the pH and ORP controllers as necessary by methods described in the Manufacturer's O&M Manual. Adjust the set points to the desired settings to comply with Air Pollution Control Permit requirements..
8. Open the isolation valves between the chemical storage tanks and the chemical metering pumps. Inspect the system to ensure there are no leaks from the chemical storage tanks and interconnecting pipes.
9. Place the chemical metering pumps into automatic operation as described below. Allow time for the chemicals to be metered to the scrubber and to bring the concentrations to their desired levels.
10. Check to be sure all chemical and recirculation pumps are pumping. Prime pumps as necessary.
11. Start the blower as described below. This initiates the flow of odorous air from the wetwell to the scrubber and the scrubbing action begins.

Odor Reduction Blower

Start up the odor reduction station blower according to the procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize LCP-GCORS.
2. Verify that the odor reduction blower discharge damper is open.
3. Place the blower into operation by placing the Off/On switch to "On" at LCP-GCORS.
4. Under normal conditions the blower will start after a 0 - 180 second delay and operate continuously. The "Blower On" indicator light at LCP-GCORS should be illuminated.
5. Visually verify the blower is operating without excessive noise or vibration.

Odor Reduction Scrubber

Start-up the scrubber according to procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize LCP-GCORS.
2. Ensure that sample ports are closed.
3. Open the appropriate isolation valves including the sodium hypochlorite feed line, sodium hydroxide feed line, and sump make up water line.
4. Ensure the sump is full of liquid. Adjust rotameter to the proper rate.
5. Activate the recirculation pumps, according to the procedure described below.

Odor Reduction pH and ORP Controllers

Start-up the pH and ORP controllers according to the procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize LCP-GCORS.
2. Ensure that the ORP analyzer is energized and displaying a millivolt reading.
3. Ensure that the pH analyzer is energized and displaying a pH reading.
4. Verify and adjust as necessary the pH and ORP set points to the desired value in accordance with air permit requirements.

Odor Reduction Recirculation Pumps

Start-up the recirculation pumps according to the procedures below:

1. Ensure that the local electrical disconnect is positioned to energize LCP-GCORS.
2. Verify that recirculation valving is in the proper orientation and the pump discharge and suction valves are open.
3. Place each pump into operation by placing the respective Off/On switch at LCP-GCORS in the “On” position. The respective “PUMP RUNNING” indicator light at LCP-GCORS should be illuminated.
4. Visually verify the pump is operating without excess noise or vibration.

Odor Reduction NaOH Metering Pump

Start-up the sodium hydroxide (NaOH) metering pump according to the procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize LCP-GCORS.
2. Verify the associated discharge and suction piping is connected.
3. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the “Chem Pump 1” Hand/Off/Auto selector switch at LCP-GCORS in the “Auto” position.
- b. In the automatic mode, the pump operates as called for by the pH controller. If the pump is running, the “Chem Pump 1 Running” indicator light at LCP-GCORS should be illuminated.

Manual Mode of Operation

- a. Place the “Chem Pump 1” Hand/Off/Auto selector switch at LCP-GCORS in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump operates continuously. The “Chem Pump 1 Running” indicator light at LCP-GCORS should be illuminated.
4. Visually verify the pump is operating without excessive noise or vibration.

Odor Reduction NaOCl Metering Pump

Start-up the sodium hypochlorite (NaOCl) metering pump according to the procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize LCP-GCORS.
2. Verify the associated discharge and suction piping is connected.
3. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the “Chem Pump 2” Hand/Off/Auto selector switch at the LCP-GCORS in the “Auto” position.
- b. In the automatic mode, the pump operates as called for by the ORP controller. If the pump is running, the “Chem Pump 2 Running” indicator light at LCP-GCORS should be illuminated.

Manual Mode of Operation

- a. Place the “Chem Pump 2” and/Off/Auto selector switch at the LCP-GCORS in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump operates continuously. The “Chem Pump 2 Running” indicator light at LCP-GCORS should be illuminated.
4. Visually verify the pump is operating without excessive noise or vibration.

Odor Reduction NaOH Storage Tank

Start-up the NaOH storage tank according to the procedures listed below:

1. Ensure that there is sufficient caustic in the tank (50% full minimum).
2. Open the isolation valve on the outlet line.

Odor Reduction NaOCl Storage Tank

Start-up the NaOCl storage tank according to the procedures listed below:

1. Ensure that there is sufficient sodium hypochlorite in the tank (50% full minimum).
2. Open the isolation valve on the outlet line.

Odor Reduction Water Conditioning System

Start up the water conditioning system according to the procedures below:

1. Ensure that the local electrical disconnect is positioned to energize LCP-GCORS.
2. Open the isolation valve on the inlet side of the water conditioning system.
3. Adjust the flow of conditioned water to the scrubber tower to meet the desired flow rate as directed by your Operations Supervisor.

Standby Generator

The standby generator is designed to start-up automatically when power from the San Ysidro (SYO) utility feeder from San Diego Gas & Electric (SDG&E) is interrupted. The standby generation should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.

2. Ensure that the diesel fuel oil storage tank is in the standby position and has sufficient fuel in the tank. If fuel storage base tank needs to be filled, perform the following procedures:
 - a. Attach fuel supply truck hose to the quick connect located inside the generator housing.
 - b. Pump the ordered amount of diesel fuel oil No. 2 into the storage tank while watching the fuel level gauge. **DO NOT OVERFILL.**
 - c. When pumping is completed, disconnect the supply hose and cap the fill pipe.

CAUTION: NO HIGH LEVEL ALARM IS PROVIDED. CONTINUOUS MONITORING OF THE TANK FILLING IS REQUIRED.

3. Place the standby generator into operation as follows:

Automatic Mode of Operation

- a. Place the Run/Off-reset/Auto master switch located at LCP-GEN in the “Auto” position.

NOTE: GENERATOR SET SHOULD ALWAYS BE IN “AUTO” POSITION SO IT IS AUTOMATICALLY CALLED TO START DURING POWER OUTAGES.

- b. Place the Automatic Transfer Switch (ATS) Auto/Hand Crank/Test/Stop selector switch in the “Auto” position.
- c. On SDG&E power fail the following automatic sequence occurs:
 - Time delay.
 - Generator starts.
 - Automatic Transfer Switch is automatically switched to the “Emergency” position.
 - The MCC is energized via the generator.
- d. Verify that the generator is operating within normal parameters: power output, oil pressure, and oil temperature.

Manual Mode of Operation

- a. Place the Run/Off-reset/Auto master switch located at the LCP-GEN in the “Run” position to start-up the generator set.

Note: The Alarm Horn sounds and the “Generator Switch Not in Auto” indicator light illuminates whenever the master switch is not in the “Auto” position.

- b. Place the Automatic Transfer Switch located, in the MCC Room, to the “Emergency” position. The MCC is now energized.

- c. Confirm that the generator set is operating within normal parameters: power output and oil pressure.
4. If equipment is in automatic mode of operation, the equipment will continue to operate based on signals from the PLC.
5. Continuously monitor generator to ensure proper operation and that the generator is not overloaded.
6. Continue to operate pump station on generator power and monitor generator until power from SDG&E is restored.

4.13.3.3 Step by Step Shutdown Procedures

4.13.3.3.1 General System Shutdown Procedures

The Goat Canyon Pump Station Facilities should be shut down according to the following procedures:

1. Refer to the General Shutdown Procedures presented in Section 4.0.3.
2. Close the pump station isolation valve, according to the procedures presented in Section 4.13.3.3.2.
3. Shut down the sewage lift pumps, according to the procedures presented in Section 4.13.3.3.2.
4. Shut down the surge arrestors, according to the procedures presented in Section 4.13.3.3.2.
5. Shut down the wetwell level control system, according to the procedures presented in Section 4.13.3.3.2.
6. Shut down the GCPS Odor Reduction Station according to the procedures described in Section 4.13.3.3.2. If the odor reduction station is to be shut down in its entirety, the shut down order for the various pieces of odor reduction equipment shall be as follows:
 - a. Blower
 - b. Recirculation Pumps
 - c. NaOH Metering Pump
 - d. NaOCl Metering Pump
 - e. NaOH Storage Tank
 - f. NaOCl Storage Tank
 - j. Scrubber

- h. pH and ORP Controllers
- i. Water Conditioning System

7. Shut down the well water supply system according to the procedures presented in Section 4.13.3.3.2.
8. Shut down the generator according to the procedures presented in Section 4.13.3.3.2.
9. Shut down the duplex sump pumps, according to the procedures presented in Section 4.13.3.3.2.
10. De-energize the circuit breakers for the equipment that is shut down at the MCC Room.

4.13.3.3.2 Individual Equipment Shutdown Procedures

Pump Station Isolation Valve

Manually close the pump station isolation valve according to the procedures listed below:

1. Determine if the valve is to be remotely or locally controlled.
2. Close the valve according to the procedures listed below.

If Remotely Controlled

- a. At the control valve, verify the Local/Remote selector switch is in the “Remote” position.
- b. Close the valve by holding the Open/Auto/Close selector switch at LCP-GCPS in the “Close” position.
- c. The valve travels closed and remains closed. The valve “Closed” indicator light at LCP-GCPS should be illuminated.

If Locally Controlled

- a. At the control valve, verify the Local/Remote selector switch is in the “Local” position.
- b. Close the valve by depressing the “Close” pushbutton.
- c. The valve travels closed and remains closed. The valve “Closed” indicator light at LCP-GCPS should be illuminated.
3. At the control valve, engage the Lock/Out/Stop switch.
4. If the valve is to be out of service for an extended period of time, disconnect the power source.

Note: If the valve is in automatic mode of operation, the valve will automatically close if the water elevation in the wetwell reaches the high level float switch.

Wetwell Level Control System

Manually shut down the wetwell level control system according to the procedures listed below:

1. For the compressor(s) to be shut down, place the On/Off selector switch(s) in the “Off” position.
2. Verify the compressor(s) has stopped. The compressor “Running” indicator light(s) should not be illuminated.
3. If the level control system is to be out of service for an extended period of time, disconnect the power source by opening the circuit breaker in power panel PP-GC.

Sewage Lift Pumps

Manually shut down the submersible lift pumps according to the procedures below:

1. Select the influent pump to be out of service.
2. At LCP-GCPS, place the HOA selector switch for the selected pump in the “Off” position to stop the pump. The pump “Run” indicator light at LCP-GCPS will not be illuminated.
3. Verify the pump has stopped.
4. At the pump, place the ROT switch in the “Off” position and lock out the ROT switch.
5. Close the selected pump discharge valve.
6. If the pump is to be out of service for an extended period of time, disconnect the power source.

Note: In automatic mode, lift pumps will automatically shut down on low water level. Lift pump will automatically shut down on low low water level (back-up shut down).

Sump Pumps

Manually shut down the sump pumps according to the procedures listed below:

1. For the pump to be shut down, place the Auto/Off/On switch at LCP-GCPSS in the “Off” position. The pump “Running” indicator light should not be illuminated.
2. Verify the pump has stopped.
3. If pumps are to be out of service for an extended period of time, turn the power control On/Off switch to the “Off” position and disconnect power source and close isolation valves.

Note: In automatic mode, the duty pump will shut down at low water level. Any pump running will be automatically shut down at low low water level.

Well Water Supply

Manually shut down the well water supply according to the procedures listed below:

1. Place the Hand/Off/Auto switch at the LCP in the “Off” position. The pump “Run” indicator light should not be illuminated.
2. Verify the pump has stopped.
3. If the pump is to be out of service for an extended period of time, turn the power control On/Off switch to the “Off” position, disconnect power source and close isolation valves.

Surge Arrestors

Manually shut down respective surge arrester control system, as described below.

Surge Arrester SA-1 provides surge protection for Lift Pumps P-1 and P-2. Surge Arrester SA-2 provides surge protection for Lift Pumps P-3 and P-4.

1. Determine which surge arrester is to be shut down. Verify the respective lift pumps have been shut down according to the procedures listed above in Section 4.13.3.3.2.

CAUTION: DO NOT SHUT DOWN A SURGE ARRESTOR IF THE RESPECTIVE LIFT PUMPS ARE IN OPERATION.

2. No specific procedure is necessary to take a surge arrester out of service.

3. If pumps and the respective surge arrestor are to be out of service for an extended period of time, drain the surge arrestor tank by opening the appropriate drain valve.

Odor Reduction Station

This section provides an overview of the shutdown procedure for the odor reduction station. Follow the shutdown instructions provided for each individual component, as described in the sections that follow:

1. For routine shutdowns, follow the shutdown order described in Paragraph 6 of Section 4.13.3.3.1.
2. If the odor reduction station is to be shut down for an extended period of time, follow the additional procedures prescribed below:
 - a. If a shutdown is planned in advance, between two weeks and one month before shutdown date, determine amount of chemical in storage tanks. Increase chemical feed rates and/or pH/ORP controller set point to use all chemical by the shutdown date. If there is chemical remaining at shutdown, a specialized contractor service should be ordered to pump out the chemical tanks and haul chemicals away for disposal.
 - b. At shutdown make sure chemical tanks are empty. Wash down the chemical feed lines.
 - c. Turn off all scrubber components at the appropriate local and LCP-GCORS switches.
 - d. Visually inspect the packing material. Perform acid wash procedures in accordance with manufacturer's recommendations. See Chapter 5.0 for more information.
 - e. Pump scrubbing solution out of all sumps. Refill sumps with water and turn on recirculation pumps for 10 minutes to rinse towers, packing, and sumps. Pump all of the water out of the sumps.
 - f. Remove the union fittings from the inlet and outlet of the recirculation pumps. Drain all liquid out of the pumps and piping.
 - g. Be sure power to pH/ORP controller is off. Remove the pH/ORP sensors from the recirculation piping. Disconnect wiring making note of proper connections for reassembly when scrubber is restarted. Be sure tip of sensors are kept wet and capped.
 - h. Close all isolation valves.
 - i. Turn off all power to system at main disconnect.

Odor Reduction Blower

Shut down the odor reduction station blower according to the procedures listed below:

1. Place the Off/On selector switch at LCP-GCORS for the blower in the “Off” position. The “Blower Off” indicator light at LCP-GCORS should be illuminated.
2. Verify the blower has stopped.
3. If the blower is to be out of service for an extended period of time, disconnect power source.
4. If the odor reduction system is to be out of service for an extended period of time, close the isolation damper on discharge of the blower.

Note: The blower will automatically shut down on motor overload.

Odor Reduction Scrubber

Shut down the odor reduction scrubber station according to the procedures listed below:

1. Close the appropriate isolation valves.

Odor Reduction pH and ORP Controllers

Shut down the pH and ORP controllers according to the procedures listed below:

1. If a controller is to be out of service for an extended period of time, disconnect the power to the controller.

Odor Reduction Recirculation Pumps

Shut down the recirculation pumps according to the procedures listed below:

1. Place the respective Off/On switch at LCP-GCORS for the recirculation pump to be shut down in the “Off” position. The “Off” indicator light at LCP-GCORS should be illuminated.
2. Verify the pump has stopped.
3. If the pump is to be out of service for an extended period of time, disconnect power source.
4. If the entire odor reduction system (or one of the recirculation pumps) is to be out of service for an extended period of time, close the isolation valves on the pump suction and discharge.

Note: The recirculation pump will automatically shut down on motor overload.

Odor Reduction NaOH Metering Pump

Shut down the sodium hydroxide metering pump according to the procedures listed below:

1. Place the Hand/Off/Auto switch at LCP-GCORS for the pump (Chem Pump 1) in the “Off” position. The “Running” indicator light at LCP-GCORS should not be illuminated.
2. Verify the pump has stopped.
3. If the pump is to be out of service for an extended period of time, disconnect power source.
4. If the entire odor reduction system is to be out of service for an extended period of time, close the isolation valve on the pump suction.

Note: In the automatic mode of operation, the pump starts and stops according to signals from the pH controller.

Odor Reduction NaOCl Metering Pump

Shut down the sodium hypochlorite metering pump according to the procedures listed below:

1. Place the Hand/Off/Auto switch at LCP-GCORS for the pump (Chem Pump 2) in the “Off” position. The “Running” indicator light at LCP-GCORS should not be illuminated.
2. Verify the pump has stopped.
3. If the pump is to be out of service for an extended period of time, disconnect power source.
4. If the entire odor reduction system is to be out of service for an extended period of time, close the isolation valve on pump suction.

Note: In the automatic mode of operation, the pump starts and stops according to signals from the ORP controller.

Odor Reduction NaOH Storage Tank

Shut down the NaOH storage tank according to the procedures listed below:

1. Close the tank isolation valve.

Odor Reduction NaOCl Storage Tank

Shut down the NaOCl storage tank according to the procedures listed below:

1. Close the tank isolation valve.

Odor Reduction Water Conditioning System

Shut down the water conditioning system according to the procedures listed below:

1. Ensure that each of the vessels of the water conditioning system is on either the “Operation” or “Stand-by” mode. (If the conditioning system is in some other mode, wait until the regeneration cycle is complete.)
2. Close the isolation valves on the inlet of the water conditioning system.
3. If the water conditioning system is to be out of service for an extended period of time, disconnect power source.

Standby Generator and ATS

The standby generator should be shut down according to the following procedures:

1. Refer to the General Shutdown Procedures presented in Section 4.0.3.
2. Shut down the mobile standby generator according to the procedures listed below:

Automatic Return to Restored SDG&E Power

- a. On restoration of utility power the following automatic sequence occurs:
 - Time delay.
 - Automatic transfer switch returns to “Normal” position.
 - Plant continues to operate without an interruption.
 - Generator runs through cool down period.

Manual Return to Restored SDG&E Power

- a. Verify that normal power has been restored by SDG&E and is available for use from the ATS annunciator “Normal Available”
- b. Place the automatic transfer switch in the “Normal” position. The plant continues to operate without an interruption
- c. Place the Run/Off-reset/Auto switch located at LCP-GEN in the “Off” Position to shutdown the generator set. The generator begins the cool down period and then shuts down.

3. Verify the pump station is operating within its normal operating limits.

4.13.3.4 Alarm and Status Annunciation

General

<u>Alarm/Status</u>	<u>Display Location</u>
PLC-GCPS Primary Failure Annunciator	LCP-GCPS
PLC-GCPS Secondary Failure Annunciator	LCP-GCPS
Pump Station System Failure Annunciator	PCC
Building Fire Alarm Annunciator	LCP-GCPS
Goat Canyon Pump Station Fire Annunciator	PCC
MCC Room High Temperature Annunciator	LCP-GCPS

Pump Station Isolation Valve

<u>Alarm/Status</u>	<u>Display Location</u>
Wetwell Inlet Valve Open Light	LCP-GCPS
Wetwell Inlet Valve Closed Light	LCP-GCPS
Wetwell Inlet Valve Open Light	Field
Wetwell Inlet Valve Closed Light	Field
Wetwell Inlet Valve Failure Annunciator	LCP-GCPS

Wetwell Level Control System

<u>Alarm/Status</u>	<u>Display Location</u>
Wetwell Low Level Annunciator	LCP-GCPS
Wetwell High Level Annunciator	LCP-GCPS
Wetwell High Combustible Gas Annunciator	LCP-GCPS
BCP-GCPS Bubbler Failure Annunciator	LCP-GCPS

Wetwell Level	LCP-GCPS
Wetwell Level	BCP-GCPS
Compressor No. 1 Running Light	BCP-GCPS
Compressor No. 2 Running Light	BCP-GCPS
Compressor No. 1 Fail Light	BCP-GCPS
Compressor No. 2 Fail Light	BCP-GCPS
Low Air Light	BCP-GCPS
Alarm Horn	BCP-GCPS

Sewage Lift Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
Lift Pump No. 1 Failure Annunciator	LCP-GCPS
Lift Pump No. 2 Failure Annunciator	LCP-GCPS
Lift Pump No. 3 Failure Annunciator	LCP-GCPS
Lift Pump No. 4 Failure Annunciator	LCP-GCPS
Lift Pump No. 1 Run Light	LCP-GCPS
Lift Pump No. 2 Run Light	LCP-GCPS
Lift Pump No. 3 Run Light	LCP-GCPS
Lift Pump No. 4 Run Light	LCP-GCPS
Lift Pump No. 1 Inverter Run Light	VFD 1
Lift Pump No. 1 Bypass Run Light	VFD 1

Lift Pump No. 2 Inverter Run Light	VFD 2
Lift Pump No. 2 Bypass Run Light	VFD 2
Lift Pump No. 3 Inverter Run Light	VFD 3
Lift Pump No. 3 Bypass Run Light	VFD 3
Lift Pump No. 4 Inverter Run Light	VFD 4
Lift Pump No. 4 Bypass Run Light	VFD 4

Sump Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
Area Sump High High Level Annunciator	LCP-GCPS
Area Sump Pump Failure Annunciator	LCP-GCPS
Pump No. 1 Running Light	LCP-GCPSS
Pump No. 1 Moisture Detection Alarm Light	LCP-GCPSS
Pump No. 1 High Temperature Alarm Light	LCP-GCPSS
Pump No. 2 Running Light	LCP-GCPSS
Pump No. 2 Moisture Detection Alarm Light	LCP-GCPSS
Pump No. 2 High Temperature Alarm Light	LCP-GCPSS
Power On Light	LCP-GCPSS
High Level Alarm Light	LCP-GCPSS
Alarm Beacon/Strobe Light	LCP-GCPSS

Well Water Supply

Well Pump Run Light	LCP
Low Pressure Light	LCP

Surge Arrestors

There are no alarm/status annunciation components associated with the surge arrestors.

Odor Reduction Station

<u>Alarm/Status</u>	<u>Display Location</u>
Odor Reduction System Failure Annunciator	LCP-GCPS
Pump Station Safety Shower Alarm Annunciator	PCC
Safety Shower Annunciator	LCP-GCPS
Panel Power On Light	LCP-GCORS
ORP Reading	LCP-GCORS
ORP Out of Range Light	LCP-GCORS
pH Reading	LCP-GCORS
pH Out of Range Light	LCP-GCORS
Blower Off Light	LCP-GCORS
Blower On Light	LCP-GCORS
Recirculation Pump 1 Off Light	LCP-GCORS
Recirculation Pump 1 Run Light	LCP-GCORS
Recirculation Pump 2 Off Light	LCP-GCORS
Recirculation Pump 2 Run Light	LCP-GCORS

Recirculation Pump 3 Off Light	LCP-GCORS
Recirculation Pump 3 Run Light	LCP-GCORS
Chemical Pump 1 (pH) Run Light	LCP-GCORS
Chemical Pump 2 (ORP) Run Light	LCP-GCORS
Phase Fail Light	LCP-GCORS
Panel Fan On Light	LCP-GCORS
Alarm Override On Light	LCP-GCORS

Standby Generator

<u>Alarm/Status</u>	<u>Display Location</u>
Lamp Test Light	LCP-GEN
System Ready Light	LCP-GEN
Generator Switch Not in Auto Light	LCP-GEN
Emergency Stop Light	LCP-GEN
High Engine Temperature Light	LCP-GEN
Low Oil Pressure Light	LCP-GEN
Overcrank Light	LCP-GEN
Overspeed Light	LCP-GEN
Auxiliary Fault Light	LCP-GEN
Pre-alarm High Engine Temperature Light	LCP-GEN
Pre-alarm Low Oil Pressure Light	LCP-GEN
Low Water Temperature Light	LCP-GEN
Low Fuel Light	LCP-GEN

Auxiliary Pre-Alarm Light	LCP-GEN
Battery Charger Fault Light	LCP-GEN
Low Battery Voltage Light	LCP-GEN
Standby Generator Diesel Tank Leak Annunciator	LCP-GCPS
Standby Generator Running Light	LCP-GCPS
Standby Generator Failure Annunciator	LCP-GCPS
Utility Power Failure Annunciator	LCP-GCPS

4.13.3.5 Daily Operational Checks

General

1. Refer to the general daily operation check requirements described in Section 4.0.5.
2. Check for any alarm conditions at the PLC-PCC. Notify your Supervisor of any annunciated alarms immediately.
3. Consult the sections below and the appropriate manufacturer's operation and maintenance manuals for specific monitoring requirements.

Pump Station Isolation Valve

1. Check and record the position of the isolation valve.
2. Check switch settings of the valve locally and at the LCP-GCPS to confirm the requirements of your Operations Supervisor.
3. Visually observe the valve for any signs of leaks or any other unusual problems.
4. Check for any alarm conditions at the LCP-GCPS. Notify your Supervisor of any annunciated alarms immediately.

Wetwell Level Control System

1. Check and record the level of the wetwell at BCP-GCPS.
2. Check switch settings of the system at the BCP-GCPS to confirm the requirements of your Operations Supervisor.

3. Check and record which air compressor is running. In the automatic mode, they should alternate automatically.
4. Check and record if any of the compressor “Fail” indicator lights are illuminated at BCP-GCPS.
5. Visually observe the control panel and compressors for any signs of leaks, unusual noise, and any other unusual problems.
6. Check for any alarm conditions at BCP-GCPS or LCP-GCPS. Notify your Supervisor of any annunciated alarms immediately.
7. Check all “push to test” indicator lights on BCP-GCPS.
8. Drain air tank condensate.
9. Consult the Manufacturer’s O&M Manual for troubleshooting, calibration, and test procedures. The following O&M Manual should be consulted for the BCP-GCPS control panel:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant (CC-4B) - BCP-GCPS Control Panel (Section 13650). Prepared by Medland Controls, Inc., 1998.

Sewage Lift Pumps

1. Check the positions of the manually-operated valves to confirm the requirements of your Operations Supervisor.
2. Check water level in the wetwell.
3. Check the pump operation to see that they are operating smoothly and quietly.
4. Record run times of the sewage lift pumps from the respective VFD control panels in the MCC Room.
5. Check switch settings of the pumps locally, in the MCC Room, and at the LCP-GCPS to confirm the requirements of your Operations Supervisor.
6. Check for any alarm conditions at the LCP-GCPS or in the MCC Room. Notify your Supervisor of any annunciated alarms immediately.
7. Consult the Manufacturer’s O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the lift pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant (CC-4B) - Submersible Non-Clog Sewage Pumps (Section 11100). Prepared by Ebara International Corporation. 1998.

Sump Pumps

1. Check the positions of the manually-operated valves to confirm the requirements of your Operations Supervisor.
2. Check the water level in the sump.
3. Check the pump operation to see that they are operating smoothly and quietly.
4. Record run times of the sump pumps from LCP-GCPSS.
5. Check switch settings of the pumps at LCP-GCPSS to confirm the requirements of your Operations Supervisor.
6. Check for any alarm conditions at LCP-GCPSS or at LCP-GCPS. Notify your Supervisor of any annunciated alarms immediately.
7. Check all “push to test” indicator lights on LCP-GCPSS.
8. Consult the Manufacturer’s O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the sump pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant (CC-4B) - Sump Pumps (Section 11016). Prepared by Ebara International Corporation. 1998.

Well Water Supply

1. Visually observe the hydropneumatic tank and pump connections for any signs of leaks and any other unusual problems.
2. Check the switch settings of the pump at the LCP to confirm the requirements of your Supervisor.
3. Check for any alarm conditions at the LCP. Notify your Supervisor of any annunciated alarms immediately.
4. Check all “push to test” indicator lights on LCP.

5. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the Well Water Supply System:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant (CC-4B) - Well Water Supply System (Section 11102). Prepared by Grundfos Pumps Corporation. 1998.

Surge Arrestors

1. Check the positions of the manually-operated isolation valves to confirm requirements of your Operations Supervisor.
2. Inspect each surge arrestor for correct liquid level.
3. Visually observe the tanks for any signs of leaks and any other unusual problems.
4. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the surge arrestors:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant (CC-4B) - Surge Control System (Section 11101). Prepared by Young Engineering Manufacturing, Inc., 1998.

Odor Reduction Station

The daily check of the odor reduction station should be according to the following procedures:

1. Observe any hydrogen sulfide or organic odors in the air, particularly downwind of the scrubber.
2. Inspect the nozzles to be sure they are distributing water evenly.
3. Check the rotometer to be sure make up water is being provided to the scrubber at the appropriate rate.
4. Inspect the system to ensure there are no leaks from the chemical storage tanks and interconnecting pipes.
5. Check control settings of each piece of equipment at LCP-GCORS to confirm the requirements of your Operations Supervisor.
6. Check for any alarm conditions at LCP-GCORS or LCP-GCPS. Notify your Supervisor of any annunciated alarms immediately.

7. Check all “push to test” indicator lights on LCP-GCORS.
8. Check that all wetwell access hatches are closed.
9. Check that portable eyewash/showers (2) are full of clean potable water. Verify that associated panic alarm switches are operational.
10. Fill out checklist as required by Air Pollution Control Permit.

Odor Reduction Blower

1. Check the position of the manually operated discharge damper to confirm the requirements of your Operations Supervisor.
2. Check the blower operation to ensure that it is operating smoothly and quietly.
3. Check the blower for leaks, excessive noise, and temperature (hand touch).
4. Check and record the discharge air velocity to confirm proper air flow.
5. Consult the Manufacturer’s O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station blowers:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4B) - Odor Reduction Scrubber Systems (Section 11050), Appendix E. Prepared by U.S.Filter/Davis Process, Inc., 1998.

Odor Reduction Scrubber

1. Visually observe scrubber sump and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the towers and all pipes, ducts, valves, and sampling valves for any signs of damage or improper installation. All sampling valves should be properly closed and tightened.
3. Check the positions of manually-operated valves and dampers to confirm the requirements of your Operations Supervisor.
4. Check and record the make-up water rotometer reading inside the make-up water control stand to satisfy requirements of the Air Pollution Control Permit.
5. Check and record the scrubber differential pressure to monitor fouling of the

packing and increased pressure on the blower.

6. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station scrubber:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4B) - Odor Reduction Scrubber systems (Section 11050). Prepared by U.S. Filter/Davis Process, Inc. 1998.

Odor Reduction pH and ORP Controllers

1. Visually observe each controller for any unusual problems.
2. Check and record pH and ORP readings to satisfy the requirements established by the Air Pollution Control Permit.
3. Check for pH and ORP "Out of Range" alarms at LCP-GCORS. If out of range, confirm that metering pump is operating properly.
4. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station pH and ORP controllers:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4B) - Odor Reduction Scrubber Systems (Section 11050), Appendix C and D. Prepared by U.S. Filter/Davis Process, Inc. 1998.

Odor Reduction Recirculation Pumps

1. Check the positions of the manually operated valves on recirculation lines to confirm the requirements of your Operations Supervisor.
2. Check the recirculation pumps operation to ensure that they are operating smoothly and quietly.
3. Check the recirculation pumps for leaks, excessive noise, and temperature (hand touch).
4. Check and record the discharge pressure using the local recirculation pump pressure gauge, as dictated by the Air Pollution Control Permit.
5. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction recirculation pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4B) - Odor Reduction Scrubber Systems (Section 11050), Appendix B. Prepared by U.S.Filter/Davis Process, Inc., 1998

Odor Reduction Station NaOH Metering Pump

1. Check the condition of the pump suction and discharge lines for any signs of damage, foreign material, or improper installation.
2. Check the pump operation to ensure that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check switch settings of the caustic metering pump at LCP-GCORS to confirm the requirements of your Operations Supervisor.
5. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station NaOH metering pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4B) - Odor Reduction Scrubber Systems (Section 11050), Appendix A. Prepared by U.S.Filter/Davis Process, Inc. 1998

Odor Reduction NaOCl Metering Pump

1. Check the condition of the pump suction and discharge lines for any signs of damage, foreign material or improper installation.
2. Check the pump operation to ensure that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check switch settings of the sodium hypochlorite pump at LCP-GCORS to confirm the requirements of your Operations Supervisor.
5. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station NaOCl metering pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4B) - Odor Reduction Scrubber Systems (Section 11050), Appendix A. Prepared by U.S.Filter/Davis Process, Inc. 1998.

Odor Reduction NaOH Storage Tank

1. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, manway, and valves for any signs of damage or improper installation. The manway should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the position of the manually-operated isolation valve at the tank to confirm the requirements of your Operations Supervisor.
4. Check and record sodium hydroxide level in the tank locally to satisfy the requirements established by your Operations Supervisor.
5. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station NaOH storage tank:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4B) - Odor Reduction Scrubber Systems (Section 11050), Appendix N. Prepared by U.S.Filter/Davis Process, Inc. 1998.

Odor Reduction NaOCl Storage Tank

1. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, manway, and valves for any signs of damage or improper installation. The manway should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the position of the manually-operated isolation valve at the tank to confirm the requirements of your Operations Supervisor.
4. Check and record sodium hypochlorite level in the tank locally to satisfy the requirements established by your Operations Supervisor.
5. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station NaOCl storage tank:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4B) - Odor Reduction Scrubber Systems (Section 11050), Appendix N. Prepared by U.S.Filter/Davis Process, Inc. 1998.

Odor Reduction Water Conditioning System

1. Check water softener vessels for leaks.
2. Check control settings of the water conditioning system to confirm the requirements of your Operations Supervisor.
3. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station water conditioning system:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4B) - Water Conditioning System (Section 11050). Prepared by Group Manufacturing. 1998

Standby Generator and ATS

1. Visually inspect all equipment for any signs of damage or improper installation.
2. Check mobile standby generator controls to ensure the generator is in automatic mode or as required by your Operation's Supervisor.
3. Visually observe the fuel tank and all fuel piping and connections for leaks.
4. Check switch settings of the standby generator and the fuel tank at LCP-GEN and the ATS to confirm the requirements of your Operations Supervisor.
5. Check the level in the fuel tank.
6. During an emergency or regular operational checks, when standby generator is operational, perform the following checks:
 - a. Check mobile standby generator to verify that it is within the established operating range and not overloaded.
 - b. Check the engine/power generator operation to see that it is operating smoothly and quietly.
 - c. Check the engine/power generator for leaks, excessive noise, and temperature.
7. Consult the manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the standby generator:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant (CC-4B) - Standby Generator and ATS (Sections 16203 and 16926). Prepared by Bay City Electric. 1998.

4.13.3.6 Training Record

The following record should be used by the Operator to ensure a complete understanding of the Goat Canyon Pump Station Facilities.

4.13.3.6.1 Reading Assignment

1. Chapters 8, 9, 13, Operation of Wastewater Treatment Plants - MOP 11. Water Environment Federation, 1990.
2. Chapters 1 Advanced Waste Treatment - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1991.

4.13.3.6.2 Field Instruction

The operator should review and know the location and purpose of each of the following items:

<u>Item</u>	<u>Operator Initials</u>
General	
PLC-PCC Alarms	_____
Pump Station Isolation Valve	
Local Controls	_____
LCP-GCPS Controls and Alarms	_____
Pump Station Wetwell	
High Level Float Switch	_____
BCP-GCPS Controls and Alarms	_____
LCP-GCPS Alarms	_____
Sewage Lift Pumps	
Isolation Valves	_____
Local Controls	_____
VFD Controls	_____

LCP-GCPS Controls and Alarms	_____
Sump Pumps	_____
Isolation Valves	_____
Level Float Switches	_____
LCP-GCPSS Controls and Alarms	_____
LCP-GCPS Alarms	_____
Well Water Supply	
Isolation Valves	_____
Local Controls and Alarms	_____
Surge Arrestors	
Isolation Valves	_____
Local Pressure Gauges	_____
Odor Reduction Blower	
Discharge Damper	_____
Portable Hydrogen Sulfide Monitor	_____
Combustible Gas Sensor	_____
LCP-GCORS Controls and Alarms	_____
Odor Reduction Scrubber	
Isolation Valves	_____
Make-Up Water Control Stand	_____
Mist Eliminator	_____

Spray Nozzles	_____
Packed Bed	_____
LCP-GCORS Controls and Alarms	_____
Differential Pressure Mamometer	_____
Odor Reduction pH and ORP Control	
pH Controller	_____
ORP Controller	_____
LCP-GCORS Controls and Alarms	_____
Odor Reduction Recirculation Pumps	
Isolation Valves	_____
LCP-GCORS Controls and Alarms	_____
Local Pressure Gauges	_____
Odor Reduction NaOH Metering Pump	
LCP-GCORS Controls and Alarms	_____
Stroke Adjustment	_____
Odor Reduction NaOC1 Metering Pump	
LCP-GCORS Controls and Alarms	_____
Stroke Adjustment	_____
Odor Reduction NaOH Storage Tank	
Isolation Valves	_____
Level Sight Tube	_____

Emergency Eyewash/Showers	_____
Odor Reduction NaOC1 Storage Tank	
Isolation Valves	_____
Level Sight Tube	_____
Odor Reduction Water Conditioning System	
Isolation/By-Pass Valves	_____
Local Controls	_____
Standby Generator	
Diesel Driven Engine	_____
Standby Generator	_____
LCP-GEN Controls and Alarms	_____
ATS Controls	_____
Diesel Fuel Base Tank	
Tank Level Sensors	_____
Atmospheric Vents	_____
Emergency Pressure Relief Vents	_____
Tank Leak Detector	_____
MCC/Generator Building	
High Temperature Switch	_____
LCP-GCPS Alarms	_____
PLC-PCC Alarms	_____
Fire Alarm System	_____

4.13.4 Hollister Street Pump Station

4.13.4.1 Description of Controls and Operation

Refer to the general control and operation philosophy description presented in Section 4.0.1. The Hollister Street Pump Station Process Schematic is presented in Figure 3.13-3. The Hollister Street Pump Station Odor Reduction System Process Schematic is presented in Figure 3.13-4.

The controls, status, and annunciators for the Hollister Street Pump Station consist of field controls and local control panels (LCP) located at the pump station or at the South Bay IWTP. The main local control panel (LCP-HSPS) is located in the MCC Room of the MCC/Generator Building at the pump station. LCP-HSPS is provided with an operator interface workstation mounted on the swing out panel to allow the operator to view and change PLC-HSPS set points, timers, and counters. The MCC Room also houses switchboards, motor control centers and variable frequency drives.

PLC-PCC, located at the Solids Processing LCC at the South Bay IWTP, receives data from HSPS via telephone lines. PLC-PCC combines all alarms (with the exception of safety shower and fire alarms) at the Hollister Street Pump Station into a single alarm which illuminates the “HOLLISTER STREET PUMP STATION SYSTEM FAILURE” annunciator.

Pump Station Isolation Valve

Influent control valve (MOV-1) is installed on the 30-inch pump station influent line. This electrically operated isolation valve is normally open to allow flow into the wetwell and is closed when a high water level occurs in the wetwell.

Locally, the influent valve is equipped with a Lock/Out/Stop (LOS) switch, open and close pushbuttons, and a Local/Remote selector switch. The LOS switch is lockable and overrides all other controls. When the Local/Remote switch at the valve is in the “Local” position, MOV-1 is controlled by “Open” and “Close” pushbutton switches at the valve. Valve position is indicated locally by “Open” and “Close” indicating lights. When the Local/Remote switch at the valve is placed in the “Remote” position, MOV-1 is controlled by signals from LCP-HSPS.

At LCP-HSPS, MOV-1 can be operated either manually or automatically. Valve controls at LCP-HSPS include a spring-loaded Open/Auto/Close selector switch, a Reset

pushbutton, and Open and Closed indicator lights. When the Open/Closed/Auto selector switch at LCP-HSPS is held in the “Open” position, the valve travels open. When the switch is held in the “Close” position, the valve travels closed. The valve only travels while the switch is held in place. When the switch is released, valve travel stops and the switch spring-returns to the “Auto” position. Pushing the “Reset” pushbutton puts the valve into automatic control.

For automatic operation, the Local/Remote switch at the valve must be in the “Remote” position and the Open/Auto/Close selector switch at LCP-HSPS must be in the “Auto” position. When water level in the wetwell reaches an elevation of 23.5 ft, a high level float switch in the wetwell signals the valve to close. A “WETWELL HIGH LEVEL” alarm is then annunciated at LCP-HSPS. This condition is included in the common “HOLLISTER STREET PUMP STATION SYSTEM FAILURE” alarm at PCC. A Reset pushbutton is provided at LCP-HSPS to reset the high water alarm logic.

“INFLUENT VALVE FAILURE” alarm is annunciated at LCP-HSPS upon motor overload, whenever the Local/Remote switch is in “Local”, or whenever PLC-HSPS logic commands the valve to close and after an adjustable time period the valve does not confirm a closed position via a closed limit switch.

Wetwell Level Control System

Raw sewage is collected at the Hollister Street inlet structure and discharged by gravity into the Hollister Street wetwell. Bubbler panel (BCP-HSPS) is provided at the wetwell to monitor the wetwell level. The wetwell level is continuously measured by a bubbler level sensor and is used as the basis for controlling sewage lift pumps. Dual air compressors are provided for the operation of the wetwell bubbler system. Dual drop tubes and valves are provided to allow monitoring of either half of the split wetwell.

BCP-HSPS is provided with a Compressor No. 1 On/Off selector switch, a Compressor No. 2 On/Off selector switch, a Compressor 1/Auto/Compressor 2 selector switch, a Reset pushbutton switch, and a Manual Purge pushbutton switch. Operation of the bubbler system is automatic. No manual control is provided.

For automatic operation, both compressors On/Off selector switches must be in the “On” position. If a compressor On/Off selector switch is in the “Off” position, the respective compressor will not operate. When the Compressor 1/Auto/Compressor 2 selector switch is

placed in the “Auto” position, the compressors alternate lead operation after each air fill cycle. When the selector switch is placed in the “Compressor 1” or “Compressor 2” position, the corresponding compressor will operate as lead. The two compressors are set up to maintain a normal receiver tank pressure of 30 to 50 psi. When tank pressure drops to 30 psi the lead compressor starts. If tank pressure drops below 25 psi the lag compressor starts. If tank pressure drops below 20 psi the “Low Air” indicator and door-mounted alarm horn at BCP-HSPS are energized.

Indicator lights are provided at BCP-HSPS to annunciate the bubbler system status. When a compressor is running, a corresponding “Running” indicator light is illuminated. If Compressor No. 1 or Compressor No. 2 fails, the respective “Fail” indicator light is illuminated. BCP-HSPS is also provided with a local indication of wetwell level.

If one or more of the “Compressor No. 1 Fail”, “Compressor No. 2 Fail”, or “Low Air” indicator lights are illuminated at BCP-HSPS, a common alarm “BCP-HSPS BUBBLER FAILURE” annunciator is activated at LCP-HSPS. This condition is included in the common “HOLLISTER STREET PUMP STATION SYSTEM FAILURE” alarm at PCC.

The pump station is provided with a combustible gas sensor/analyzer to continuously monitor the wetwell atmosphere to detect the presence of combustible gases or vapors. The sensor is duct-mounted at the odor control facility. In the event the combustible gas concentration reaches its high level set point of 25% LEL, a signal activates an alarm “WETWELL HIGH COMBUSTIBLE GAS” at LCP-HSPS. This condition is included in the common “HOLLISTER STREET PUMP STATION SYSTEM FAILURE” alarm at PCC.

Sewage Lift Pumps

Four submersible sewage lift pumps are provided at the wetwell. Each pump is started by a variable frequency drive (VFD) programmed to ramp to 100% speed and operate at constant speed. Smaller capacity Pump Nos. P-1 and P-2 operate in a LEAD-STANDBY mode and pump into a 16-inch force main. Larger capacity Pump Nos. P-3 and P-4 operate in a LEAD-LAG mode and pump into a 30-inch force main.

Each pump is furnished with a locally-mounted Remote-Off/Test (ROT) selector switch. “Remote” position arms controls located at LCP-HSPS. The “Off” position is lockable and prevents the pump from operating, overriding all other controls. The “Test” position is spring-loaded and is used to test the operation of the pump.

Each pump is provided with a Hand/Off/Auto (HOA) selector switch at LCP-HSPS inside the MCC Building. The HOA switch is only functional when the respective ROT switch is in the “Remote” position. In the “Hand” mode the pump runs continuously. In the “Auto” mode the pump is controlled via a bubbler level control system at the wetwell. With both respective switches in “Auto”, Pump Nos. P-1 and P-2 operate in a LEAD-STANDBY mode. A Lead Select switch is provided at LCP-HSPS to dictate which of the two pumps is lead and which is standby. With both respective switches in “Auto”, Pump Nos. P-3 and P-4 operate in a LEAD-LAG mode. A Lead Select switch is provided at LCP-HSPS to dictate which of the two pumps is lead and which is lag.

Automatic starting and stopping of pumps is dictated by operator adjustable wetwell level set points. Set points can be adjusted through a PLC work station mounted to the front of LCP-HSPS. The PLC set points are determined by subtracting the wetwell invert elevation (3.50 ft) and the distance from the bottom of the bubbler to the wetwell invert (2.0 ft), from the desired set point. Initial set points are shown on the following table:

Action	Initial Set point Elevation/Water Column Above Bubbler	Operator Revised Set point
High Alarm	El 23.5 ft/18.0 ft W.C.	
Start P-3/P-4 Lag	El 22.5 ft/17.0 ft W.C.	
Start P-3/P-4 Lead	El 20.5 ft/15.0 ft W.C.	
Start P-1/P-2 Lead	El 10.5 ft/5.0 ft W.C.	
Stop P-3/P-4 Lag	El 8.5 ft/3.0 ft W.C.	
Stop P-3/P-4 Lead	El 7.5 ft/2.0 ft W.C.	
Stop P-1/P-2 Lead	El 6.5 ft/1.0 ft W.C.	
Low Low Alarm, Stop all pumps	El 6.0 ft/0.5 ft W.C.	
Bottom of Bubbler	El 5.5 ft/0.0 ft W.C.	
Wetwell Bottom	El 3.5 ft/-2.0 ft	

Loss of flow for each pump is detected by a discharge check valve limit switch. If flow is not detected after an adjustable time delay when a pump is called on to operate, PLC-HSPS will shut down and lock out the pump and initiate alarm annunciation “LIFT PUMP NO. X FAILURE” at LCP-HSPS. This condition is included in the common “HOLLISTER STREET PUMP STATION SYSTEM FAILURE” alarm at PCC. The lift pump failure alarm is also initiated upon sensing of high motor temperature or moisture via the VFD. Failure of the selected lead pump will automatically initiate operation of its associated standby pump after an adjustable time delay. A Reset button is provided at LCP-HSPS for each pump to allow resetting of PLC pump control logic. Each pump is provided with a run light at LCP-HSPS.

Sump Pumps

The Hollister Street Pump Station area is provided with a duplex sump pump station that includes two submersible pumps with duplex control, to handle site drainage.

The duplex pump station control panel, LCP-HSPSS, located in the field at the pumps, is provided with a lockable Auto/Off/On selector switch for each pump and a Pump1/Alternating/Pump2, duty pump selector switch.

For manual operation, the appropriate Auto/Off/On selector switch is placed in the “On” position. The respective pump will run until shut off manually or by the low low level float switch. If a pump Auto/Off/On selector switch is placed in the “Off” position, the position is lockable and disables all controls for the pump.

For automatic operation, the Auto/Off/On selector switches for both pumps are placed in the “Auto” position. When the Pump1/Alternating/Pump2 selector switch is placed in the “Alternating” position, the pumps alternate automatically as duty and standby pump on each pump down cycle. In the “Auto” mode, the pumps run as called for by float level switches. A high level switch starts the duty pump and activates a “HIGH LEVEL ALARM” light at LCP-HSPSS. A high-high level switch starts the standby pump, activates a beacon strobe light at LCP-HSPSS, and activates an “AREA SUMP HIGH HIGH LEVEL” alarm at LCP-HSPS. A low level switch stops the duty pump. A low low level switch, shuts down any pump operating and serves as a backup to the low level switch. If a duty selected or alternator selected pump fails, the standby pump operates in its place.

Indicator lights are provided at LCP-HSPSS to annunciate pump status. When a pump is running, its corresponding “Running” light is illuminated. LCP-HSPSS is also provided with an elapsed time meter for each pump. The sump pumps are equipped with high temperature switches installed in the motor windings to prevent operation on winding high temperature. In the event of high temperature detection, the corresponding “High Temperature Alarm” light illuminates at LCP-HSPSS. The sump pumps are also equipped with moisture sensing elements for motor winding moisture detection. In the event of winding moisture detection; the corresponding “Moisture Detection Alarm” light illuminates at LCP-HSPSS. In the event of either condition, a sump pump failure alarm “AREA SUMP PUMP FAILURE” is activated at the LCP-HSPS.

Surge Arrestors

The surge arrestor tanks provide surge control for the pump station 16-inch and 30-inch force mains. Tank water levels are set by adjusting the level probe switches. Prior to pump start-up, the tanks are approximately half full of water. As the pumps run, the air in the tanks is compressed. As the pumps shut down, the water in the tanks is released under pressure to prevent column separation.

Each surge arrestor is provided with an LCP. The LCPs are provided with status indicator lights, pushbutton switches for “Test”, “Silence”, and “Acknowledge”, and an On/Off toggle switch. When liquid in the tank is within the normal operating range, as sensed by the level switches, the “In Range” light is illuminated. In the event of high liquid level, a “High Level” indicator light is illuminated at the LCP, and a “SURGE ARRESTOR HIGH LEVEL” alarm is activated at LCP-HSPS. In the event of low liquid level, a “Low Level” indicator light is illuminated at the LCP, and a “SURGE ARRESTOR LOW LEVEL” alarm is activated at LCP-HSPS.

Liquid level in the surge tank is controlled by the LCP by introducing or expelling compressed air. If liquid level is too high, a compressed air solenoid valve is opened, allowing compressed air in and forcing the liquid level down. If the liquid level is too low, a solenoid valve on the top of the tank is opened, causing air to be released from the tank and allowing the water level to rise.

Surge Arrestor Air Compressor

A surge arrestor air compressor supplies make up air for surge arrestors SA-1 and SA-2. The air compressor is provided with a field control panel. The FCP is provided with “High Pressure”, “Low Pressure”, and “Low Low Pressure” indicator lights, a Reset pushbutton, a Hand/Off/Auto Selector Switch, and an hour meter. In the event of an air compressor failure, an “AIR COMPRESSOR FAILURE” alarm is activated at LCP-HSPS. This condition is included in the common “HOLLISTER STREET PUMP STATION SYSTEM FAILURE” alarm at PCC.

Odor Reduction Station

The HSPS wetwell off-gas is treated by a packaged odor reduction system which draws air from the wetwell through 12-inch PVC ducts. The odor reduction system consists of a three-stage, factory-packaged unit with counter-current flow, induced draft blower, and sodium hydroxide (NaOH) and sodium hypochlorite (NaOCl) solution chemical feed systems. Operation of the odor reduction system is intermittent, as dictated by the Air Pollution Control Permit. Starting and stopping the facility is manual. Once started, chemical feed control is automatic.

Circuit breakers, blower On/Off switches, recirculation pumps On/Off switches, chemical pumps Hand/Off/Auto (HOA) selector switches, panel fan On/Off switch, status indicator lights, pH/ORP controllers, an alarm bypass Override/Normal selector switch, a water seal On/Off switch, and a Phase Reset pushbutton switch are located at LCP-HSORS. In the event of an odor reduction system failure, LCP-HSORS initiates an “ODOR REDUCTION SYSTEM FAILURE” alarm at LCP-HSPS, provided the Alarm Bypass Switch is in the “Normal” position. This condition is included in the common “HOLLISTER STREET PUMP STATION SYSTEM FAILURE” alarm at PCC.

An emergency shower/eyewash is provided outside the Odor Reduction Station. The shower is provided with an in-line flow switch. A portable emergency eyewash station is provided inside the Odor Reduction Station. The portable eyewash station is provided with a local mushroom pushbutton panic switch. Activation of either alarm switch annunciates a “SAFETY SHOWER” alarm at LCP-HSPS and a “HOLLISTER STREET PUMP STATION SAFETY SHOWER” alarm at PCC.

Odor Reduction Blower

Under normal conditions, the blower operates continuously drawing odorous air from the Hollister Street Pump Station wetwell. Blower controls at LCP-HSORS consist of an Off/On selector switch. Operating status of the blower is indicated by Blower “On” and “Off” lights in LCP-HSORS. A flow switch is installed on the suction side of the blower to indicate motor failure or blocked ductwork. Activation of the switch activates an “ODOR REDUCTION SYSTEM FAILURE” alarm at LCP-HSPS.

Odor Reduction Scrubber

The odor reduction scrubbers treat odorous air from the pump station wetwell. Each of the three stages is provided with a packed bed where odors are removed by contact with recirculated scrubbant solution. A differential pressure manometer is installed across the three scrubbers to provide local indication of pressure loss across the scrubber for packing.

Odor Reduction pH Control

pH control is provided by a pH sensor and a controller to measure pH and control the NaOH chemical metering pump. The pH sensor is installed in the suction line of Recirculation Pump No. 2. The pH reading is displayed at the pH controller mounted at LCP-HSORS. The pH operating range is set between 0 and 14, with a target set point of 10.5. pH set point is maintained by automatically starting and stopping the NaOH metering pump. If the pH is not in range, a pH “Out of Range” alarm light is illuminated at LCP-HSORS.

Odor Reduction ORP Control

ORP control is provided by an ORP sensor and a controller to measure ORP and control the NaOCl chemical metering pump. The ORP sensor is installed in the suction line of Recirculation Pump No. 3. The ORP operating range is set between 0 mv to 1000 mv. ORP set point is maintained by automatically starting and stopping the NaOCl metering pump. If the ORP is not in range, an ORP “Out of Range” light is illuminated at LCP-HSORS.

Odor Reduction Recirculation Pumps

Each of the three scrubber stages is provided with a recirculation pump to provide continuous recirculation of scrubbing solution from the sump to the packed bed spray nozzles. Recirculation pump controls at LCP-HSORS consist of an On/Off selector switch

for each pump. “Pump Run” and “Pump Off” indicator lights are provided at LCP-HSORS to annunciate pump status. Failure of a recirculation pump activates an “ODOR REDUCTION SYSTEM FAILURE” alarm at the LCP-HSPS.

Odor Reduction NaOH Metering Pump

One chemical metering pump is provided for metering of industrial grade, 20 to 25% NaOH from the NaOH storage tank to stage two of the scrubber system. Pump capacity is manually controlled by adjusting the stroke length at the pump.

NaOH pump controls at LCP-HSORS consist of a “Chem Pump #1” HOA selector switch. When the HOA selector switch is placed in the “Hand” position, the pump runs continuously. When the selector switch is placed in the “Auto” position, the pump turns on and off, as dictated by the pH controller to maintain pH set point. A “Pump Run” indicator light is provided at LCP-HSORS to annunciate pump status. Failure of the NaOH pump activates an “ODOR REDUCTION SYSTEM FAILURE” alarm at LCP-HSPS.

Odor Reduction NaOCl Metering Pump

One chemical metering pump is provided for metering of industrial grade, 10 to 15% NaOCl from the NaOCl storage tank to stage three of the scrubber system. Pump capacity is manually controlled by adjusting the stroke length at the pump.

NaOCl pump controls at LCP-HSORS consist of a “Chem Pump #2” HOA selector switch. When the HOA selector switch is placed in the “Hand” position, the pump runs continuously. When the selector switch is placed in the “Auto” position, the pump turns on and off, as dictated by the ORP controller to maintain ORP set point. A “Pump Run” indicator light is provided at LCP-HSORS to annunciate pump status. Failure of the NaOCl pump activates an “ODOR REDUCTION SYSTEM FAILURE” alarm at LCP-HSPS.

Odor Reduction NaOH and NaOCl Storage Tanks

Two bulk chemical storage tanks, one dedicated for NaOH and one for NaOCl, are provided at the Odor Reduction Station. Each tank is equipped with a sight tube for determining the level of chemical in the tank. There are no other controls associated with the NaOH and NaOCl storage tanks.

Odor Reduction Make-Up Water System

Make-up water controls are provided to ensure water flow to the Odor Reduction Station at constant pressure and flow rate. The make-up water controls consist of an air gap

system, a main shut-off ball valve, a pressure regulator, an anti-scaling unit, and an adjustable flow control valve.

The air gap system is a water seal unit consisting of a 50 gallon water tank with a brass float valve, and a turbine pump. The pump controls are located at LCP-HSORS and includes a Water Seal On/Off Switch. When the On/Off switch is placed in the “On” position, the pump runs continuously and the Water Seal “On” light is illuminated at LCP-HSORS.

An anti-scaling (sequestering agent) media dosing system is also installed to continuously treat make-up water to the packed bed scrubber to help minimize scaling of the packing. The system is a cartridge-type system consisting of a fully self contained unit requiring no external power sources or adjustments. Media delivery is accomplished by the combination of solubility pressure differential created by two small ports within the media delivery head. As water passes through the media delivery head, a small amount of water enters the media sump wetting the media and slowly dissolving it. Delivery amounts are factory preset, requiring no field adjustment.

Standby Generator

The Hollister Street Pump Station is fed power by San Diego Gas & Electric (SDG&E) through their Imperial Beach (IB) utility feeder. Startup of the generator is automatic upon failure of utility power. When a utility power failure occurs, an automatic transfer switch (ATS) located in the MCC Room signals the generator to start, and provides a discrete input to local control panel LCP-HSPS indicating a "UTILITY POWER FAILURE" alarm. This condition is included in the common “HOLLISTER STREET PUMP STATION SYSTEM FAILURE” alarm at PCC. A standby generator running light is provided at LCP-HSPS located in the MCC Room. After the generator reaches approximately 90 percent of rated voltage, the transfer switch transfers the pump station facility to standby generator power. After the return of utility power, and after an adjustable time delay, the transfer switch returns to its normal position, transferring the facility back to utility power. The engine will continue to run in a cool down mode for an adjustable time before shutting off. The ATS is also capable of facilitating maintenance testing of the generator set with or without loads.

Generator control panel (LCP-GEN) is located inside the generator housing. LCP-

GEN contains the controls, instruments, lights, and other devices necessary to manually and automatically start, stop, and protect the engine generator unit. Controls and alarms operate from battery power. LCP-GEN contains the following pushbuttons, switches, and meters:

- Generator master switch (Run/Off-reset/Auto)
- Emergency stop pushbutton (aborts cool down)
- Frequency Meter
- AC Voltmeter
- AC Ammeter
- Scale Lamps (Upper/Lower)
- DC Voltmeter for 24 VDC engine batteries
- Hour meter
- Voltage adjustment
- Alarm horn and silence pushbutton switch
- Lamp test pushbutton
- Oil pressure gauge
- Engine oil temperature gauge
- Water temperature gauge

Status indicator lights at the LCP-GEN are:

- Air Damper
- System Ready
- Generator Switch Not in Auto

Alarm lights are provided at LCP-GEN for the following alarms in which shutdown of the generator will occur:

- “EMERGENCY STOP”
- “HIGH ENGINE TEMPERATURE”
- “LOW OIL PRESSURE”
- “OVERCRANK”
- “OVERSPEED”
- “AUXILIARY FAULT”

Alarm lights are provided for the following alarms in which shutdown will not occur:

- “PRE-ALARM HIGH ENGINE TEMPERATURE”
- “PRE-ALARM LOW OIL PRESSURE”
- “LOW WATER TEMPERATURE”
- “LOW FUEL”
- “AUXILIARY PRE-ALARM”
- “BATTERY CHARGER FAULT”

- “LOW BATTERY VOLTAGE”
- “HIGH BATTERY VOLTAGE”

All alarms at LCP-GEN will send a common alarm signal to the LCP-HSPS as “STANDBY GENERATOR FAILURE.” This condition is included in the common “HOLLISTER STREET PUMP STATION SYSTEM FAILURE” alarm at PCC.

A base mounted diesel fuel tank is provided for the generator with a low level switch which initiates a “Low Fuel” alarm at LCP-GEN. The fuel tank is also provided with an inner tank leak detection system. Leak detection initiates a “STANDBY GENERATOR DIESEL TANK LEAK” alarm at LCP-GCPS.

Support Systems

The MCC Room is provided with a temperature gauge and switch to monitor the adequacy of the cooling and ventilation system. Upon reaching an adjustable high temperature setting, a “MCC ROOM HIGH TEMPERATURE” alarm will annunciate at LCP-HSPS. This condition is included in the common “HOLLISTER STREET PUMP STATION SYSTEM FAILURE” alarm at PCC.

The MCC /Generator Building is provided with a fire alarm system. When the fire alarm system is triggered by either a smoke detector or a pull station, “BUILDING FIRE ALARM” will annunciate at LCP-HSPS and initiate a “HOLLISTER STREET PUMP STATION FIRE ALARM” at PCC.

4.13.4.2 Step by Step Start-Up Procedures

4.13.4.2.1 General System Start-Up Procedures

The Hollister Street Pump Station Facilities should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Ensure that circuit breakers at the Motor Control Center in the MCC Room are energized for all equipment to be operated.

3. Ensure that control panel LCP-HSPS and the automatic transfer switch (ATS) located in the MCC Room of the MCC Room/Generator Building; BCP-HSPS located at the pump station wetwell; LCP-HSPSS located at the sump pump station; LCP-HSORS located at the Odor Reduction Station; LCP-GEN located at the generator are energized.
4. Ensure that all isolation valves on the sump pump discharge lines are all fully open.
5. Ensure the duplex sump pumps are operational, according to the procedures presented in Section 4.13.4.2.2.
6. Ensure the standby emergency generator is operational, according to the procedures presented in Section 4.13.4.2.2.
7. Ensure that the surge arrestors and air compressor are operational, according to the procedures in Section 4.13.4.2.2.
8. Ensure that the wetwell level control system is in operation, according to the procedures presented in Section 4.13.4.2.2.
9. Ensure that all isolation valves on the lift pump discharge lines are open.
10. Ensure the sewage lift pumps are operational, according to the procedures presented in Section 4.13.4.2.2.
11. Start the HSPS Odor Reduction Station according to the procedures described in Sections 4.13.4.2.2 in the following order:
 - a. Make-Up Water Control System
 - b. Scrubber
 - c. Recirculation Pumps
 - d. pH and ORP Controllers
 - e. NaOCl Storage Tank
 - f. NaOCl Metering Pump
 - g. NaOH Storage Tank
 - h. NaOH Metering Pump
 - i. Blower
12. After normal operation of the Odor Reduction Station is established, start to introduce influent flow by opening the pump station isolation valve, according to the procedures presented in Section 4.13.4.2.2.
13. pH and ORP of the odor control scrubber solution should be continuously monitored. The optimum set points (pH and ORP) should be in accordance

with the Odor Reduction Station Air Permit and your Operations Supervisor's direction based on operating experience.

4.13.4.2.2 Individual Equipment Start-Up Procedures

Pump Station Isolation Valve

Open the pump station isolation valve according to the procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize the isolation valve controls.
2. At the control valve, ensure the Lock/Out/Stop switch is disengaged.
3. At LCP-HSPS, push the Reset pushbutton.
4. Open the valve according to the procedures listed below.

CAUTION: IF THE ISOLATION VALVE IS CLOSED, THE UPSTREAM GRAVITY LINE MAY BE FULL. THE VALVE SHOULD INITIALLY BE PARTIALLY OPENED IN MANUAL FROM LCP-HSPS WHILE MONITORING WETWELL LEVEL. ENSURE THAT THE PUMPS ARE KEEPING UP WITH THE FLOW BEFORE OPENING THE VALVE FURTHER AND ULTIMATELY PLACING IT INTO AUTOMATIC OPERATION. THIS WILL PREVENT POTENTIAL FLOODING OF THE WETWELL IF THE GRAVITY LINE IS FULL.

Automatic Mode of Operation

- a. At LCP-HSPS, place the Open/Auto/Close selector switch in the "Auto" position.
- b. At the control valve, place the Local/Remote selector switch into the "Remote" position.
- c. At this time, the operation of the valve is controlled by a float switch in the wetwell. The valve is normally open. The position of the valve is indicated at LCP-HSPS.

Note: If the level in the wetwell rises to the elevation of the high float switch, the valve automatically closes.

Manual Mode of Operation - Remotely Controlled

- a. At the control valve, place the Local/Remote selector switch into the "Remote" position.
- b. Open the valve by holding the Open/Auto/Close selector switch at LCP-HSPS in the "Open" position.

- c. The valve travels open and remains open. The “Open” indicator light at LCP-HSPS should be illuminated.

CAUTION: MONITOR THE WATER ELEVATION IN THE WETWELL. IF THE WATER ELEVATION IN THE WETWELL REACHES HIGH LEVEL, THE VALVE WILL NOT BE CLOSED AUTOMATICALLY IN THE MANUAL MODE OF OPERATION.

Manual Mode of Operation - Locally Controlled

- a. At the control valve, place the Local/Remote selector switch into the “Local” position.
- b. Open the valve by depressing the “Open” pushbutton.
- c. The valve travels open and remains open. The “Open” indicator light at LCP-HSPS should be illuminated.

CAUTION: MONITOR THE WATER ELEVATION IN THE WETWELL. IF THE WATER ELEVATION IN THE WETWELL REACHES HIGH LEVEL, THE VALVE WILL NOT BE CLOSED AUTOMATICALLY IN THE MANUAL MODE OF OPERATION.

Wetwell Level Control System

- 1. Ensure that the circuit breaker in MCC Room power panel PP-HS is positioned to energize the bubbler system.
- 2. Ensure that all appropriate isolation valves inside BCP-HSPS are open.
- 3. Bubbler air can be directed to either of two drop tubes into the wetwell. Ensure that one of the two isolation valves on top of the wetwell are open.
- 4. Start up the bubbler system according to the procedures below:

Automatic Mode of Operation

- a. At BCP-HSPS, place the Compressor 1/Auto/Compressor 2 selector switch in the “Auto” position.
- b. For both compressors, place the On/Off selector switches in the “On” position. At this time, the compressors alternate operation after each air fill cycle. If a compressor is running, the respective compressor “Running” light at BCP-HSPS should be illuminated.

Manual Mode of Operation

- a. Manual operation is not provided.

5. Visually verify compressor is operating smoothly without excess noise or vibration.
6. Confirm that local level indication reflects level in wetwell.

Sewage Lift Pumps

Start up the sewage lift pumps according to the procedures below:

1. Ensure that the local electrical disconnect is positioned to energize the lift pump controls.
2. Ensure that associated variable frequency drives (VFDs) are operational.
3. Verify that pump discharge valves in the valve vault are open.
4. At the pumps, place the respective ROT switches in the “Remote” position.
5. At LCP-HSPS, reset the pumps by depressing the “Reset” pushbuttons for each pump.
6. At LCP-HSPS, select the lead pump by placing the Pump 1/Pump 2 and Pump 3/Pump 4 selector switches in the desired positions.
7. Start up the lift pumps according to the procedures listed below:

Automatic Mode of Operation

- a. At the LCP-HSPS, place the HOA selector switches for all pumps in the “Auto” position. At this time, the pumps are controlled by the bubbler level control panel.
- b. Lead pump (1 or 2) starts when the water level in the wetwell reaches an operator adjustable set point. The VFD will start the pump and ramp it to 100 percent speed. If level continues to rise and reaches an operator adjustable set point, lead pump (3 or 4) starts. If level continues to rise further and reaches an operator adjustable set point, lag pump (3 or 4) starts. Pumps are shut down upon falling level, at adjustable set points, in the reverse order they were started. See Section 4.13.3.1, ***Sewage Lift Pumps***, for control points and their respective elevations. If a pump is running, the respective pump “Run” indicator light at LCP-HSPS should be illuminated.

Note: If the water elevation in the wetwell reaches a low low set point level, the pumps will be shut down and locked out and an alarm initiated.

Manual Mode of Operation

- a. At LCP-HSPS, place the HOA selector switch for the selected pump in the “Hand” position. The VFD will start the pump and ramp it to 100 percent speed and the pump will run continuously. The pump “Run” indicator light at LCP-HSPS should be illuminated.

CAUTION: MONITOR THE WATER ELEVATION IN THE WETWELL. DO NOT RUN PUMPS UNDER DRY CONDITIONS. IF THE WATER ELEVATION IN THE WETWELL REACHES LOW LOW LEVEL, THE PUMPS WILL NOT BE SHUTDOWN AND LOCKED OUT AUTOMATICALLY WHILE IN THE MANUAL MODE OF OPERATION.

8. Visually verify pump is operating smoothly without excessive noise or vibration.

Sump Pumps

Start up the sump pump, according to the procedures listed below:

1. Ensure that the circuit breakers in the MCC and power panel PP-HS are closed to energize the sump pumps and associated controls.
2. Verify the associated pump discharge valves in the valve vault are open.
3. At the LCP-HSPSS, reset the pumps by depressing the “Reset” pushbuttons for each selected pump.
4. Start up the sump pumps according to the procedures listed below:

Automatic Mode of Operation

- a. Place the Pump 1/Alternating/Pump 2 selector switch in the “Alternating” position.
- b. Place the Auto/Off/On switch at LCP-HSPSS in the “Auto” position. If both pumps are to be operational, then both pump Auto/Off/On switches must be in the “Auto” position.
- c. The pumps run as called for by float level switches in the sump. The pumps alternate cycles automatically as duty and standby pump on each pump down cycle. If the water level reaches the high level float, the duty pump starts automatically. If the water level reaches the high high level float, the standby pump starts automatically. If a pump is running, the respective pump “Run” indicator light at LCP-HSPSS should be illuminated.

Note: If the water elevation in the sump reaches the low low level float, any pump running will be shut down automatically.

Manual Mode of Operation

- a. For the pump selected, place the Auto/Off/On switch at LCP-HSPSS in the “Auto” position.
 - b. The pump motor starts and the pump runs until shut off manually or by the low low level float. The respective pump “Run” indicator light at LCP-HSPSS should be illuminated.
5. Visually verify pump is operating smoothly, without excessive noise and vibration.

Surge Arresters

Start up the surge arrestors according to the procedures listed below:

1. Verify that the drain valve for the tank to be put in service is closed.
2. Verify that isolation valves at the air relief valves and the vacuum relief valve are open.
3. Verify that isolation valves at level sight gauge are open.
4. Ensure that the local surge arrestor systems controls are energized.
5. Ensure that the compressed air system has been started.
6. Verify tank liquid level is at the proper level. Confirm level with your Supervisor. The “In Range” indicator lights at the LCP should be illuminated.

Surge Arrestor Air Compressor

Start up the surge arrestor air compressor according to the procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize the surge arrestor air compressor system controls.
2. Close the service valve. At the LCP, reset the compressor by depressing the “Reset” pushbutton.
3. Start the compressor according to the procedures listed below. As the unit builds pressure, check for air leaks.

Automatic Mode of Operation

- a. At the LCP, place the HOA selector switch in the “Auto” position.
- b. The compressor and solenoid valve are controlled by signals from the pressure switches on the receiver tank.

Manual Mode of Operation

- a. At the LCP, place the HOA selector switch in the “Hand” position.
 - b. The compressor will start and run continuously.
4. When the receiver pressure reaches 175 psig, the unit will stop. Open the service valve and/or drain valve to bleed air from the receiver. Note the pressure at which the compressor starts.
 5. As the unit builds pressure, check for unusual noise or vibration.

Odor Reduction Station

This section provides an overview of the startup procedure for the scrubber system. Follow the start up instructions provided for each individual component, as described in the sections that follow. Start up the odor reduction station according to the procedures listed below:

1. Ensure that the local electrical disconnect on panel LCP-HSORS is positioned to energize the odor reduction station systems controls. Reconnect all piping and tubing that was disconnected at the scrubber, if necessary.
2. Start up make-up water air gap system to provide continuous supply of make-up water.
3. Ensure the NaOH and NaOCl tanks have adequate chemical.
4. Fill the scrubber sump to the proper level using the make-up water feed system. Open the appropriate valves and allow the water to run until it begins to flow out the scrubber drain.
5. Adjust the make-up water rotometer to the proper rate (approximately 0.5 gpm).
6. Activate the recirculation pumps. Inspect the nozzles to be sure they are distributing water evenly.
7. Reset the pH/ORP sensors, if necessary. Calibrate the pH and ORP controllers as necessary by methods described in the Manufacturer’s O&M Manual. Adjust the set points to the desired settings to comply with Air Pollution Control Permit requirements.
8. Open the isolation valves between the chemical storage tanks and the chemical metering pumps. Inspect the system to ensure there are no leaks from the chemical storage tanks and interconnecting pipes.

9. Place the chemical metering pumps into automatic operation as described below. Allow time for the chemicals to be metered to the scrubber and to bring the concentrations to their desired levels.
10. Check to be sure all chemical and recirculation pumps are pumping. Prime pumps as necessary.
11. Start the blower as described below. This initiates the flow of odorous air from the wetwell to the scrubber and the scrubbing action begins.

Odor Reduction Blower

Start up the odor reduction station blower according to the procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize LCP-HSORS.
2. Verify that the odor reduction blower discharge damper is open.
3. Place the blower into operation by placing the Off/On switch to “On” at LCP-HSORS.
4. Under normal conditions the blower will start after a 0 - 180 second delay and operate continuously. The “Blower On” indicator light at LCP-HSORS should be illuminated.
5. Visually verify the blower is operating without excessive noise or vibration.

Odor Reduction Scrubber

Start-up the scrubber according to procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize LCP-HSORS.
2. Ensure that sample ports are closed.
3. Open the appropriate isolation valves including the sodium hypochlorite feed line, sodium hydroxide feed line, and sump make up water line.
4. Ensure the sump is full of liquid. Adjust rotameter to the proper rate.
5. Activate the recirculation pumps, according to the procedure described below.

Odor Reduction pH and ORP Controllers

Start-up the pH and ORP controllers according to the procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize LCP-HSORS.
2. Ensure that the ORP analyzer is energized and displaying a millivolt reading.
3. Ensure that the pH analyzer is energized and displaying a pH reading.
4. Verify and adjust as necessary the pH and ORP set points to the desired value in accordance with air permit requirements.

Odor Reduction Recirculation Pumps

Start-up the recirculation pumps according to the procedures below:

1. Ensure that the local electrical disconnect is positioned to energize the LCP-HSORS.
2. Verify that recirculation valving is in the proper orientation and the pump discharge and suction valves are open.
3. Place each pump into operation by placing the respective Off/On switch at LCP-HSORS in the “On” position. The respective “Pump Running” indicator light at LCP-HSORS should be illuminated.
4. Visually verify the pump is operating without excess noise or vibration.

Odor Reduction NaOH Metering Pump

Start-up the sodium hydroxide (NaOH) metering pump according to the procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize LCP-HSORS.
2. Verify the associated discharge and suction piping is connected.
3. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the “Chem Pump 1” Hand/Off/Auto selector switch at LCP-HSORS in the “Auto” position.
- b. In the automatic mode, the pump operates as called for by the pH controller. If the pump is running, the “Chem Pump 1 Running” indicator light at LCP-HSORS should be illuminated.

Manual Mode of Operation

- a. Place the “Chem Pump 1” Hand/Off/Auto selector switch at LCP-HSORS in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump operates continuously. The “Chem Pump 1 Running” indicator light at LCP-HSORS should be illuminated.
4. Visually verify the pump is operating without excessive noise or vibration.

Odor Reduction NaOCl Metering Pump

Start-up the sodium hypochlorite (NaOCl) metering pump according to the procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize LCP-HSORS.
2. Verify the associated discharge and suction piping is connected.
3. Place the pump into operation as follows:

Automatic Mode of Operation

- a. Place the “Chem Pump 2” Hand/Off/Auto selector switch at LCP-HSORS in the “Auto” position.
- b. In the automatic mode, the pump operates as called for by the ORP controller. If the pump is running, the “Chem Pump 2 Running” indicator light at LCP-HSORS should be illuminated.

Manual Mode of Operation

- a. Place the “Chem Pump 2” Hand/Off/Auto selector switch at the LCP-HSORS in the “Hand” position.
 - b. After a 0 to 180 second delay the pump motor starts and pump operates continuously. The “Chem Pump 2 Running” indicator light at LCP-HSORS should be illuminated.
4. Visually verify the pump is operating without excessive noise or vibration.

Odor Reduction NaOH Storage Tank

Start-up the NaOH storage tank according to the procedures listed below:

1. Ensure that there is sufficient caustic in the tank (50% full minimum).
2. Open the isolation valve on the outlet line.

Odor Reduction NaOCl Storage Tank

Start-up the NaOCl storage tank according to the procedures listed below:

1. Ensure that there is sufficient sodium hypochlorite in the tank (50% full minimum).
2. Open the isolation valve on the outlet line.

Odor Reduction Water Control System

Start up the water control system according to the procedures listed below:

1. Ensure that the local electrical disconnect is positioned to energize the air gap system pump.
2. Ensure the brass float valve is operational.
3. Start up the pump according to the procedures listed below:
 - a. Place the Water Seal Off/On selector switch at LCP-HSORS in the “On” position.
 - b. The pump will start and run continuously. The Water Seal “On” indicator light at LCP-HSORS should be illuminated.
4. Visually verify pump is operating smoothly, without excessive noise and vibration.
5. Adjust the flow of water at the rotometer to the scrubber tower to meet the desired flow rate as directed by your Operations Supervisor.

Standby Generator

The standby generator is designed to start-up automatically when power from the San Ysidro (SYO) utility feeder from San Diego Gas & Electric (SDG&E) is interrupted. The standby generation should be started according to the following procedures:

1. Refer to the General Start-Up Procedures presented in Section 4.0.2.
2. Ensure that the diesel fuel oil storage tank is in the standby position and has sufficient fuel in the tank. If fuel storage base tank needs to be filled, perform the following procedures:
 - a. Attach fuel supply truck hose to the quick connect located inside the generator housing
 - b. Pump the ordered amount of diesel fuel oil No. 2 into the storage tank

- c. while watching the fuel level gauge. **DO NOT OVERFILL.**
When pumping is completed, disconnect the supply hose and cap the fill pipe.

CAUTION: NO HIGH LEVEL ALARM IS PROVIDED. CONTINUOUS MONITORING OF THE TANK FILLING IS REQUIRED.

3. Place the standby generator into operation as follows:

Automatic Mode of Operation

- a. Place the Run/Off-Reset/Auto master located at LCP-GEN in the “Auto” position.

NOTE: GENERATOR SET SHOULD ALWAYS BE IN “AUTO” POSITION SO IT IS AUTOMATICALLY CALLED TO START DURING POWER OUTAGES.

- b. Place the Automatic Transfer Switch (ATS) Auto/Hand Crank/Test/Stop selector switch in the “Auto” position.
c. On SDG&E power fail the following automatic sequence occurs:
- Time delay.
 - Generator starts.
 - Automatic Transfer Switch is automatically switched to the “Emergency” position.
 - The MCC is energized via the generator.
- d. Verify that the generator is operating within normal parameters: power output, oil pressure, and oil temperature.

Manual Mode of Operation

- a. Place the Run/Off-Reset/Auto master switch located at the LCP-GEN in the “Run” position to start-up the generator set.

Note: The alarm horn sounds and the “Generator Switch Not in Auto” indicator light illuminates whenever the switch is not in the “Auto” position.

- b. Place the Automatic Transfer Switch, located in the MCC Room, to the “Emergency” position. The MCC is now energized.
c. Confirm that the generator set is operation within normal parameters: power output and oil pressure.

4. If equipment is in automatic mode of operation, the equipment continues to operate based on signals from the PLC.

5. Continuously monitor generator to ensure proper operation and that the generator is not overloaded.
6. Continue to operate pump station on generator power and monitor generator until power from SDG&E is restored.

4.13.4.3 Step by Step Shutdown Procedures

4.13.4.3.1 General System Shutdown Procedures

The Hollister Street Pump Station Facilities should be shut down according to the following procedures:

1. Refer to the General Shutdown Procedures presented in Section 4.0.3.
2. Close the pump station isolation valve, according to the procedures presented in Section 4.13.4.3.2.
3. Shut down the sewage lift pumps, according to the procedures presented in Section 4.13.4.3.2.
4. Shut down the surge arrestor control system, according to the procedures presented in Section 4.13.4.3.2.
5. Shut down the wetwell level control system, according to the procedures presented in Section 4.13.4.3.2.
6. Shut down the HSPS Odor Reduction Station according to the procedures described in Section 4.13.4.3.2. If the odor reduction station is to be shut down in its entirety, the shut down order for the various pieces of odor reduction equipment shall be as follows:
 - a. Blower
 - b. Recirculation Pumps
 - c. NaOH Metering Pump
 - d. NaOCl Metering Pump
 - e. NaOH Storage Tank
 - f. NaOCl Storage Tank
 - g. Scrubber
 - h. pH and ORP Controllers
 - i. Water Control System
7. Shut down the generator according to the procedures presented in Section 4.13.4.3.2.

8. Shut down the duplex sump pumps, according to the procedures presented in Section 4.13.4.3.2.
9. De-energize the circuit breakers for the equipment that is shut down at the MCC Room.

4.13.4.3.2 Individual Equipment Shutdown Procedures

Pump Station Isolation Valve

Manually close the pump station isolation valve according to the procedures listed below:

1. Determine if the valve is to be remotely or locally controlled.
2. Close the valve according to the procedures listed below.

If Remotely Controlled

- a. At the control valve, verify the Local/Remote selector switch is in the “Remote” position.
- b. Close the valve by holding the Open/Auto/Close selector switch at LCP-HSPS in the “Close” position.
- c. The valve travels closed and remains closed. The valve “Close” indicator light at LCP-HSPS should be illuminated.

If Locally Controlled

- a. At the control valve, verify the Local/Remote selector switch is in the “Local” position.
 - b. Close the valve by depressing the “Close” pushbutton.
 - c. The valve travels closed and remains closed. The valve “Closed” indicator light at LCP-HSPS should be illuminated.
3. At the control valve, engage the Lock/Out/Stop switch.
 4. If the valve is to be out of service for an extended period of time, disconnect the power source.

Note: If the valve is in automatic mode of operation, the valve will automatically close if the water elevation in the wetwell reaches the high level float switch.

Wetwell Level Control System

Manually shut down the wetwell level control system according to the procedures listed below:

1. For the compressor(s) to be shut down, place the On/Off selector switch(es) in the “Off” position.
2. Verify the compressor(s) has stopped. The compressor “Running” indicator light(s) should not be illuminated.
3. If the level control system is to be out of service for an extended period of time, disconnect the power source by opening the circuit breaker in power panel PP-HS.

Sewage Lift Pumps

Manually shut down the submersible lift pumps according to the procedures below:

1. Select the influent pump to be out of service.
2. At LCP-HSPS, place the HOA selector switch for the selected pump in the “Off” position to stop the pump. The pump “Run” indicator light at LCP-HSPS will not be illuminated.
3. Verify the pump has stopped.
4. At the pump, place the ROT switch in the “Off” position and lock out the ROT switch.
5. Close the selected pump discharge valve.
6. If the pump is to be out of service for an extended period of time, disconnect the power source.

Note: In automatic mode, lift pumps will automatically shut down on low water level. Lift pump will automatically shut down on low low water level (back-up shut down).

Sump Pumps

Manually shut down the sump pumps according to the procedures listed below:

1. For the pump to be shut down, place the Auto/Off/On switch at the LCP-HSPSS in the “Off” position. The pump “Running” indicator light should not be illuminated.

2. Verify the pump has stopped.
3. If pumps are to be out of service for an extended period of time, turn the power control On/Off switch to the “Off” position and disconnect power source and close isolation valves.

Note: In automatic mode, the duty pump will shut down at low water level. Any pump running will be automatically shut down at low low water level.

Surge Control System

Manually shut down respective surge arrester control system, as described below.

Surge Arrester SA-1 provides surge protection for Lift Pumps P-1 and P-2. Surge Arrester SA-2 provides surge protection for Lift Pumps P-3 and P-4.

1. Determine which surge arrester is to be shut down. Verify the respective lift pumps have been shut down according to the procedures listed above in Section 4.13.4.3.2.

CAUTION: DO NOT SHUT DOWN A SURGE ARRESTOR IF THE RESPECTIVE LIFT PUMPS ARE IN OPERATION.

2. Shut down the surge arrester air compressor by placing the HOA selector switch at the LCP to the “Off” position.
3. If pumps and the respective surge arrester and/or compressor are to be out of service for an extended period of time, drain the surge arrester tank by opening the appropriate drain valve.

Odor Reduction Station

This section provides an overview of the shutdown procedure for the odor reduction station. Follow the shutdown instructions provided for each individual component, as described in the sections that follow.

1. For routine shutdowns follow the shutdown order described in Paragraph 6 of Section 4.13.4.3.1.
2. If the odor reduction station is to be shut down for an extended period of time, follow the additional procedures presented below:
 - a. If a shutdown is planned in advance, between two weeks and one month before shutdown date, determine amount of chemical in storage tanks. Increase chemical feed rates and/or pH/ORP controller set point to use all chemical by the shutdown date. If there is chemical remaining at shutdown, a specialized contractor service

- should be ordered to pump out the chemical tanks and haul chemicals away for disposal.
- b. At shutdown make sure chemical tanks are empty. Wash down the chemical feed lines.
 - c. Turn off all scrubber components at the appropriate local and LCP-HSORS switches.
 - d. Visually inspect the packing material. Perform acid wash procedures in accordance with manufacturer's recommendations. See Chapter 5.0 for more information.
 - e. Pump scrubbing solution out of all sumps. Refill sumps with water and turn on recirculation pumps for 10 minutes to rinse towers, packing, and sumps. Pump all of the water out of the sumps.
 - f. Remove the union fittings from the inlet and outlet of the recirculation pumps. Drain all liquid out of the pumps and piping.
 - g. Be sure power to pH/ORP controller is off. Remove the pH/ORP sensors from the recirculation piping. Disconnect wiring making note of proper connections for reassembly when scrubber is restarted. Be sure tip of sensors are kept wet and capped.
 - h. Close all isolation valves.
 - i. Turn off all power to system at main disconnect.

Odor Reduction Blower

Shut down the odor reduction station blower according to the procedures listed below:

1. Place the Off/On selector switch at LCP-HSORS for the blower in the "Off" position. The "Blower Off" indicator light at LCP-HSORS should be illuminated.
2. Verify the blower has stopped.
3. If the blower is to be out of service for an extended period of time, disconnect power source.
4. If the odor reduction system is to be out of service for an extended period of time, close the isolation damper on the discharge of the blower.

Note: The blower will automatically shut down on motor overload.

Odor Reduction Scrubber

Shut down the odor reduction scrubber station according to the procedures listed below:

1. Close the appropriate isolation valves.

Odor Reduction pH and ORP Controllers

Shut down the pH and ORP controllers according to the procedures listed below:

1. If a controller is to be out of service for an extended period of time, disconnect the power to the controller.

Odor Reduction Recirculation Pump

Shut down the recirculation pumps according to the procedures listed below:

1. Place the respective Off/On switch at LCP-HSORS for the recirculation pump to be shut down in the “Off” position. The “Off” indicator light at LCP-HSORS should be illuminated.
2. Verify the pump has stopped.
3. If the pump is to be out of service for an extended period of time, disconnect power source.
4. If the entire odor reduction system (or one of the recirculation pumps) is to be out of service for an extended period of time, close the isolation valves on the pump suction and discharge.

Note: The recirculation pump will automatically shut down on motor overload.

Odor Reduction NaOH Metering Pump

Shut down the sodium hydroxide metering pump according to the procedures listed below:

1. Place the Hand/Off/Auto switch at LCP-HSORS for the pump (Chem Pump 1) in the “Off” position. The “Running” indicator light at LCP-HSORS should not be illuminated.
2. Verify the pump has stopped.
3. If the pump is to be out of service for an extended period of time, disconnect power source.
4. If the entire odor reduction system is to be out of service for an extended period of time, close the isolation valve on the pump suction.

Note: In the automatic mode of operation, the pump starts and stops according to signals from the pH controller.

Odor Reduction NaOCl Metering Pump

Shut down the sodium hypochlorite metering pump according to the procedures listed below:

1. Place the Hand/Off/Auto switch at LCP-HSORS for the pump (Chem Pump 2) in the “Off” position. The “Running” indicator light at LCP-HSORS should not be illuminated.
2. Verify the pump has stopped.
3. If the pump is to be out of service for an extended period of time, disconnect power source.
4. If the entire odor reduction system is to be out of service for an extended period of time, close the isolation valve on pump suction.

Note: In the automatic mode of operation, the pump starts and stops according to signals from the ORP controller.

Odor Reduction NaOH Storage Tank

Shut down the NaOH storage tank according to the procedures listed below:

1. Close the tank isolation valve.

Odor Reduction NaOCl Storage Tank

Shut down the NaOCl storage tank according to the procedures listed below:

1. Close the tank isolation valve.

Odor Reduction Water Control System

Shut down the water control system according to the procedures listed below:

1. Place the Water Seal Off/On selector switch at the LCP-HSORS in the “Off” position.
2. Verify pump has stopped. Close the isolation valves on the inlet and outlet sides of the anti-scaling unit.
3. If the water control system is to be out of service for an extended period of time, disconnect power source.

Standby Generator and ATS

The standby generator should be shut down according to the following procedures:

1. Refer to the General Shutdown Procedures presented in Section 4.0.3.

2. Shut down the mobile standby generator according to the procedures listed below:

Automatic Return to Restored SDG&E Power

- a. On restoration of utility power the following automatic sequence occurs:
 - Time delay.
 - Automatic transfer switch returns to “Normal” position.
 - Plant continues to operate without an interruption.
 - Generator runs through cool down period.

Manual Return to Restored SDG&E Power

- a. Verify that normal power has been restored by SDG&E and is available for use from the ATS annunciator “Normal Available”
 - b. Place the automatic transfer switch in the “Normal” position. The plant continues to operate without an interruption
 - c. Place the Run/Off-reset/Auto switch located at LCP-GEN in the “Off” Position to shutdown the generator set. The generator begins the cooldown period and then shuts down.
3. Verify the pump station is operating within its normal operating limits.

4.13.4.4 Alarm and Status Annunciation

General

<u>Alarm/Status</u>	<u>Display Location</u>
PLC-HSPS Primary Failure Annunciator	LCP-HSPS
PLC-HSPS Secondary Failure Annunciator	LCP-HSPS
Pump Station System Failure Annunciator	PCC
Building Fire Alarm Annunciator	LCP-HSPS
Hollister Street Pump Station Fire Annunciator	PCC
MCC Room High Temperature Annunciator	LCP-HSPS

Pump Station Isolation Valve

<u>Alarm/Status</u>	<u>Display Location</u>
Wetwell Inlet Valve Open Light	LCP-HSPS
Wetwell Inlet Valve Closed Light	LCP-HSPS
Wetwell Inlet Valve Open Light	Field
Wetwell Inlet Valve Closed Light	Field
Wetwell Inlet Valve Failure Annunciator	LCP-HSPS

Wetwell Level Control System

<u>Alarm/Status</u>	<u>Display Location</u>
Wetwell Low Level Annunciator	LCP-HSPS
Wetwell High Level Annunciator	LCP-HSPS
Wetwell High Combustible Gas Annunciator	LCP-HSPS
BCP-HSPS Bubbler Failure Annunciator	LCP-HSPS
Wetwell Level	LCP-HSPS
Wetwell Level	BCP-HSPS
Compressor No. 1 Running Light	BCP-HSPS
Compressor No. 2 Running Light	BCP-HSPS
Compressor No. 1 Fail Light	BCP-HSPS
Compressor No. 2 Fail Light	BCP-HSPS
Low Air Light	BCP-HSPS
Alarm Horn	BCP-HSPS

Sewage Lift Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
Lift Pump No. 1 Failure Annunciator	LCP-HSPS
Lift Pump No. 2 Failure Annunciator	LCP-HSPS
Lift Pump No. 3 Failure Annunciator	LCP-HSPS
Lift Pump No. 4 Failure Annunciator	LCP-HSPS
Lift Pump 1 Run Light	LCP-HSPS
Lift Pump 2 Run Light	LCP-HSPS
Lift Pump 3 Run Light	LCP-HSPS
Lift Pump 4 Run Light	LCP-HSPS
Lift Pump 1 Inverter Run Light	VFD 1
Lift Pump 1 Bypass Run Light	VFD1
Lift Pump 2 Inverter Run Light	VFD 2
Lift Pump 2 Bypass Run Light	VFD2
Lift Pump 3 Inverter Run Light	VFD 3
Lift Pump 3 Bypass Run Light	VFD3
Lift Pump 4 Inverter Run Light	VFD 4
Lift Pump 4 Bypass Run Light	VFD4

Sump Pumps

<u>Alarm/Status</u>	<u>Display Location</u>
Area Sump High High Level Annunciator	LCP-HSPS
Area Sump Pump Failure Annunciator	LCP-HSPS
Pump 1 Running Light	LCP-HSPSS
Pump 1 Moisture Detection Alarm Light	LCP-HSPSS
Pump 1 High Temperature Alarm Light	LCP-HSPSS
Pump 2 Running Light	LCP-HSPSS
Pump 2 Moisture Detection Alarm Light	LCP-HSPSS
Pump 2 High Temperature Alarm Light	LCP-HSPSS
Power On Light	LCP-HSPSS
High Level Alarm Light	LCP-HSPSS
Alarm Beacon/Strobe Light	LCP-HSPSS

Surge Control System

<u>Alarm/Status</u>	<u>Display Location</u>
Surge Arrestor SA-1 High Level Annunciator	LCP-HSPS
Surge Arrestor SA-1 Low Level Annunciator	LCP-HSPS
Surge Arrestor SA-2 High Level Annunciator	LCP-HSPS
Surge Arrestor SA-2 Low Level Annunciator	LCP-HSPS
Air Compressor Failure Annunciator	LCP-HSPS
SA-1 High Level Light	LCP @SA-1

SA-2 High Level Light	LCP @SA-2
SA-1 In Range Light	LCP @SA-1
SA-2 In Range Light	LCP @SA-2
SA-1 Low Level Light	LCP @SA-1
SA-2 Low Level Light	LCP @SA-2

Odor Reduction Station

<u>Alarm/Status</u>	<u>Display Location</u>
Odor Reduction System Failure Annunciator	LCP-HSPS
Safety Shower Annunciator	LCP-HSPS
Pump Station Safety Shower Alarm Annunciator	PCC
ORP Reading	LCP-HSORS
ORP Out of Range Light	LCP-HSORS
pH Reading	LCP-HSORS
pH Out of Range Light	LCP-HSORS
Panel Power Light	LCP-HSORS
System Alarm Light	LCP-HSORS
Blower Off Light	LCP-HSORS
Blower On Light	LCP-HSORS
Recirculation Pump 1 Off Light	LCP-HSORS
Recirculation Pump 1 Run Light	LCP-HSORS
Recirculation Pump 2 Off Light	LCP-HSORS
Recirculation Pump 2 Run Light	LCP-HSORS

Recirculation Pump 3 Off Light	LCP-HSORS
Recirculation Pump 3 Run Light	LCP-HSORS
Chemical Pump 1 (pH) Run Light	LCP-HSORS
Chemical Pump 2 (ORP) Run Light	LCP-HSORS
Phase Fail Light	LCP-HSORS
Water Seal On Light	LCP-HSORS
Panel Fan On Light	LCP-HSORS
Alarm Override On Light	LCP-HSORS

Standby Generator

<u>Alarm/Status</u>	<u>Display Location</u>
Lamp Test Light	LCP-GEN
System Ready Light	LCP-GEN
Generator Switch Not in Auto Light	LCP-GEN
Emergency Stop Light	LCP-GEN
High Engine Temperature Light	LCP-GEN
Low Oil Pressure Light	LCP-GEN
Overcrank Light	LCP-GEN
Overspeed Light	LCP-GEN
Auxiliary Fault Light	LCP-GEN
Pre-alarm High Engine Temperature Light	LCP-GEN
Pre-alarm Low Oil Pressure Light	LCP-GEN
Low Water Temperature Light	LCP-GEN

Low Fuel Light	LCP-GEN
Auxiliary Pre-alarm Light	LCP-GEN
Battery Charger Fault Light	LCP-GEN
Low Battery Voltage Light	LCP-GEN
Standby Generator Diesel Tank Leak Annunciator	LCP-HSPS
Standby Generator Running Light	LCP-HSPS
Standby Generator Failure Annunciator	LCP-HSPS
Utility Power Failure Annunciator	LCP-HSPS

4.13.4.5 Daily Operational Checks

General

1. Refer to the general daily operation check requirements described in Section 4.0.5.
2. Check for any alarm conditions at the PLC-PCC. Notify your Supervisor of any annunciated alarms immediately.
3. Consult the sections below and the appropriate manufacturer's operation and maintenance manuals for specific monitoring requirements.

Pump Station Isolation Valve

1. Check and record the position of the isolation valve.
2. Check switch settings of the valve locally and at the LCP-HSPS to confirm the requirements of your Operations Supervisor.
3. Visually observe the valve for any signs of leaks, or any other unusual problems.
4. Check for any alarm conditions at the LCP-HSPS. Notify your Supervisor of any annunciated alarms immediately.

Wetwell Level Control System

1. Check and record the level of the wetwell at BCP-HSPS.

2. Check switch settings of the system at the BCP-HSPS to confirm the requirements of your Operations Supervisor.
3. Check and record which air compressor is running. In the automatic mode, they should alternate automatically.
4. Check and record if any of the compressor “Fail” indicator lights are illuminated at BCP-HSPS.
5. Visually observe the control panel and compressors for any signs of leaks, unusual noise, and any other unusual problems.
6. Check for any alarm conditions at BCP-HSPS or LCP-HSPS. Notify your Supervisor of any annunciated alarms immediately.
7. Check all “push to test” indicator lights on BCP-HSPS.
8. Drain air tank condensate.
9. Consult the Manufacturer’s O&M Manual for troubleshooting, calibration, and test procedures. The following O&M Manual should be consulted for the BCP-HSPS control panel:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant (CC-4A) - BCP-HSPS Control Panel (Section 13650). Prepared by Medland Controls, Inc. 1998.

Sewage Lift Pumps

1. Check the positions of the manually-operated valves to confirm the requirements of your Operations Supervisor.
2. Check water level in the wetwell.
3. Check the pump operations to see that they are operating smoothly and quietly.
4. Record run times of the sewage lift pumps from the respective VFD control panels in the MCC Room.
5. Check switch settings of the pumps locally, in the MCC Room, and at the LCP-HSPS to confirm the requirements of your Operations Supervisor.
6. Check for any alarm conditions at the LCP-HSPS or at the MCC Room. Notify your Supervisor of any annunciated alarms immediately.

7. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the lift pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant (CC-4A) - Submersible Non-Clog Sewage Pumps (Section 11100). Prepared by Ebara International Corporation. 1998.

Sump Pumps

1. Check the positions of the manually-operated valves to confirm the requirements of your Operations Supervisor.
2. Check the water level in the sump.
3. Check the pump operation to see that they are operating smoothly and quietly.
4. Record run times of the sump pumps from LCP-HSPSS.
5. Check switch settings of the pumps locally at LCP-HSPSS to confirm the requirements of your Operations Supervisor.
6. Check for any alarm conditions at LCP-HSPSS or at LCP-HSPS. Notify your Supervisor of any annunciated alarms immediately.
7. Check all "push to test" indicator lights on LCP-HSPSS.
8. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the sump pumps:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant CC-4A) - Sump Pumps (Section 11016). Prepared by Ebara International Corporation. 1998.

Surge Arrestors

1. Check positions of the manually-operated isolation valves to confirm requirements of your Operations Supervisor.
2. Inspect each surge arrestor for correct liquid level.
3. Visually observe the tanks for any signs of leaks and any other unusual problems.

4. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the surge arrestors:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant CC-4A) - Surge Control System (Section 11101). Prepared by Young Engineering Manufacturing, Inc., 1998.

Surge Arrestor Air Compressor

1. Check positions of the manually-operated valves to confirm requirements of your Operations Supervisor.
2. Check the compressor operation to see if it is operating smoothly and quietly.
3. Check the compressor for leaks, unusual noise/vibration, and temperature (hand touch).
4. Check switch settings of the compressor at the LCP to confirm the requirements of your Operations Supervisor.
5. Record run time of the compressor at the LCP.
6. Check frame lubricant level of the compressor.
7. Drain condensate from receiver/tank.
8. Consult the Manufacturer's O&M Manual for troubleshooting and test procedures. The following O&M Manual should be consulted for the surge arrestor air compressor:

Operations and Maintenance Manual - South Bay International Wastewater Treatment Plant CC-4A) - Surge Control Air Compressor (Section 11015). Prepared by Young Engineering Manufacturing, Inc., 1998.

Odor Reduction Station

The daily check of the odor reduction station should be according to the following procedures:

1. Observe any hydrogen sulfide or organic odors in the air, particularly downwind of the scrubber.
2. Inspect the nozzles to be sure they are distributing water evenly.
3. Check the rotometer to be sure make up water is being provided to the scrubber at the appropriate rate.

4. Inspect the system to ensure there are no leaks from the chemical storage tanks and interconnecting pipes.
5. Check control settings of each piece of equipment at LCP-HSORS to confirm the requirements of your Operations Supervisor.
6. Check for any alarm conditions at LCP-HSORS or LCP-HSPS. Notify your Supervisor of any annunciated alarms immediately.
7. Check all “push to test” indicator lights on LCP-HSPSS.
8. Check that all wetwell access hatches are closed.
9. Check that portable eyewash/shower is full of clean potable water. Verify that associated panic alarm switch is operational.
10. Fill out checklist as required by Air Pollution Control Permit.

Odor Reduction Blower

1. Check the position of the manually operated discharge damper to confirm the requirements of your Operations Supervisor.
2. Check the blower operation to ensure that it is operating smoothly and quietly.
3. Check the blower for leaks, excessive noise, and temperature (hand touch).
4. Check and record the discharge air velocity to confirm proper air flow.
5. Consult the Manufacturer’s O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station blowers:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plan CC-4A) - Odor Reduction Scrubber Systems (Section 11050), Appendix F. Prepared by U.S.Filter/Davis Process, Inc. 1998.

Odor Reduction Scrubber

1. Visually observe scrubber sump and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the towers and all pipes, ducts, valves, and sampling valves for any signs of damage or improper installation. All sampling valves should be properly closed and tightened.

3. Check the positions of manually-operated valves and dampers to confirm the requirements of your Operations Supervisor.
4. Check and record the make-up water rotometer reading inside the make-up water control stand to satisfy requirements of the Air Pollution Control Permit.
5. Check and record the scrubber differential pressure to monitor fouling of the packing and increased pressure on the blower.
6. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station scrubber:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plan (CC-4A) - Odor Reduction Scrubber Systems (Section 11050). Prepared by U.S. Filter/Davis Process, Inc. 1998.

Odor Reduction pH and ORP Controllers

1. Visually observe each controller for any unusual problems.
2. Check and record pH and ORP readings to satisfy the requirements established by the Air Pollution Control Permit.
3. Check for pH and ORP "Out of Range" alarms at LCP-HSORS. If out of range, confirm that metering pump is operating properly.
4. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station pH and ORP controllers:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plan (CC-4A) - Odor Reduction Scrubber Systems (Section 11050), Appendix C and D. Prepared by U.S. Filter/Davis Process, Inc. 1998.

Odor Reduction Recirculation Pumps

1. Check the positions of the manually operated valves on recirculation lines to confirm the requirements of your Operations Supervisor.
2. Check the recirculation pumps operation to ensure that they are operating smoothly and quietly.
3. Check the recirculation pumps for leaks, excessive noise, and temperature (hand touch).

4. Check and record the discharge pressure using the local recirculation pump pressure gauge, as dictated by the Air Pollution Control Permit.
5. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction recirculation pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4A) - Odor Reduction Scrubber Systems (Section 11050), Appendix B. Prepared by U.S.Filter/Davis Process, Inc. 1998

Odor Reduction NaOH Metering Pump

1. Check the condition of the pump suction and discharge lines for any signs of damage, foreign material, or improper installation.
2. Check the pump operation to ensure that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check switch settings of the caustic metering pump at LCP-HSORS to confirm the requirements of your Operations Supervisor.
5. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station NaOH Metering pumps:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4A) -Odor Reduction Scrubber Systems (Section 11050), Appendix A. Prepared by U.S.Filter/Davis Process, Inc. 1998.

Odor Reduction Station NaOCl Metering Pump

1. Check the condition of the pump suction and discharge lines for any signs of damage, foreign material, or improper installation.
2. Check the pump operation to ensure that it is operating smoothly and quietly.
3. Check the pump for leaks, excessive noise, and temperature (hand touch).
4. Check switch settings of the sodium hypochlorite pump at LCP-HSORS to confirm the requirements of your Operations Supervisor.
5. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station NaOCl metering pumps:

Odor Reduction NaOH Storage Tank

1. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, man way, and valves for any signs of damage or improper installation. The man way should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the position of the manually-operated isolation valve at the tank to confirm the requirements of your Operations Supervisor.
4. Check and record sodium hydroxide level in the tank locally to satisfy the requirements established by your Operations Supervisor.
5. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station NaOH storage tank:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4A) - Odor Reduction Scrubber Systems (Section 11050), Appendix O. Prepared by U.S.Filter/Davis Process, Inc. 1998.

Odor Reduction NaOCl Storage Tank

1. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
2. Visually observe the roof of each tank, and all pipes, man way, and valves for any signs of damage or improper installation. The man way should be properly closed and tightened as directed by your Operations Supervisor.
3. Check the position of the manually-operated isolation valve at the tank to confirm the requirements of your Operations Supervisor.
4. Check and record sodium hypochlorite level in the tank locally to satisfy the requirements established by your Operations Supervisor.
5. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station NaOCl storage tank:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4A) - Odor Reduction Scrubber Systems (Section 11050), Appendix O. Prepared by U.S.Filter/Davis Process, Inc. 1998.

Odor Reduction Water Air Gap System

1. Check the pump operation to ensure that it is operating smoothly and quietly.
2. Check the pump for leaks, excessive noise, and temperature (hand touch).
3. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manual should be consulted for the odor reduction station air gap system:

Operations and Maintenance Manual-South Bay International Wastewater Treatment Plant (CC-4A) - Odor Reduction Scrubber Systems (Section 11050), Appendix E. Prepared by U.S.Filter/Davis Process, Inc. 1998.

Standby Generator and ATS

1. Visually inspect all equipment for any signs of damage or improper installation.
2. Check mobile standby generator controls to ensure the generator is in automatic mode or as required by your Operation's Supervisor.
3. Visually observe the fuel tank and all fuel piping and connections for leaks.
4. Check switch settings of the standby generator and the fuel tank at LCP-GEN and the ATS to confirm the requirements of your Operations Supervisor.
5. Check the level in the fuel tank.
6. During an emergency or regular operations checks, when standby generator is operational, perform the following checks:
 - a. Check mobile standby generator to verify that it is within the established operating range and not overloaded.
 - b. Check the engine/power generator operation to see that it is operating smoothly and quietly.
 - c. Check the engine/power generator for leaks, excessive noise, and temperature.
4. Consult the Manufacturer's O&M Manuals for troubleshooting and test procedures. The following O&M Manuals should be consulted for the standby generator:

4.13.4.6 Training Record

The following record should be used by the Operator to ensure a complete understanding of the Hollister Street Pump Station Facilities.

4.13.4.6.1 Reading Assignment

1. Chapters 8, 9, 13, Operation of Wastewater Treatment Plants - MOP 11. Water Environment Federation, 1990.
2. Chapter 1 Advanced Waste Treatment - A Field Study Training Program. California State University, Sacramento (Kenneth Kerri), 1991.

4.13.4.6.2 Field Instruction

The operator should review and know the location and purpose of each of the following items:

<u>Item</u>	<u>Operator Initials</u>
General	
PLC-PCC Alarms	_____
Pump Station Isolation Valve	
Local Controls	_____
LCP-HSPS Controls and Alarms	_____
Pump Station Wetwell	
High Level Float Switch	_____
BCP-HSPS Controls and Alarms	_____
LCP-HSPS Alarms	_____
Sewage Lift Pumps	
Isolation Valves	_____
Local Controls	_____

VFD Controls	_____
LCP-HSPS Controls and Alarms	_____
Sump Pumps	
Isolation Valves	_____
Level Float Switches	_____
LCP-HSPSS Controls and Alarms	_____
LCP-HSPS Alarms	_____
Surge Arrestors	
Isolation Valves	_____
Local Pressure Gauges	_____
LCP-HSPS Alarms	_____
Local Controls and Alarms	_____
Surge Arrestor Air Compressor	
Isolation Valves	_____
Local Controls and Alarms	_____
Odor Reduction Blower	
Discharge Damper	_____
Portable Hydrogen Sulfide Meter	_____
LCP-HSORS Controls and Alarms	_____
Combustible Gas Sensor	_____
Odor Reduction Scrubber	
Isolation Valves	_____
Make-Up Water Control Stand	_____
Mist Eliminator	_____
Spray Nozzles	_____
Packed Bed	_____
LCP-HSORS Controls and Alarms	_____

Differential Pressure Mamometer	_____
Odor Reduction pH and ORP Control	
pH Controller	_____
ORP Controller	_____
LCP-HSORS Controls and Alarms	_____
Odor Reduction Recirculation Pumps	
Isolation Valves	_____
LCP-HSORS Controls and Alarms	_____
Local Pressure Gauges	_____
Odor Reduction NaOH Metering Pump	
LCP-HSORS Controls and Alarms	_____
Stroke Adjustment	_____
Odor Reduction NaOCl Metering Pump	
LCP-HSORS Controls and Alarms	_____
Stroke Adjustment	_____
Odor Reduction NaOH Storage Tank	
Isolation Valves	_____
Level Sight Tube	_____
Emergency Eyewash/Shower	_____
Odor Reduction NaOCl Storage Tank	
Isolation Valves	_____
Level Sight Tube	_____
Odor Reduction Air Gap System	
Float Switch	_____
LCP-HSORS Controls and Alarms	_____
Standby Generator	
Diesel Driven Engine	_____

Standby Generator	_____
LCP-GEN Controls and Alarms	_____
ATS Controls	_____
Diesel Fuel Base Tank	
Tank Level Sensors	_____
Atmospheric Vents	_____
Emergency Pressure Relief Vents	_____
Tank Leak Detector	_____
MCC/Generator Building	
High Temperature Switch	_____
LCP-HSPS Alarms	_____
PLC-PCC Alarms	_____
Fire Alarm System	_____

Chapter 5

PREVENTIVE MAINTENANCE

NOTICE AND CAUTIONS TO USERS OF THIS O&M MANUAL

This O&M Manual provides a general overview only of the South Bay International Wastewater Treatment Plant (SBIWTP).

This O&M Manual relies on information obtained from the various equipment manufactures and the Construction Contractors that were involved in construction of the SBIWTP. The information obtained from equipment manufacturers and construction Contractors was reviewed by Malcolm Pirnie only for general compliance with the submittal requirements specified in construction Contract Documents.

All USERS of this O&M Manual shall be required to consult the detailed O&M Manuals provided by the equipment manufactures and Construction Contractors and to understand and follow the directions given therein for safe operation and maintenance of all equipment and systems prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all safety manuals published and provided by their employer(s) and to understand and follow all directions given therein, including but not limited to *Personnel Protective Equipment (PPE), Electrical Lock-Out Procedures, Fall Prevention Procedures and Confined Space Entry Procedures* prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all “record” drawings and to understand how equipment and systems are intended to be operated and controlled prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to understand and acknowledge that the SBIWTP contains chemicals and equipment that if not operated and/or maintained in a responsible and safe manner can result in serious injury or death.

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5.0 FOREWORD

The purpose of the preventive maintenance procedures is to keep individual facilities and the entire plant in suitable condition to perform the services for which they were intended and to prolong the useful life of equipment. All maintenance activities should be coordinated with your Maintenance Supervisor to avoid unscheduled shutdowns and to avoid potential emergency situations.

This chapter should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately.

In the event of a disagreement between instructions presented herein and those contained in the manufacturer's manual or preventive maintenance instructions from your Maintenance Supervisor, the manufacturer's manual or the instructions of your Maintenance Supervisor should take precedence.

Weekly, monthly, quarterly, semi-annual and annual tasks should be performed on a specific day as determined by your Maintenance and Operations Supervisors to avoid confusion.

An integral part of the overall maintenance program is good housekeeping, and the following basic rules should be followed as part of your preventive maintenance activities:

1. The facilities should be kept neat, clean and orderly.
2. Preventive maintenance should be approached energetically and in a systematic fashion.
3. The routine schedules of inspection and lubrication should be reviewed periodically by your Operations and Maintenance Supervisors and updated and revised as necessary.
4. Individual data and records for each piece of equipment should be kept.
5. Proper safety procedures and rules should always be observed and followed (See Section 7.2).

The recommended guidelines and schedules for preventive maintenance are described in Sections 5.1 to 5.13 of this manual.

5.1 HEADWORKS

Refer to the general preventive maintenance requirements described in Section 5.0. The following sections should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately.

5.1.1 Screening Equipment

Influent Sluice Gates

1. Weekly:
 - a. Inspect the threaded operating portion of the gate stem. If the lubricant on the stem threads depletes and/or becomes contaminated, it should be cleaned away and replenished with one of the following mixtures of a Teflon paste with grease:

La-Co Industries/Fiske Bros.	Slic-Tite Paste/No. 630 AAA Grease (24 oz paste/gal of grease)
Grainger (#4X222)/Conoco	Dayton Sealant Paste All Purpose Superlube Grease
Grainger (#5X998)/Texaco	Dayton Sealant Paste/Multi Fax Heavy Duty No. 2 Grease
2. Every 3 Months:
 - a. Run gate through one complete cycle.
3. Every 6 Months:
 - a. Clean and grease stem threads with one of the mixtures of the Teflon paste with a grease indicated above.
 - b. Pressure grease the lift through the grease fittings with one of the following greases:

Fiske Bros.	Lubriplate No. 630 AAA or AA
Conoco	All Purpose Superlube
Texaco	Multi Fax Heavy Duty No. 2

- c. Inspect gear case lubrication for the gate actuators every 6 months or 500 cycles, whichever comes first. The “worm” should be totally immersed in grease. Do **not** grease drive bearings unless they are leaking. Excess grease will damage seals. If grease is lacking or contaminated with dirt, water, or foreign matter, units should be flushed with a commercial degreaser/cleaner such as Exxon Varsol #18 which does not affect seal materials. Re-pack unit allowing for grease thermal expansion with one of the following:

Exxon	Nebula EP-0 (calcium based)
Alternative	NLGI Grade 0 or 1, EP additive, water and heat resistant, non-separating, does not create more than 8% swell in Buna N or Viton, not corrosive to steel, Dropping point >316°F

- d. Grease the geared limit switch for the gate actuators with Exxon Beacon 325. In accordance with manufacturer’s recommendation, there is **NO SUBSTITUTE** for the grease for the geared limit switch.

4. Annually:

- a. Clean and grease seating faces and wedge surfaces with one of the greases indicated above in item 3.a.

Screening Channel Slide Gates

1. Every 3 Months:

- a. Run gate through one complete cycle.

2. Every 6 Months:

- a. Grease fittings and manual operators with one of the following:

Mobil	Mobilgrease Special
Chevron	RMP Heavy Duty Grease EPNLGI2
Unocal	Megaplex XD-2
Lubriplate	#630-AA

- b. Clean and grease operating stems with one of the following:

Lubricate	#630-2
Shell	Alvania EP #2
Mobil	Mobilux EP #2
Valvoline	Val-Lith EP #2
Chevron	Ultra Duty Grease EP #2

3. Annually:
 - a. Remove the lift nut and inspect for wear. If excessive wear is evident the lift nut should be replaced.

Portable Hydraulic Operator

1. Weekly:
 - a. Check pressure gauges on filters. Change fluid filter if high.
 - b. Inspect flexible hoses for damage and deterioration. Replace as required.
 - c. Check hydraulic oil level. If low, add one of the following:

Chevron	Hydraulic Oil #AW150HYD46
Shell	Tellus 46
Unocal	Unax AW46
2. Monthly:
 - a. Remove, clean and oil the air breathers.
 - b. Tighten and check for damaged hydraulic hose connections. Replace the damaged fittings and hose as needed.
 - c. Clean equipment to prevent overheating.
3. Every 6 Months:
 - a. Replace all fluid filter cartridges in use for over 3 months.
 - b. Check quality of hydraulic oil. If contaminated change with one of the oils indicated above.
 - c. Check pump and motor alignment. Correct as required.
 - d. Grease the motor with one of the following:

Shell Oil	Dolium R
Chevron	SRI NLGI #2

Automatic Influent Wastewater Sampler with Remote Peristaltic Pump

1. Weekly:
 - a. Check humidity indicator. If the indicator turns pink or white, inspect electronics housing for seal failure and replace the desiccant module.

- b. Check sample withdrawal quantity with a graduate cylinder.
- 2. Monthly:
 - a. Clean sample cabinet with a damp sponge and mild detergent.
 - b. Clean intake tubing by pumping water with mild detergent through the tubing.
- 3. Every 6 Months:
 - a. Check intake tubing for any leaks and/or damage. Replace tubing if needed.
 - b. Clean the condenser fins and coils behind the access cover on the back of the sample cabinet.

Automatic Screening Influent Wastewater Sampler with Remote Peristaltic Pump

- 1. Weekly:
 - a. Check humidity indicator. If the indicator turns pink or white, inspect electronics housing for seal failure and replace the desiccant module.
 - b. Check sample withdrawal quantity with a graduate cylinder.
- 2. Monthly:
 - a. Clean sample cabinet with a damp sponge and mild detergent.
 - b. Clean intake tubing by pumping water with mild detergent through the tubing.
- 3. Every 6 Months:
 - a. Check intake tubing for any leaks and/or damage. Replace tubing if needed.
 - b. Clean the condenser fins and coils behind the access cover on the back of the sample cabinet.

Mechanical Bar Screens

NOTE: Lifting lugs provided on mechanical bar screens are for lifting the motor only after it has been disconnected from the gear reducer and brake. Lifting the motor/brake/reducer together is best achieved using slings.

1. Daily:
 - a. Inspect drive assembly motor for loose mounting bolts. Check for any signs of damage.
 - b. Check to see that drive assembly motor is properly ventilated. Remove obstructions that would not permit proper ventilation of the motor.
 - c. Inspect structural housing columns, girts, purlins, stairs, handrails, toe plates, bracing, etc., (as applicable) for any signs of damage or deterioration or corrosion.
2. Weekly:
 - a. Inspect drive assembly reducer for loose mounting bolts and any signs of damage.
 - b. With the motor running, check for vibration. Shim as necessary.
 - c. Check drive assembly motor couplings for wear.
 - d. Lubricate rake assembly cartridge bearing with the following grease:

NLGI	0 to 1 for low temperature
NLGI	2 for high temperature
 - e. Lubricate rake assembly aircraft bearing with a low pressure grease gun with the following:

Shell	Alvania #2
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 - f. Inspect rake wiper for loose mounting bolts and any signs of damage.
 - g. Inspect structural housing for cracked or broken welds.
 - h. Inspect structural housing for loose, missing or damaged bolts, screws and nuts.
 - i. Inspect structural housing galleries and walkways for signs of damage, deterioration or excessive rust.
3. Monthly:
 - a. Check drive assembly reducer housing for corrosion.
 - b. Check drive assembly reducer horizontal shaft alignment.

- c. Inspect drive assembly motors for worn or damaged shaft bearings.
- d. Check drive assembly motor for correct alignment of the motor and drive shafts.
- e. Inspect rake wiper blades for excessive wear or damage. Adjust blades as necessary.
- f. Check automatic wiper guide lubrication applicator and adjust as necessary. Lubricant should be provided as follows:

Shell	Alvania #2
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- g. Inspect structural housing for paint deterioration and wear.
- h. Lubricate rack roller and bushings using a squirt oil-can with the following:

Shell	SAE-30
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4. Every 3 Months:

- a. Replace rake assembly cartridge bearing grease with the following:

NLGI	0 to 1 for low temperature
NLGI	2 for high temperature

- b. Replace rake assembly aircraft bearing oil with the following:

Shell	Alvania #2
-------	------------

5. Every 6 Months:

- a. With the cover removed, inspect the drive assembly reducer for proper oil level. Add the following oil as necessary:

Almasol	LP680
Pinnacle	680

Any synthetic oil equivalent to ISO VG680.

- b. Check drive assembly brake solenoid plunger for proper gap.
- c. Check brake shoes for wear.

- d. With the cover removed, inspect drive assembly reducers for cracked, broken or excessively worn gear teeth. Check pinion alignment and tooth clearance.

6. Annually:

- a. Lubricate drive assembly motors as necessary using a low pressure grease gun with the following:

Shell	Dolium R
-------	----------

- b. Check rake assembly cartridge bearings for wear.

- c. Check rake assembly aircraft bearings for wear.

- d. Check rake assembly limit switches yearly unless maintenance is required on rake assembly.

- e. Lubricate gear reducer helical-worm using an oil funnel with the following:

Temperature +125 to +15	
Mobile	Glygoyle #30

Temperature +75 to -10	
Omala	100

- f. Lubricate the rake wiper rotary shock absorber using an oil funnel with the following:

Shell	Tellis #100
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7. As Required:

- a. Check condition of rake assembly limit switch.

- b. Fill rake drive shaft grease feeders when near empty with one of the following:

Shell	Alvania No. 1 for low temperature
Shell	Alvania No. 2 for high temperature

Conveyors

1. Every 3 Months:
 - a. Check worm gear speed reducer oil levels and replenish as necessary with one of the following:

Browning	HGLI28HT4
Shell	Tellue 150
Mobil	DTE Extra Heavy
Chevron	OC TURB 150

Initial drain and change of the worm gear speed reducer oil must be made at 100 hours.

- b. Check pulley bearing and idler bearing oil levels and replenish as necessary with one of the following NLGI #2:

Shell	Alvania #2
Shell	Amolith #2

- c. Check motor grease levels and replenish as necessary using one of the following:

Shell	Dolium R
Chevron	SR1

- d. Check the drive chain oil level and replenish to sight glass as necessary using one of the following:

Shell	SAE 30
Mobile	SAE 30
Chevron	SAE 30

2. Every 8 Months:
 - a. Change pulley bearing housing oil with one of the oils listed above.
3. Every 9 Months:
 - a. Change motor oil with one of the oils listed above.
4. Annually:
 - a. Change worm gear speed reducer oil with one of the oils listed above.
 - b. Change the idler bearing housing oil with one of the oils listed above.

- c. Change the drive chain oil with one of the oils listed above.
- 5. Every 18 Months:
 - a. Inspect gear case lubrication for the gate actuators every 18 months or 500 cycles, whichever comes first. The “worm” should be totally immersed in grease. Do **not** grease drive bearings unless they are leaking. Excess grease will damage seals. If grease is lacking or contaminated with dirt, water, or foreign matter, units should be flushed with a commercial degreaser/cleaner such as Exxon Varsol #18 which does not affect seal materials. Re-pack unit allowing for grease thermal expansion with one of the following:

Exxon	Nebula EP-0 (calcium based)
Alternative	NLGI Grade 0 or 1, EP additive, water and heat resistant, non-separating, does not create more than 8% swell in Buna N or Viton, not corrosive to steel, Dropping point >316°F
 - b. Grease the geared limit switch for the gate actuators with Exxon Beacon 325. In accordance with manufacturer’s recommendation, there is **NO SUBSTITUTE** for the grease for the geared limit switch.
- 6. As Necessary:
 - a. Change actuator gear case oil only if it leaks with one of the oils indicated above.
 - b. Change actuator limit switch oil only if it leaks with the oil indicated above.

Transport and Positioning Winches

- 1. Before Each Operation:

WARNING: DO NOT USE DAMAGED OR MALFUNCTIONING EQUIPMENT. PLACE AN “OUT OF ORDER” SIGN ON THE WINCH. DO NOT USE THE WINCH UNTIL THE SIGN IS REMOVED BY A QUALIFIED MAINTENANCE PERSON WHO HAS COMPLETELY CORRECTED THE PROBLEM.

CAUTION: LUBRICATE THE SPUR GEARS BEFORE OPERATING THE WINCH AND PERIODICALLY DURING OPERATION. FAILURE TO LUBRICATE THE GEARS WILL CAUSE DAMAGE OR DEFORMATION OF THE GEAR TEETH.

MOTOR BEARINGS ARE LUBRICATED FOR LIFE BY THE MANUFACTURER. REPLACE THE MOTOR BEARINGS IF THE MOTOR IS DISASSEMBLED FOR ANY REASON.

- a. Perform Frequent Inspection before each operation every 3 hours during operation:
- 1) Visually inspect the entire winch and all other equipment involved in the operation.
 - Check all equipment for cracks, dents, bending, rust, wear, corrosion and other damage.
 - Make sure the wire rope is installed correctly and anchored securely to the drum.
 - Check the reducer for signs of leakage.
 - Make sure the entire winch is properly lubricated.
 - Make sure breather plugs are clean, open, and installed correctly.
 - Make sure mounting fasteners are tightened securely.
 - Make sure the foundation is in good condition, and capable of supporting the winch and its load under all load conditions.
 - Check electrical wiring and connections for wear, corrosion, cuts, and other damage.
 - Check clutch operation to make sure it moves freely and engages completely.
 - 2) Test winch performance by moving a test load equal to 10% of the rated capacity.
 - Listen for unusual noises, and look for signs of damage as you operate the winch.
 - Make sure the wire rope winds evenly and tightly onto the drum. If it is loose or uneven, rewind it before continuing.

- Make sure the load moves smoothly, without hesitation or strain.
- Make sure the winch responds to the control device. It must rotate as shown on the control labels, and it must turn off when you release the control.

Completely correct all problems before continuing. Use the Troubleshooting Chart presented in the Manufacturer's O&M Manual.

- b. Check oil level and refill the reducer before each operation, and every 10 hours during operation using an 8 EP lubricant such as:

Shell	Omala No. 680
Mobil	Mobil Extra Hecla Super
Texaco	Meropa 680

CAUTION: MAKE SURE BREATHER PLUGS ARE CLEAN AND OPEN TO VENT HEAT AND PRESSURE. POOR VENTILATION MAY CAUSE OVERHEATING AND RESULT IN DAMAGE TO OIL SEALS AND OTHER EQUIPMENT. FILL THE SPEED REDUCER TO THE PROPER LEVEL WITHOUT OVERFILLING. TOO MUCH OR TOO LITTLE LUBRICANT WILL CAUSE OVERHEATING AND RESULT IN DAMAGE TO SEALS, BEARINGS, AND GEARS. DO NOT MIX DIFFERENT LUBRICANTS.

- c. Lubricate the spur gears before each operation and at least every 10 hours of operation with one of the following greases:

Mobil	Mobilux EP2, NGLI #2
Shell	Dolium R

Insert grease through the grease zerk in the gear guard to lubricate the gear teeth.

- d. Lubricate the flange bearings as required by inserting one of the following greases through the grease zerk:

Mobil	Mobilux EP2, NGLI #2
Shell	Dolium R

2. After First 100 Hours of Operation:

- a. Change reducer oil with one of the oils indicated above. Remove the drain plug to drain the reducer.

CAUTION: DO NOT LEAVE PLUG HOLES IN THE REDUCER OPEN. OPEN PLUG HOLES WILL ALLOW DIRT AND MOISTURE TO CONTAMINATE THE LUBRICATION.

3. Every 6 Months:

- a. Clean the winches. Wipe down all equipment with an appropriate solvent per manufacturer's recommendations to remove dirt and grease. Remove all unnecessary objects from the area around the winch.

- b. Visually inspect the winch and all other equipment.

- 1) Check the finish for wear, flaking, or other damage.
- 2) Check all equipment for cracks, dents, bending, rust, wear, corrosion and other damage. If the winch was overloaded, or if you notice cracks and other signs of overloading, check for damage using magnetic or chemical crack detecting procedures.
- 3) Check all fasteners for stripped threads, wear, bends, and other damage.
- 4) Make sure all labels and plates are readable, firmly attached, free of damage and clean. Replacements are available.
- 5) Check the reducer for signs of leakage.
- 6) Remove guards and visually inspect spur gears for excessive wear, corrosion, and other damage.
- 7) Make sure gear teeth are properly lubricated.
- 8) Check clutch operation, if applicable, to make sure it moves freely and engages completely.

- c. Remove the winch from the foundation.

- 1) Check mounting fasteners for stripped threads, wear, and other damage.
- 2) Check the foundation for cracks, corrosion, and other damage.

- d. Drain a small amount of lubricant from the reducer into a clean container.
 - 1) Check the lubricant for dirt, metal particles, water, and other signs of contamination. Completely drain the reducer if lubricant is contaminated.
- e. Remove the wire rope from the drum.
 - 1) Check the entire length of wire rope for bent wires, crushed areas, broken or cut wires, corrosion, and other damage. Carefully inspect areas that pass over sheaves or through roller guides.
 - 2) Note the location and concentration of broken wires. Replace wire rope if more than 6 wires are broken in one lay, or more than 3 wires are broken in one strand in one lay.
- f. Place 100 pounds of tension on the wire rope.
 - 1) Measure the diameter of the wire rope, especially in areas where wear is noticeable. Replace the wire rope if the diameter measures below the minimum diameter at any point.
- g. Move the drum with your hands.
 - 1) Check for excessive movement indicating worn or loose gears or bearings. Excessive movement is caused by overloading or overheating, and is a sign that your application may require a larger power winch.
 - 2) Disassemble the winch if necessary. Inspect gears, keys, bearings, seals, and shafts for wear, distortion, and other damage.
 - 3) Check the anchor holes in the drum and the surrounding area for signs of wear or distortion.
- h. Fasten the winch securely to the foundation.
- i. Change reducer oil with one of the oils indicated above. Remove the drain plug to drain the reducer.

- j. Install the wire rope.
 - 1) Make sure the load hook or other device is securely attached to the wire rope, and the wire rope where it is attached is not frayed, corroded, broken, or otherwise damaged.
 - 2) Measure the throat opening, thickness, and twist of the hook. Replace the hook if it shows signs of damage.
- k. Test winch performance by operating the winch with a test load equal to the load rating.
 - 1) Listen for unusual noises, and look for signs of damage as you operate the winch.
 - 2) Make sure the wire rope winds evenly and tightly onto the drum. If it is loose or uneven, rewind it before continuing.
 - 3) Observe the rotating drum, look for signs of loose or misaligned bearings.
 - 4) Make sure the winch responds to the control device. It must rotate as shown on the control labels, and it must turn off when you release the control.
 - 5) Make sure the load moves smoothly without hesitation or strain.
- l. Disconnect electric power and inspect electrical equipment.
 - 1) Check electrical wires for worn insulation, cuts, corroded connections, and other damage.
 - 2) Check voltage of electrical supply with a UL approved voltmeter. If voltage is low, have a licensed electrician inspect the circuit.
 - 3) Make sure the electrical control box is securely installed. Look inside the control box for signs of moisture, corrosion, burn marks, cracks, and other damage.
- m. Connect electrical power.

CAUTION: COMPLETELY CORRECT ALL PROBLEMS BEFORE CONTINUING. USE THE TROUBLESHOOTING CHART

**PRESENTED IN THE MANUFACTURER'S O&M MANUAL
TO HELP DETERMINE THE CAUSE OF CERTAIN
PROBLEMS.**

5.1.2 Influent Pump Station

IPS Wetwell Slide Gates

1. Every 3 Months:
 - a. Run gate through one complete cycle.
2. Every 6 Months:
 - a. Grease fittings and manual operators with one of the following:

Mobil	Mobilgrease Special
Chevron	RMP Heavy Duty Grease EPNLGI2
Unocal	Megaplex XD-2
Lubriplate	#630-AA
 - b. Clean and grease operating stems with one of the following:

Lubricate	#630-2
Shell	Alvania EP #2
Mobil	Mobilux EP #2
Valvoline	Val-Lith EP #2
Chevron	Ultra Duty Grease EP #2
3. Annually:
 - a. Remove the lift nut and inspect for wear. If excessive wear is evident the lift nut should be replaced.

IPS Gates for Scum Removal

1. Every 3 Months:
 - a. Run gate through one complete cycle.
2. Every 6 Months:
 - a. Grease fittings and manual operators with one of the following:

Mobil	Mobilgrease Special
Chevron	RMP Heavy Duty Grease EPNLGI2
Unocal	Megaplex XD-2
Lubriplate	#630-AA

- b. Clean and grease operating stems with one of the following:

Lubricate	#630-2
Shell	Alvania EP #2
Mobil	Mobilux EP #2
Valvoline	Val-Lith EP #2
Chevron	Ultra Duty Grease EP #2

3. Annually:

- a. Remove the lift nut and inspect for wear. If excessive wear is evident the lift nut should be replaced.

Influent Pumps

1. Daily:

- a. Check for proper operation of the pump water flush lubricated column and bowl bearings.
- b. Check for proper operation of motor bearing lubrication system.
- c. Check oil levels in the oil lubricated bearings and replenish as necessary with one of the following:

(≤100°F) (100-400°F)

Texaco, Inc.	Regal	32	68
Chevron USA, Inc.	Chevron OC		
	Turbine Oil	32	68
Mobile Oil Co.	DTE Oil	Light	Heavy
			Medium
Penzoil Co, Inc.	AW HYD Oil	32	68
Shell Oil Co.	Tellus	32	68

- d. In order to prevent the build-up of grit and solids in the 60-inch influent line between the Influent Pump Station (IPS) and the Aerated Grit Chamber when the Plant is operating at **low** flows (less than 25 MGD), the following procedures should be executed as directed by the Operations Supervisor.
 - 1) Shut down operating influent pump and allow the water level in the IPS wetwell rise to a depth of 8.7 feet (the high level alarm set point) as indicated at the LCP-HWE.

- 2) When the level reaches 8.7 feet, start two (interval between starts shall be approximately 5 seconds) of the variable speed influent pumps in “Manual” mode according to the procedures defined in Section 4.1.2.2.2 of this O&M Manual. The pumps should be started at minimum speed.
- 3) Manually ramp up the speed of the variable speed pumps to full speed. Stop the pumps manually when the IPS level reaches 3.5 feet as indicated at the LCP-HWE.
- 4) Restart the IPS in the “auto” mode according to the procedures described in Section 4.1.2.2.2.

2. Weekly:

- a. Exercise all manual isolation valves.
- b. Inspect stuffing box for excessive leakage every 150 hours.

3. Monthly:

- a. Lubricate 30-inch swing check valve at the influent pump discharge with a waterproof, edible grease as follows:

Master Lubricants Co. Lubriko #CW-606

Using a cartridge grease gun, inject 8 full strokes of grease.

- b. Check and clean areas between the influent pump drive motor cooling fins and the area through which air is drawn into the fan guard.

4. Annually:

- a. Change motor bearing housing oil with one of the oils indicated above.
- b. Check pump for any alignment changes.
- c. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil Alvania #2

5.1.3 Grit Handling Equipment

Grit Chamber Blowers

1. Daily:
 - a. Check oil level in blower and replenish as necessary with one of the following:

Sutorbilt	AEON PD Oil
Alternative	SAE 20 Grade Oil with rust and oxidation inhibitors, anti-foam additives and an oil viscosity of 100 Centistokes @ 40°C
2. Weekly:
 - a. Check air filter restriction gauge and inspect air filter. If gauge reads more than 18 inches, replace filter element.
 - b. Exercise all manual isolation valves.
 - c. Check belt tension of blower for tightness. Drive belts must be kept tight enough to prevent slipping. Adjust as necessary.
3. Monthly:
 - a. Grease drive end bearings on the blower once a month or every 500 hours of operation with one of the following:

Shell Oil	Alvania EP #2
Mobil Oil	Mobilux EP #2
Alternative	NLGI Grade 2EP
 - b. Check and clean the areas between the blower drive motor cooling fins and the area through which air is drawn into the fan guard.
 - c. Check mechanical seals of the blowers for leakage once per month or after 150 hours of operation, whichever comes first.
4. Annually:
 - a. Change oil every year or after 1500 hours, whichever comes first, with one of the oils indicated above.
 - b. Re-grease blower motor bearings with one of the following:

Chevron	SRI NLGI #2
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Shell

Dolium R

Motors can be re-greased by stopping the motor, removing drain plug and pumping new grease into fill hole. **Use a low pressure grease gun and avoid over-greasing.** Run motor with drain plug removed until excess grease has been discharged (minimum 10 minutes). Stop motor and replace drain plug.

- c. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil

Alvania #2

Grit Pumps

1. Daily:

- a. Check oil levels in the oil lubricated bearings and replenish as necessary with one of the following:

Mobil

D.T.E. 25

Alternative

Grade SAE 20 or equal

Keep bearing oil reservoir filled to the oil level line on the sight glass. Oil lubricated bearings are shipped without oil. Before initially starting pump, fill oil reservoir to sight glass level mark. Operate pump for 2 minutes, then drain oil and refill to proper oil level with fresh oil.

2. Weekly:

- a. Exercise all manual isolation valves.
- b. Check V-belts of the grit pumps for tightness. Drive belts must be kept tight enough to prevent slipping. Adjust as necessary.

3. Monthly:

- a. Check mechanical seals of the grit pumps for leakage once per month or after 150 hours of operation, whichever occurs first.
- b. Check and clean the areas between the grit pump drive motor cooling fins and the area through which air is drawn into the fan guard.

- c. Check for water condensation in oil in the grit pump lubrication reservoir. If water is present, drain completely, flush out and fill to correct level with one of the oils indicated above.
- 4. Every 6 Months:
 - a. Check sheave belt tension. Re-tension and align as needed.
 - b. Inspect sheaves for proper operation. Keep all sheave grooves smooth and uniform.
 - c. Grease motor bearing with one of the following:

Shell	Dolium R
Texaco	Premium RB #2
Chevron	SRI NGLI #2
Exxon	Unirex #2
- 5. Annually:
 - a. Change bearing housing oil with one of the oils indicated above.
 - b. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil	Alvania #2
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Grit Classifiers/Separators

- 1. Every 500 to 1,000 Hours:
 - a. Check reducer oil levels and replenish as necessary with one of the following:

Mobile	SAE 20-30-40
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- 2. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check V-belts for tightness. Drive belts must be kept tight enough to prevent slipping. Adjust as necessary.

3. Every 6 Months:
 - a. Check sheave belt tension. Re-tension and align as needed.
 - b. Inspect sheaves for proper operation. Check alignment and belt for wear. Keep all sheave grooves smooth and uniform.
4. Annually:
 - a. Change lower bearing oil with one of the following:
Mobile SAE 10-40

The first oil change should be made after 500 hours of operation. Subsequent oil changes are made after 2,500 hours of long continuous operation (12 to 24 hours per day) and after one year of short intermittent operation.

Before restarting an SM-Cyclo Drive reduction unit that has been out of operation for a long period, be sure to change the oil with the oils indicated above.

- b. Check and replace as necessary lower bearing torics rings in seal.
- c. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil Alvania #2

5.1.4 Odor Reduction Station

Odor Reduction Station Exhaust Fans

1. Monthly:
 - a. Check fan for excessive vibration or noise. Do not operate fan if excessive noise or vibration is present. Shut down immediately.
 - b. Inspect fan two weeks after start-up and then check periodically once a month until experience indicates that a longer or shorter period of maintenance is necessary.
 - c. Check V-belts for proper tension, alignment, or excessive wear. Check sheave's grooves for excessive wear, rough spots, and foreign matter. Belt should not squeal or slip when the fan is started.

- d. Check tightness of all fasteners, including screw on bearing locking collar, and taper lock bushing on shaft.
- e. Check fan bearings for adequate lubrication, wear, tightness, and overheating. If bearings are in need of lubrication, re-grease with one of the following lithium based greases, No. 2 NLGI:

BP Oil	EP-2
ARCO	MIP #2
Gulf	Crown #2
Mobil	Multilith #2
Texaco	MP #2
Chevron	SRI #2
Shell	Alvania #2

- f. Check condensate in housing to be sure it is not clogged.
- g. Inspect housing for foreign material build-up and visual sign of damage.
- h. Check impeller and blades for the following:
 - Build-up of foreign matter
 - Signs of visual damage or abrasion
 - Hairline or star shaped cracks
 - Delamination
- i. Check fan inlet ductwork for foreign matter.
- j. Check gaskets and shaft seals for damage, cracks, and compressibility. Replace as necessary.
- k. Check and clean the areas between the fan motor cooling fins and the area through which air is drawn into the fan guard.

2. Every 6 Months:

- a. Re-grease motor bearings with one of the following:

Chevron	SRI #2
Exxon	Unirex N2
Shell	Dolium R
Texaco	Premium RB

- b. Exercise dampers by rotating to open and close positions while the fan system is running.

RETURN DAMPER TO THE BALANCED POSITION.

- 3. Annually:
 - a. Inspect the gearing of the damper actuators which have a chainwheel operator. Re-grease gearings with one of the following:

Amaco	Amdex No. 1 EP
Exxon	Nebula EP-1

Odor Reduction Station Scrubber

- 1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
- 2. Every 3 Months:
 - a. Visually observe the scrubber and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the shell of each scrubber, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - c. Visually check the overflow line for any restrictions.
- 3. Every 6 Months:
 - a. Determine the increase in pressure drop across the packing section of the scrubber and the mist eliminator since the last cleaning.
 - b. Visually inspect both the packing section and the mist eliminator for signs of fouling or plugging. If cleaning is necessary follow cleaning procedures per the Manufacturer's O&M Manual.
 - c. Clean outside with soap and water to help maintain the original appearance of the scrubber.

4. Every 3 Years:
 - a. Visually inspect the inside of the scrubber. **The inspection program should follow U. S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the scrubber should be observed.**

Odor Reduction Station pH and ORP Controllers

1. Weekly:
 - a. Calibrate the pH and ORP meter according to the Manufacturer's O&M Manuals. Initially perform this task weekly, if meter does not drift significantly a less frequent time interval may be appropriate.
 - b. Clean the pH and ORP sensor using a soap solution according to the Manufacturer's O&M Manual. When scaling occurs and soap solution does not adequately clean the pH or ORP sensor, clean sensor with a dilute acid procedure outlined in the Manufacturer's O&M Manual.

Odor Reduction Station Recirculation Pumps

1. Daily:
 - a. Check oil level in the oil lubricated bearings using installed sight glass and replenish as necessary with one of the following:

Shell	Alvania #2
Gulf	Crown #2
Standard Oil	Amilith #2
2. Weekly:
 - a. Exercise all manual isolation valves.
3. Monthly:
 - a. Check and clean the areas between the recirculation pump drive motor cooling fins and the area through which air is drawn into the fan guard.
 - b. Check mechanical seals of the recirculation pumps for leakage once per month or after 150 hours of operation, whichever comes first.

4. Every 3 Months:
 - a. Inspect the electric motor. Drain accumulated moisture by removing plug in the bottom center of the motor housing.
5. Every 6 Months:
 - a. Grease motor bearings with one of the bearing greases listed below:

Chevron	SR1 NLGI #2
Exxon	Unirex N2
Shell	Dolium R
Texaco	Premium RB

Motors can be re-greased by stopping the motor, removing drain plug, and using a hand operated grease gun until a small amount of new grease is forced out of the drain. Replace inlet plugs and run the motor for 1/2 hour before replacing drain plug.

6. Annually:
 - a. Check motor to pump alignment annually and after any pump/seal maintenance according to procedures in Manufacturer's O&M Manual.
 - b. Replace bearing frame oil with one of the oils indicated above. See Manufacturer's O&M Manual for complete instructions. Approximate oil capacity is 2.5 pints. Do not fill oil through breather connection as overfilling is possible, resulting in oil leakage and excessive temperatures.

Odor Reduction Station NaOH Metering Pump

1. Weekly
 - a. Check pumping action of the NaOH metering pump by observing the discharge pressure, about 40 psi, along with grasping the discharge line and feeling the pulsations caused by the pump.
 - b. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check oil levels in the gear box for low level and possible contamination. Replenish as necessary with one of the following (do not mix brands):

Pulsafeeder
Exxon

PULSAlube #1
Nuto Series (API Gravity 28-30;
Viscosity Index 95-160; SSU @ 100
deg F is 450-700; SSU @ 210 deg F is
73-78)

Shell

Tellus Series (API Gravity 28-30;
Viscosity Index 95-160; SSU @ 100 F
is 450-700; SSU @ 210 F is 73-78)

Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The Pulsalube lubricant takes on a yellowish color. Change the oil per the manufacturer's procedures immediately, if this occurs and examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.

- b. Check the inlet and outlet valves for corrosion.
- c. Check the oil seals for leakage.

3. Every 6 Months:

- a. Regrease the motor bearing with one of the following:

Chevron
Shell

SRI NGLI #2
Dolium R

4. Annually:

- a. Drain oil per manufacturer's procedures (first oil change shall be after 6 months) and check oil for possible contamination. Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The Pulsalube lubricant takes on a yellowish color. Examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.
- b. Change the oil in the gear box with one of the oils listed above.

Odor Reduction Sodium Hypochlorite Metering Pump

1. Weekly
 - a. Check pumping action of the NaOCl metering pump by observing discharge pressure, about 40 psi, along with grasping the discharge line and feeling the pulsations of the pump.
 - b. Exercise all manual isolation valves.

2. Every 3 Months:

- a. Check oil levels in the gear box for low level and possible contamination. Replenish as necessary with one of the following (Do not mix brands):

PulsaFeeder

PULSAlube #1

Exxon

Nuto Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 deg F is 450-700; SSU @ 210 deg F is 73-78)

Shell

Tellus Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 F is 450-700; SSU @ 210 F is 73-78)

Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The Pulsalube lubricant takes on a yellowish color. Change the oil, per the manufacturer's procedures, immediately, if this occurs and examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.

- b. Check the inlet and outlet valves for corrosion.
 - c. Check the oil seals for leakage.

3. Every 6 Months:

- a. Regrease the motor bearing with one of the following:

Chevron
Shell

SR1 NGLI #2
Dolium R

4. Annually:
 - a. Drain oil per manufacturer's procedures (First oil change shall be after 6 months) and check oil for possible contamination. Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The Pulsalube lubricant takes on a yellowish color. Examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.
 - b. Change the oil in the gear box one of the oils listed above.

Odor Reduction Sodium Hydroxide (NaOH) Storage Tank

1. Weekly
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
2. Every 3 Months
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof off each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - c. Visually check the air vent pipe and the tank overflow line for any restrictions.
3. Every 6 Months
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
4. Every 3 Years
 - a. Visually inspect the inside of the tanks. **The inspection program should follow U. S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should be observed.**

Odor Reduction Station NaOCl Storage Tank

1. Weekly
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
2. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof of each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - c. Visually check the air vent pipe and the tank overflow line for any restrictions.
3. Every 6 Months
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
4. Every 3 Years
 - a. Visually inspect the inside of the tanks. **The inspection program should follow U. S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should observed.**

NaOH and NaOCl Containment Sump Pumps

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally specified. The float switches may have to be moved back to their original position.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.

- c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.
 - d. Check the moisture sensor light and thermal sensor light. If either is on, contact the local representative.
3. Every 2 Years:
- a. Change dielectric oil surrounding motor with one of the following:

Mobil	D.T.E. Oil Light
BP	Enerpar SE 40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

Odor Reduction Station Water Softener System

1. Weekly
 - a. Check salt level:
 - Remove brine tank lid.
 - Add salt when the salt level is below the water line.
 - Pour in salt to the top of tank.
 - Close lid.
 - b. Inspect the connection of both vessels for leaks.
2. Monthly
 - a. Check the duplex water softener for proper operation.
 - b. Calibrate the calcium ion selective meter according to procedures in the Manufacturer's O&M Manual.
3. Annually
 - a. Clean brine tank.
 - Disconnect brine line
 - Remove salt.
 - Drain water.
 - Rinse with hose.
 - Clean with brush and mild soap.
 - Rinse with hose
 - Reconnect brine line.
 - Fill 1/2 way with water.
 - Fill with salt.
 - Return to service.

Storage Bin/Grit Dewatering Areas Air Supply and Exhaust Fans (EF1, EF2, SF1)

1. Weekly
 - a. Check General operation including noise and vibration. Excessive fan vibration can be caused by many things. ALL POSSIBLE SOURCES OF THE EXCESSIVE VIBRATION MUST BE CHECKED OUT AND CORRECTIVE ACTION TAKEN IMMEDIATELY TO CORRECT THE PROBLEM. See the fan manufacturer trouble-shooting chart for possible causes of excessive fan vibration.
 - b. Inspect the fan impeller for any buildup of foreign material or wear from abrasion. Carefully clean the impeller of any foreign material.
 - c. Check V-belt for proper alignment, tension, and excessive wear. NEVER SERVICE OR ADJUST ROTATING EQUIPMENT WHILE IT IS IN OPERATION. LOCK OUT THE POWER SOURCE BEFORE PERFORMING MAINTENANCE.

V-belts on belt drive fans are oil, heat, and static resistant type and oversized for continuous duty. With proper installation and maintenance years of operating efficiency can be added to the life span of the V-belt drive.

V-belt drives should be completely guarded.

A noisy V-belt indicates the need for attention. However, it is normal for belts to squeal slightly at startup. V-belt noise can be caused by the slapping of the belts against the drive guard or other obstruction. Check for an improperly installed guard, loose belts, buildup of foreign material on the sheave grooves, or excessive vibration. The cause of excessive vibration should be determined and corrected.

Check belt tension. Ideal tension is the tension at which the belt will not slip under peak load conditions. Over-tensioning shortens belt and bearing life. Keep belts free from foreign material which may cause slipping. The use of belt dressing is not recommended. See manufacturers for recommended tensioning.

Inspect sheaves. Keep all sheaves grooves smooth and uniform. Burrs and rough spots along the sheave rim can damage belts. Dust, oil, and other foreign matter can lead to pitting and rust, and should be avoided as much as possible. Badly worn grooves or a shiny groove bottom indicates that either the sheave, the belt, or both are badly worn. Replace either or both belts and worn sheaves.

Check sheave alignment. Sheaves that are not aligned properly cause excessive belt wear and sheave wear.

2. Every 2 Months:

All belt drive fan bearings are heavy duty, self-aligning ball or roller type, and are re-lubricable for continuous service.

- a. Grease motor and fan bearings with a hand held grease gun. **Avoid the use of a pressure greasing system which tends to fill the bearing chamber completely.** Do not over grease. Use only 1 or 2 shots with a hand gun in most cases. Maximum hand gun rating 40 P.S.I. Rotate bearings during lubrication where good safety practice permits. Use one of the following greases:

Texaco	Premium PR#2 or Regal AFB#2
Union 76	Unoba EP#2 (275 deg F)
Mobil Oil	Mobilux EP#2
Shell Oil	Shell Alvania EP#2

Screening and Wetwell Areas Exhaust Fan (EF3)

1. Weekly

- a. Check General operation including noise and vibration. Excessive fan vibration can be caused by many things. **ALL POSSIBLE SOURCES OF THE EXCESSIVE VIBRATION MUST BE CHECKED OUT AND CORRECTIVE ACTION TAKEN IMMEDIATELY TO CORRECT THE PROBLEM.** See the fan manufacturer trouble-shooting chart for possible causes of excessive fan vibration.
- b. Inspect the fan impeller for any buildup of foreign material or wear from abrasion. Carefully clean the impeller of any foreign material.
- c. Check V-belt for proper alignment, tension, and excessive wear. **NEVER SERVICE OR ADJUST ROTATING EQUIPMENT WHILE IT IS IN OPERATION. LOCK OUT THE POWER SOURCE BEFORE PERFORMING MAINTENANCE.**

V-belts on belt drive fans are oil, heat, and static resistant type and oversized for continuous duty. With proper installation and maintenance years of operating efficiency can be added to the life span of the V-belt drive.

V-belt drives should be completely guarded.

A noisy V-belt indicates the need for attention. However, it is normal for belts to squeal slightly at startup. V-belt noise can be caused by the slapping of the belts against the drive guard or other obstruction. Check for an improperly installed guard, loose belts, buildup of foreign material on the sheave grooves, or excessive vibration. The cause of excessive vibration should be determined and corrected.

Check belt tension. Ideal tension is the tension at which the belt will not slip under peak load conditions. Over-tensioning shortens belt and bearing life. Keep belts free from foreign material which may cause slipping. The use of belt dressing is not recommended. See manufacturers for recommended tensioning.

Inspect sheaves. Keep all sheaves grooves smooth and uniform. Burrs and rough spots along the sheave rim can damage belts. Dust, oil, and other foreign matter can lead to pitting and rust, and should be avoided as much as possible. Badly worn grooves or a shiny groove bottom indicates that either the sheave, the belt, or both are badly worn. Replace either or both belts and worn sheaves.

Check sheave alignment. Sheaves that are not aligned properly cause excessive belt wear and sheave wear.

2. Every 2 Months:

All belt drive fan bearings are heavy duty, self-aligning ball or roller type, and are relubricable for continuous service.

The most frequent cause of bearing failure is not greasing often enough, using an excessive quantity of grease, or using incompatible greases. Excessive vibration, especially if the bearing is not rotating, will also cause bearings to fail. Bearings must also be protected from water and moisture to avoid internal corrosion.

- a. Grease motor and fan bearings with a hand held grease gun. **Avoid the use of a pressure greasing system which tends to fill the bearing chamber completely.** Do not over grease. Use only 1 or 2 shots with a hand gun in most cases. Maximum hand gun rating 40

P.S.I. Rotate bearings during lubrication where good safety practice permits. Use one of the following greases:

Texaco	Premium PR#2 or Regal AFB#2
Union 76	Unoba EP#2 (275 deg F)
Mobil Oil	Mobilux EP#2
Shell Oil	Shell Alvania EP#2

5.2 PRIMARY SEDIMENTATION FACILITIES

Refer to the general preventative maintenance requirements presented in Section 5.0. This section should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately.

5.2.1 Primary Sedimentation Tanks

Effluent Weirs and Launderers

1. Weekly:
 - a. Check for algae growth and debris on the launderers and hose down as needed to keep algae growth to a minimum.

5.2.2 Channel Aeration Facilities

Channel Air Blowers

1. Daily:
 - a. Check oil level in blower and replenish as necessary with one of the following:

Sutorbilt	AEON PD Oil
Alternative	SAE 20 Grade Oil with rust and oxidation inhibitors, anti-foam additives and an oil viscosity of 100 Centistokes @ 40°C
2. Weekly:
 - a. Check air filter restriction gauge and inspect air filter. If gauge reads more than 18-inches, replace filter element.
 - b. Exercise all manual isolation valves.
 - c. Check belt tension of blower for tightness. Drive belts must be kept tight enough to prevent slipping. Adjust as necessary.
3. Monthly:
 - a. Grease drive end bearings on the blower once a month or every 500 hours of operation with one of the following:

Shell Oil	Alvania EP #2
Mobil Oil	Mobilux EP #2

Alternative

NLGI Grade 2EP

- b. Check and clean the areas between the blower drive motor cooling fins and the area through which air is drawn into the fan guard.
- c. Check mechanical seals of the blowers for leakage once per month or after 150 hours of operation, whichever comes first.
- d. Exercise dampers by rotating to open and close positions while the fan system is running.

RETURN DAMPER TO THE BALANCED POSITION.

4. Annually:

- a. Change oil every year or after 1500 hours, whichever comes first, with one of the oils indicated above.
- b. Re-grease blower motor bearings with one of the following:

Chevron
Shell

SRI NLGI #2
Dolium R

Motors can be re-greased by stopping the motor, removing drain plug and pumping new grease into fill hole. **Use a low pressure grease gun and avoid over greasing.** Run motor with drain plug removed until excess grease has been discharged (minimum 10 minutes). Stop motor and replace drain plug.

- c. Inspect the gearing of the damper actuators which have a chainwheel operator. Re-grease gearings with one of the following:

Amaco
Exxon

Amdex No. 1 EP
Nebula EP-1

Diffusers

1. Annually:

- a. Clean diffusers annually or when air release is non-uniform. Close valve, disconnect from pipe, and lift aeration header assembly out of channel. Rinse pipe, diffuser diaphragm, and diffuser with clean water. Use a rag to wipe extraneous material from assembly. Inspect cleaned diffusers to determine if any debris has entered the orifice holes, or if any are damaged and need replacing.

Supply Air and PST Exhaust Fans

1. Weekly
 - a. Check General operation including noise and vibration. Excessive fan vibration can be caused by many things. ALL POSSIBLE SOURCES OF THE EXCESSIVE VIBRATION MUST BE CHECKED OUT AND CORRECTIVE ACTION TAKEN IMMEDIATELY TO CORRECT THE PROBLEM. See the fan manufacturer trouble-shooting chart for possible causes of excessive fan vibration.
 - b. Inspect the fan impeller for any buildup of foreign material or wear from abrasion. Carefully clean the impeller of any foreign material. NEVER SERVICE OR ADJUST ROTATING EQUIPMENT WHILE IT IS IN OPERATION. LOCK OUT THE POWER SOURCE BEFORE PERFORMING MAINTENANCE.
2. Every 2 Months:
 - a. Grease motor bearings with a hand held grease gun. **Avoid the use of a pressure greasing system which tends to fill the bearing chamber completely.** Do not over grease. Use only 1 or 2 shots with a hand gun in most cases. Maximum hand gun rating 40 P.S.I. Rotate bearings during lubrication where good safety practice permits. Use one of the following greases:

Texaco	Premium PR#2 or Regal AFB#2
Union 76	Unoba EP#2 (275 deg F)
Mobil Oil	Mobilux EP#2
Shell Oil	Shell Alvania EP#2

5.2.3 Rapid Mix Chamber ***Slide Gates***

1. Every 3 Months:
 - a. Run gate through one complete cycle.
2. Every 6 Months:
 - a. Grease fittings and manual operators with one of the following:

Mobil	Mobilgrease Special
Chevron	RMP Heavy Duty Grease EPNLGI2
Unocal	Megaplex XD-2
Lubriplate	#630-AA

- b. Clean and grease operating stems with one of the following:

Lubricate	#630-2
Shell	Alvania EP #2
Mobil	Mobilux EP #2
Valvoline	Val-Lith EP #2
Chevron	Ultra Duty Grease EP #2

3. Annually:

- a. Remove the lift nut and inspect for wear. If excessive wear is evident the lift nut should be replaced.

Rapid Mix Pumps

1. Daily:

- a. Check oil levels in the oil lubricated bearings and oil lubricated mechanical seal and replenish as necessary with one of the following:

Shell	Turbo 46
Texaco	Regalo 1B
Gulf	Harmony 46
Exxon	Teressic 46
Chevron	CP-46

If oil for the bearings is cloudy, dirty, or discolored, the mechanical seal may have failed. Replace the mechanical seal and replace the oil with one of the oils indicated above.

2. Weekly:

- a. Exercise all manual isolation valves.

3. Monthly:

- a. Check and clean the areas between the rapid mix pump drive motor cooling fins and the area through which air is drawn into the fan guard.
- b. Check for water condensation in oil in the rapid mix pump lubrication reservoirs. If water is present, drain completely, flush out and fill to correct level with one of the oils indicated above. If water is present in the bearings oil reservoir, the mechanical seal may have failed. Replace mechanical seal when replacing the oil.

- c. Check amperage draw to the pump motor and compare to that measured at startup. Make sure that power draw does not exceed allowable amperage to the motor at full load.
 - d. Check mechanical seals of the rapid mix pumps for leakage once per month or after 150 hours of operation, whichever comes first.
 - e. Check bearing oil reservoir for visible oil level. Upper bearing must be covered with oil.
4. Every 3 Months:
- a. Inspect the electric motor. Make sure that casing drain is not plugged to ensure that motor cannot fill up with water.
5. Every 6 Months:
- a. Grease motor bearings with one of the bearing greases listed below:
- | | |
|-----------|-------------|
| Chevron | SR1 NLGI #2 |
| Exxon | Unirex N2 |
| Shell Oil | Dolium R |
| Texaco | Premium RB |

Motors can be re-greased by stopping the motor, removing drain plug, and using a hand operated grease gun, pumping 1 cubic inch of new grease into fill hole. Run the motor for two hours. Stop motor and plug drain.

6. Annually:
- a. Isolate the pump and remove the suction manifold to check for any suction-side blockage and to inspect the impeller clearance from the cutter bar.
 - b. Check for smooth shaft rotation by rotating the pump shaft by hand. Be especially alert to rough spots on the bearings. Make sure there is no axial play in the shaft.
 - c. Inspect the pump bowl for wear and replace as necessary.
 - d. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

PST Gallery Sump Pump

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally specified. The float switches may have to be moved back to their original position.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.
 - d. Check the moisture sensor light and thermal sensor light. If either is on, contact the local representative
3. Every 2 Years:
 - a. Change dielectric oil surrounding motor with one of the following:

Mobil	D.T.E. Oil Light
BP	Enerpar SE 40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

5.2.4 Sludge Collection and Pumping Facilities

Sludge Collectors

WARNING: ALWAYS LOCK OUT THE POWER SUPPLY TO THE COLLECTOR TANK DRIVE MOTOR BEFORE PERFORMING ANY MAINTENANCE.

1. Monthly:
 - a. Shear pins in the shear pin hubs should be removed and inspected as should be the shear pin bushings for damage or excessive wear. Replace any damaged material. While the shear pin is removed, be sure to inspect the hub to see that it rotates freely and independently from the drive sprocket. This rotation should cause the release of the trip cam which activates the limit switch. BE SURE that the shear pin mechanism operates properly.
2. Every 6 Months:
 - a. Inspect the collector chain sprockets. If excessive wear is discovered, the rim segments can be reversed to lengthen the sprocket life. Refer to sprockets under IV-2 Replacement Maintenance in the Operation and Maintenance Manual for the Sludge Collection Equipment prepared by NRG Company, Inc.
 - b. Inspect the carrying and return wear shoes. If they are worn, replace them as is described in section II of the Operation and Maintenance Manual for the Sludge Collection Equipment prepared by NRG Company, Inc.
 - c. Check the sprocket alignment according to section II-7 of the Operation and Maintenance Manual for the Sludge Collection Equipment prepared by NRG Company, Inc. and realign them if necessary.
 - d. Change the oil in the speed reducer (approximately every 2500 hours of operation) with 1.4 gallons of one of the following oils:

Mobil Oil	Mobilgear 629-220
Chevron Oil	NL Gear Guard Compound 220
Exxon	Spartan EP220
Shell Oil	Omala 71-220
Texaco Oil	Meropa 220

When changing oil, remember that different brands and types of oil may not be compatible. Therefore, when changing to a different oil, it is recommended that the housing

be completely drained and thoroughly flushed with a light flushing oil prior to refilling. If a speed reducer is to stand idle for a long period of time it is recommended that the unit be completely filled with oil to protect the interior parts from corrosion. ALWAYS BE SURE THAT THE SPEED REDUCER CONTAINS THE PROPER AMOUNT OF OIL BEFORE IT IS OPERATED. REMEMBER THAT OIL MAY SETTLE INTO THE REDUCER SLOWLY CREATING A FALSE READING. TO AVOID FALSE READINGS, CHECK OIL LEVEL AFTER IT HAS BEEN GIVEN 1/2 HOUR TO SETTLE INTO REDUCER. CHECK LEVEL AGAIN.

If the speed reducer is overfilled, overheating will occur. If the reducer is under filled, the resultant friction can cause overheating.

3. Annually:

- a. Drain the collector tank and immediately add grease to all collector shaft bearings to prevent rusting.
- b. Grease the motor bearings. Bearing should be re-greased annually or every 5000 hours with one of the following:

Chevron	Chevron SRI NLGI #2
Shell Oil	Dolium R

- c. Clean the UHMW floor rails and measure their height to ensure that they extend 1/4" minimum above the concrete for their entire length. If not, they will need to be removed and replaced to provide proper clearance.
- d. Check all hardware to ensure that it is properly tightened.
- e. Check the idler sprockets to make sure they turn freely on the shaft. If not, remove the sprocket and check both bearing surfaces for smoothness. Clean both surfaces and return the sprocket to the shaft. Make sure there is 1/16" of clearance between the free idler sprockets and the set collars.

4. Upon Dewatering of Tanks:

- a. When tank is empty, grease the wall bearings with one of the greases indicated above. During normal operation the bearings are lubricated with the wastewater.

- b. All of the equipment should be washed down and any debris should be removed. To avoid damage which may result from high water pressure, do not direct the flow of water at the bearing seals of the motor or reducer when cleaning them.
- c. Check all of the sprocket and set collar set screws to ensure that they are tight.
- d. Check the sprocket rim segment attaching bolts to ensure that they are tight.

Primary Sludge Pumps

1. Daily:

- a. Check oil levels in the plunger. If low, replenish as necessary with one of the following AGMA 5 EP:

Gulf Oil	Lubricant HD-220
Mobil Oil	Mobilgear 630
Shell Oil	Omala 220
Texaco	Meropa 220
Exxon	Spartan EP-220

If filled with water or sludge, drain and refill with clean oil. Be careful that no water gets inside plunger. If so, it will float the oil and the wrist pin will get no lubrication even though the plunger appears to contain oil.

- b. Until rate of oil use is established, check level in eccentric oiler hourly. When rate is known (typically 4-5 drops/min), check at suitable intervals but at least once per shift.
- c. Check for excessive leakage at the packing gland. Adjust as necessary. Whenever adjustment is done, the connecting rod alignment must also be checked.
- d. Check shear pin for bends. It should not have any bends in it, inside or outside the driving flange or eccentric. The shear pin should protrude about 1/2-inch.
- e. Check air chamber for liquid. Drain if required.
- f. Check gear reducer for proper operating temperature and unusual noise.

2. Weekly:

- a. Exercise all manual isolation valves.
- b. Grease bearings on main drive shaft with one squirt of grease while the pump is in operation. Do not over grease. Use one of the following:

Gulf Oil Co.	Gulflex Moly Grease
Exxon	Beacon Q-2 Lithium Base Moly Grease
Sun Oil Co.	Sunfleet XL Grease
Texaco	Molytex Grease

- d. Check keys in driving flange. They should not be loose, allowing backlash.
- e. Babbitt lined bearings should be flushed with about 2 ounces of kerosene weekly or a minimum of 75 hours run time, after which the oiler should be reinstalled and filled the proper level with one of the AGMA 5 EP oils indicated above.
- f. Check condition of eccentric liner for unusual wear due to lack of lubrication.
- g. Check main shaft for rust. Remove if present and recoat shaft with a film of grease.
- h. Check oil level in reducer and replenish as necessary with one of the following AGMA 3 EP oils:

Gulf Oil Co.	Harmony 100
Mobil Oil	DTE Heavy
Shell Oil	Tellus 100

The oil levels must be to the upper red line on the oil level gauge while the unit is not operated, and above the lower red line during operation.

3. Monthly:

- a. Check and clean areas around the valve actuator compartment covers.
- b. Lubricate valve stems for automatic primary sludge valves. Turn handwheel to work in grease.

- c. Replace oil inside plunger with one of the AGMA 5 EP oils indicated above.
 - d. Check and clean the areas between the pump drive motor cooling fins and the area through which air is drawn into the fan guard.
 - e. Check for water condensation in oil in the pump lubrication reservoir. If water is present, drain completely, flush out and fill to correct level with one of the oils indicated above.
 - f. Check valve balls and seats for wear. Replace valve balls when worn to 4-3/4" diameter.
 - g. Check condition of coupling between motor and reducer.
 - h. Check plunger for side wall wear per manufacturer's O&M Manual.
 - i. Check wrist pin condition. It should not be excessively loose.
 - j. Check set screws on drive flanges for tightness at ambient temperatures.
 - k. Inspect motor and reducer seals for leakage. If necessary, change oil in the reducer with one of the AGMA 3 EP oils indicated above.
 - l. Check motor bearings to see possible need for lubrication. If required, lubricate bearings with one of the following:

Shell Oil	Dolium R
Chevron	SRI NLGI #2
 - m. Check lubricant in coupling between reducer and pump shaft. Add if required with:

Falk Coupling	Falk LTG Grease
Gulf Oil	Gulflex Moly Grease
Exxon	Beacon Q-2 Lithium Base Moly Grease
Sun Oil	Sunfleet XL Grease
Texaco	Molytex Grease
4. Every 3 Months:
- a. Change reducer oil every 3 months or 3000 hours of operation, whichever comes first, with one of the AGMA 3 EP oils indicated

above. The first oil change is to be performed after 500 hours of operation.

- b. Grease primary sludge pump motor bearings with one of the following NGLI #2 greases indicated above. Shut down motor and remove grease plug and drain plug. Add grease and close grease plug. After re-greasing, operate motor for 20 minutes before replacing the drain plug.

5. Every 6 Months:

- a. Inspect gear case lubrication for the automatic primary sludge valves every 6 months or 500 cycles, whichever comes first. The “worm” should be totally immersed in grease. Do **not** grease drive bearings unless they are leaking. Excess grease will damage seals. If grease is lacking or contaminated with dirt, water, or foreign matter, units should be flushed with a commercial degreaser/cleaner such as Exxon Varsol #18 which does not affect seal materials. Repack unit allowing for grease thermal expansion with one of the following:

Exxon
Alternative

Nebula EP-0 (calcium based)
NLGI Grade 0 or 1, EP additive, water
and heat resistant, non-separating,
does not create more than 8% swell in
Buna N or Viton, not corrosive to
steel, Dropping point >316°F

- b. Grease the geared limit switch for the automatic primary sludge valves with Exxon Beacon 325. In accordance with manufacturer’s recommendation, there is **NO SUBSTITUTE** for the grease for the geared limit switch.

6. Annually:

- a. Lubricate the coupling between the reducer and pump shaft with one of the greases indicated above.
- b. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil

Alvania #2

Primary Sludge Grinder

1. Daily:

- a. Check oil levels in the reducer and replenish as necessary with one of the following:

Texaco	Meropa 220
Mobil Oil	Mobilgear 630
Shell Oil	Omala Oel 220
ESSO	Spartan EP 220
Castrol	Alpha SP 220

Proper oil level must be maintained in the reducer. The reducer has a filler/breather plug, level plug, and drain plug. The filler/breather plug must be located at the top of the reducer. Remove it using a wrench to replace oil. The breather is designed to release pressure caused by operating heat. Do not restrict the operation of the vent with paint or other obstruction. This could cause damage to the oil seals and the unit.

The level plug is located on the side of the reducer. To check the oil level, remove this plug. The correct level of lubricant is to the bottom of this hole.

2. Weekly:

- a. Exercise all manual isolation valves.
- b. Grease the grinder gears with one of the following:

Petrolon	Slick 50 Grease QMI
Royal Lub.	Royco 22
Sentinel	Sentinel Lubricant

Grease the gears by pumping through grease fitting. Used grease must be removed (with POWER OFF) from the space under the gear.

3. Monthly:

- a. Check the grinder seals for leakage once per month or after 150 hours of operation, whichever occurs first.
- b. Check and clean the areas between the grinder drive motor cooling fins and the area through which air is drawn into the fan guard.

4. Every 6 Months:
 - a. Change reducer oil with one of the oils indicated above.
 - b. Grease the motor bearings with one of the following:

Shell Oil	Dolium R
Chevron	SRI NLGI #2
 - c. Grease the bearings on either side of the grinder. There is one grease fitting located on the bearing housing of each bearing. Pump 3 shots of grease into the lubrication fitting with Petrolon Slick 50 or an equal grease as indicated above for the grinder gears.
 - d. Visually inspect cutter for wear. Replace as necessary.
5. Annually:
 - a. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil	Alvania #2
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5.2.5 Primary Skimmings Processing Facilities

Surface Skimmers

1. Weekly:
 - a. Check for an accumulation of solids. If there is a buildup of algae, solids, or other material, increase the frequency of cleaning and sluicing of the skimmer pipe. Use a high pressure spray and wash the pipe off once per week.
 - b. Check for excessive scum or septic conditions.
2. Monthly:
 - a. Check and clean the areas around the actuator compartment cover.
3. Every 6 Months:
 - a. Inspect gear case lubrication every 6 months or 500 cycles, whichever comes first. The “worm” should be totally immersed in grease. Do **not** grease drive bearings unless they are leaking. Excess grease will damage seals. If grease is lacking or contaminated with dirt, water, or foreign matter, units should be flushed with a commercial

degreaser/cleaner such as Exxon Varsol #18 which does not affect seal materials. Repack unit allowing for grease thermal expansion with one of the following:

Exxon	Nebula EP-0 (calcium based)
Alternative	NLGI Grade 0 or 1, EP additive, water and heat resistant, non-separating, does not create more than 8% swell in Buna N or Viton, not corrosive to steel, dropping point > 316°F

- b. Grease the geared limit switch with Exxon Beacon 325. In accordance with manufacturer's recommendation, there is **NO SUBSTITUTE** for the grease for the geared limit switch.
- c. Inspect actuator for skimmings water sprayers. Re-grease with the following or equal:

Shell	Aeroshell Grease #17
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Primary Skimmings Pump

1. Daily:

- a. Check oil levels in the oil lubricated bearings and replenish as necessary with one of the following:

Mobil	D.T.E. 25
Alternative	Grade SAE 20 or equal

Keep bearing oil reservoir filled to the oil level line on the sight glass. Oil lubricated bearings are shipped without oil. Before initially starting pump, fill oil reservoir to sight glass level mark. Operate pump for 2 minutes, then drain oil and refill to proper oil level with fresh oil.

2. Weekly:

- a. Exercise all manual isolation valves.
- b. Check V-belts of the primary skimmings pumps for tightness. Drive belts must be kept tight enough to prevent slipping. Adjust as necessary.

3. Monthly:
 - a. Check and clean areas around the valve actuator compartment cover.
 - b. Lubricate valve stems for the automatic primary skimmings valves. Turn handwheel to work in grease.
 - c. Check mechanical seals of the primary skimmings pumps for leakage once per month or after 150 hours of operation, whichever occurs first.
 - d. Check and clean the areas between the primary skimmings pump drive motor cooling fins and the area through which air is drawn into the fan guard.
 - e. Check for water condensation in oil in the primary skimmings pump lubrication reservoir. If water is present, drain completely, flush out and fill to correct level with one of the oils indicated above.

4. Every 6 Months:
 - a. Check sheave belt tension. Re-tension and align as needed.
 - b. Inspect sheaves for proper operation. Keep all sheave grooves smooth and uniform.
 - c. Grease motor bearing with one of the following:

Shell	Dolium R
Texaco	Premium RB #2
Chevron	SRI NGLI #2
Exxon	Unirex #2
 - d. Inspect gear case lubrication for the automatic primary skimmings valves every 6 months or 500 cycles, whichever comes first. The “worm” should be totally immersed in grease. Do **not** grease drive bearings unless they are leaking. Excess grease will damage seals. If grease is lacking or contaminated with dirt, water, or foreign matter, units should be flushed with a commercial degreaser/cleaner such as Exxon Varsol #18 which does not affect seal materials. Repack unit allowing for grease thermal expansion with one of the following:

Exxon	Nebula EP-0 (calcium based)
Alternative	NLGI Grade 0 or 1, EP additive, water and heat resistant, non-separating, does not create more than 8% swell in

Buna N or Viton, not corrosive to steel, dropping point > 316°F

- e. Grease the geared limit switch for the automatic primary skimmings valves with Exxon Beacon 325. In accordance with manufacturer's recommendation, there is **NO SUBSTITUTE** for the grease for the geared limit switch.
5. Annually:
- a. Change bearing housing oil with one of the oils indicated above.
 - b. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil

Alvania #2

Primary Skimmings Grinder

1. Daily:
- a. Check oil levels in the reducer and replenish as necessary with one of the following:

Texaco

Meropa 220

Mobil Oil

Mobilgear 630

Shell Oil

Omala Oel 220

ESSO

Spartan EP 220

Castrol

Alpha SP 220

Proper oil level must be maintained in the reducer. The reducer has a filler/breather plug, level plug, and drain plug. The filler/breather plug must be located at the top of the reducer. Remove it using a wrench to replace oil. The breather is designed to release pressure caused by operating heat. Do not restrict the operation of the vent with paint or other obstruction. This could cause damage to the oil seals and the unit.

The level plug is located on the side of the reducer. To check the oil level, remove this plug. The correct level of lubricant is to the bottom of this hole.

2. Weekly:
- a. Exercise all manual isolation valves.
 - b. Grease the grinder gears with one of the following:

Petrolon
Royal Lub.
Sentinel

Slick 50 Grease QMI
Royco 22
Sentinel Lubricant

Grease the gears by pumping through grease fitting. Used grease must be removed (with POWER OFF) from the space under the gear.

3. Monthly:

- a. Check the grinder seals for leakage once per month or after 150 hours of operation, whichever occurs first.
- b. Check and clean the areas between the grinder drive motor cooling fins and the area through which air is drawn into the fan guard.

4. Every 6 Months:

- a. Change reducer oil with one of the oils indicated above.
- b. Grease the motor bearings with one of the following:

Shell Oil
Chevron

Dolium R
SRI NLGI #2

- c. Grease the bearings on either side of the grinder. There is one grease fitting located on the bearing housing of each bearing. Pump 3 shots of grease into the lubrication fitting with Petrolon Slick 50 or an equal grease as indicated above for the grinder gears.
- d. Visually inspect cutter for wear. Replace as necessary.

5. Annually:

- a. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil

Alvania #2

Skimmings Dry Well Sump Pump

1. Weekly:

- a. Exercise all manual isolation valves.

2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally specified. The float switches may have to be moved back to their original position.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.
 - d. Check the moisture sensor light and thermal sensor light. If either is on, contact the local representative.
3. Every 2 Years:
 - a. Change dielectric oil surrounding motor with one of the following:

Mobil	D.T.E. Oil Light
BP	Enerpar SE 40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

5.2.6 Chemical Addition Facilities

Polymer Containment Sump Pump, Polymer Mixing Area Sump Pump, and Ferric Chloride Containment Sump Pump

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally specified. The float switches may have to be moved back to their original position.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.

- d. Check the moisture sensor light and thermal sensor light. If either is on, contact the local representative.
- 3. Every 2 Years:
 - a. Change dielectric oil surrounding motor with one of the following:

Mobil	D.T.E. Oil Light
BP	Enerpar SE 40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

5.2.6.1 Polymer Addition System

Polymer Storage Tank and Polymer Mixing Tanks

- 1. Daily:
 - a. Check the water flowing through the make-up water solenoid valve and make sure that water is as free of dirt and foreign matter as possible.
- 2. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
- 3. Monthly:
 - a. Cycle the make-up water solenoid valve on and off by disconnecting and reconnecting power. This will help ensure proper opening and closing.
- 4. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof of each tank, and all pipes, duct, valves, manholes for any signs of damage or improper installation.
 - c. Visually check the air vent pipe and the tank overflow line for any restrictions.

5. Every 6 Months:
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
 - b. Clean the make-up water solenoid valve. A periodic cleaning of the solenoid valve is desirable to assure proper operation. If valve operation is sluggish (even though voltage to the coil is correct), or if you detect excessive noise or leakage, the valve should be disassembled and cleaned.

While carrying out periodic cleaning, carefully inspect all internal valve parts for wear or damage. Replace parts as necessary. **Shut down mixing tank.** Always turn off water supply and electrical power and depressurize valve before disassembling it for cleaning or repairs. It is not necessary to remove the water supply pipeline to disassemble the valve.

6. Every 3 Years:
 - a. Visually inspect the inside of the tanks. **The inspection program should follow U. S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should be observed.**

Polymer Mixers

The mixer gearboxes are permanently lubricated and sealed by the manufacturer. Driveshaft bearings are permanently lubricated and sealed.

1. Every 6 Months:
 - a. Clean both the gear drive and motor exterior surfaces of any accumulation of dirt, grime, or other coatings. Surface coatings will significantly decrease heat dissipation.
 - b. Re-torque all mounting hardware. Shaft coupling hardware, and impeller hardware to the recommended torque values given in Table 2 of Chemineer's Manual 231. Checking hardware torque is **strongly** recommended if mixer has been left out of service for an extended period of time.

Polymer Transfer Pumps and Polymer Addition Pumps

The ball bearings for the D.C. motor are deep grooved, double shielded with sufficient lubricant packed onto the bearing by the manufacturer for “life lubrication”. No grease fittings are provided as the initial lubricant is adequate for up to 5 years of operation under normal conditions.

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check V-belts of the polymer pumps for tightness. Drive belts must be kept tight enough to prevent slipping. Adjust as necessary.
2. Monthly:
 - a. Check mechanical seals of the polymer pumps for leakage once per month or after 150 hours of operations, whichever occurs first.
 - b. Check and clean the areas between the polymer pump drive motor cooling fins and the area through which air is drawn into the fan guard.
 - c. Inspect pump and motor for damaged wiring or conduit.
3. Every 6 Months:
 - a. Measure the capacity of the pump. Because the pump is designed to yield a specific capacity (G.P.M.) against a specific pressure, a decrease in capacity normally indicates a reduction in compression fit between rotor and stator, i.e., element wear. If a gradual reduction is discovered and all other system parameters are unchanged, wear is the most probable cause for the deterioration in capacity. Remove and inspect the stator for wear. Measure the rotor crest-to-crest. Refer to the pump “Operation-Assembly Instructions” for information on component reuse and replacement. Get a feel for the amount of wear in a given operation time.

WARNING: NEVER LET THE PUMP RUN DRY. ALWAYS BE SURE TO HAVE A FLUID PASSING THROUGH THE ELEMENTS WHEN THEY ARE BEING ROTATED.

- b. Inspect the grease seal. If you notice that an appreciable amount of grease has escaped a grease seal, wipe it clean and visually inspect the seal. If no obvious deficiencies can be seen, continue to monitor. The escaped lubricant could merely be excess in the cavity. If it

continues for close to a week, add, through the "zerk" fitting, an amount of the proper lubricant equal to the escaped amount. Replace the seals at the earliest convenience. Use the following grease for the pump bearing:

Shell Oil	Cyprina #3 or Alvania #2
Texaco	Regal AFB2
Mobil	Mobilux EP1
Dow Corning	DC 33
Keystone Lub. Co.	Keystone #89

- c. Check brushes of the motor to make certain that they move freely in the holders and make proper contact with the commutator. Replace worn brushes.
- d. Check condition of the motor's commutator. The commutator should remain a polished surface. Blackening may indicate rough or eccentric commutator. Occasional wiping (power off) with dry canvas or non-lining cloth may suffice. If rough or excessively dirty, smooth with very fine (00) sandpaper lightly with armature rotating. Never use emery cloth. Never allow the brushes to wear so short that spring tension is lost. The resultant sparking will seriously damage the commutator.

WARNING: DEPRESSING THE "STOP" SWITCH DOES NOT REMOVE POWER FROM THE MOTOR. THEREFORE, THE A-C LINE DISCONNECT SHOULD BE TURNED "OFF" AND LOCKED OUT WHENEVER THE MOTOR IS BEING SERVICED.

- 4. Annually:
 - a. Re-lubricate pump bearings with one of the greases listed above.

The pump is equipped with ball bearings in the drive end. The bearings are lubricated at the factory and do not need additional lubrication for 8500 hours of normal operation.

When re-lubricating the bearings, the bearing-shaft assembly should be removed (See Disassembly instructions in the O&M Manual by Moyno Industrial Products) and cleaned of old grease. Add only enough grease to fill the area between the bearings 1/3 full. Add a few drops of oil to bearing seals before reassembling. It is normal for bearings to run warm to the touch for the first few hours of operation.

- b. Completely disassemble the pump as described in the “Operation-Assembly Instructions” of the manufacturer’s Operation and Maintenance Manual.
 - 1) Use a clean degreasing agent to remove all bearing grease and closely inspect bearings for roughness and “scoring” of “races”. Check lip seals. Replace all worn or damaged parts.
 - 2) Inspect shaft quill. Check for wear grooves. Replace if necessary.
 - 3) Examine all pin joint components. Replace connecting rod washers. Check pins for wear and replace if worn. Check the pin holes in connection rod, drive shaft, and rotor head for wear and replace if necessary.
 - 4) Inspect rotor and stator as described above and in “Operation-Assembly Instructions”. Follow the guidelines given for reuse and replacement.

When rebuilding the pump, follow the procedure outlined in the assembly instructions. Care should be taken to assure proper lubrication. Be sure to use the prescribed lubricants.

5.2.6.2 Ferric Chloride Addition System

Ferric Chloride Storage Tanks and Ferric Chloride Mixing Tanks

- 1. Daily:
 - a. Check the water flowing through the make-up water solenoid valve and make sure that water is as free of dirt and foreign matter as possible.
- 2. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
- 3. Monthly:
 - a. Cycle the make-up water solenoid valve on and off by disconnecting and reconnecting power. This will help ensure proper opening and closing.

4. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof of each tank, and all pipes, ducts, valves, manholes for any signs of damage or improper installation.
 - c. Visually check the air vent pipe and the tank overflow line for any restrictions.
5. Every 6 Months:
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
 - b. Clean the make-up water solenoid valve. A periodic cleaning of the solenoid valve is desirable to assure proper operation. If valve operation is sluggish (even though voltage to the coil is correct), or if you detect excessive noise or leakage, the valve should be disassembled and cleaned.

While carrying out periodic cleaning, carefully inspect all internal valve parts for wear or damage. Replace parts as necessary. **Shut down mixing tank.** Always turn off water supply and electrical power and depressurize valve before disassembling it for cleaning or repairs. It is not necessary to remove the water supply pipeline to disassemble the valve.

6. Every 3 Years:
 - a. Visually inspect the inside of the tanks. **The inspection program should follow U. S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should be observed.**

Ferric Chloride Mixers

The mixer gearboxes are permanently lubricated and sealed by the manufacturer. Driveshaft bearings are permanently lubricated and sealed.

1. Every 6 Months:
 - a. Clean both the gear drive and motor exterior surfaces of any accumulation of dirt, grime, or other coatings. Surface coatings will significantly decrease heat dissipation.
 - b. Re-torque all mounting hardware. Shaft coupling hardware, and impeller hardware to the recommended torque values given in Table 2 of Chemineer's Manual 231. Checking hardware torque is **strongly** recommended if mixer has been left out of service for an extended period of time.

Ferric Chloride Transfer Pumps and Ferric Chloride Addition Pumps

1. Weekly:
 - a. Check pumping action of ferric chloride transfer and addition metering pumps by grasping output line and determining that obvious pulsation is felt during operations.
 - b. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check oil levels in the gear box for low level and possible contamination. Replenish as necessary with one of the following (Do not mix brands):

PulsaFeeder	PULSA lube #1
Exxon	Nuto Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 deg F is 450-700; SSU @ 210 deg F is 73-78)
Shell	Tellus Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 F is 450-700; SSU @ 210 F is 73-78)

Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSA lube lubricant takes on a yellowish color. Change the oil per the manufacturer's procedures immediately, if this occurs and examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.

- b. Check the inlet and outlet valves for corrosion.
 - c. Check the oil seals for leakage.
- 3. Every 6 Months:
 - a. Re-grease the motor bearing with one of the following:

Chevron	SRI NGLI #2
Shell	Dolium R
- 4. Annually:
 - a. Drain oil per manufacturer's procedures (first oil change shall be after 6 months) and check oil for possible contamination. Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The Pulsa lube lubricant takes on a yellowish color. Examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.
 - b. Change the oil with one of the oils indicated above.

5.2.7 Odor Reduction Station

Odor Reduction Station Exhaust Fans

- 1. Monthly:
 - a. Check fan for excessive vibration or noise. Do not operate fan if excessive noise or vibration is present. Shut down immediately.
 - b. Inspect fan two weeks after start-up and then check periodically once a month until experience indicates that a longer or shorter period of maintenance is necessary.
 - c. Check V-belts for proper tension, alignment, or excessive wear. Check sheave's grooves for excessive wear, rough spots, and foreign matter. Belt should not squeal or slip when the fan is started.

- d. Check tightness of all fasteners, including screw on bearing locking collar, and taper lock bushing on shaft.
- e. Check fan bearings for adequate lubrication, wear, tightness, and overheating. If bearings are in need of lubrication, re-grease with one of the following lithium based greases, No. 2 NLGI:

BP Oil	EP-2
ARCO	MIP #2
Gulf	Crown #2
Mobil	Multilith #2
Texaco	MP #2
Chevron	SRI #2
Shell	Alvania #2

- f. Check condensate in housing to be sure it is not clogged.
- g. Inspect housing for foreign material build-up and visual sign of damage.
- h. Check impeller and blades for the following:
 - Build-up of foreign matter
 - Signs of visual damage or abrasion
 - Hairline or star shaped cracks
 - De-lamination
- i. Check fan inlet ductwork for foreign matter.
- j. Check gaskets and shaft seals for damage, cracks, and compressibility. Replace as necessary.
- k. Check and clean the areas between the fan motor cooling fins and the area through which air is drawn into the fan guard.

2. Every 6 Months:

- a. Re-grease motor bearings with one of the following:

Chevron	SRI #2
Exxon	Unirex N2
Shell	Dolium R
Texaco	Premium RB

- b. Exercise dampers by rotating to open and close positions while the fan system is running.

RETURN DAMPER TO THE BALANCED POSITION.

Odor Reduction Station Scrubber

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
2. Every 3 Months:
 - a. Visually observe the scrubber and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the shell of each scrubber, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - c. Visually check the overflow line for any restrictions.
3. Every 6 Months:
 - a. Determine the increase in pressure drop across the packing section of the scrubber and the mist eliminator since the last cleaning.
 - b. Visually inspect both the packing section and the mist eliminator for signs of fouling or plugging. If cleaning is necessary follow cleaning procedures per the Manufacturer's O&M Manual.
 - c. Clean outside with soap and water to help maintain the original appearance of the scrubber.
4. Every 3 Years:
 - a. Visually inspect the inside of the scrubber. **The inspection program should follow U. S. Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the scrubber should be observed.**

Odor Reduction Station pH and ORP Controllers

1. Weekly:
 - a. Calibrate the pH and ORP meter according to the Manufacturer's O&M Manuals. Initially perform this task weekly, if meter does not drift significantly a less frequent time interval may be appropriate.
 - b. Clean the pH and ORP sensor using a soap solution according to the Manufacturer's O&M Manual. When scaling occurs and soap solution does not adequately clean the pH or ORP sensor, clean sensor with a dilute acid procedure outlined in the Manufacturer's O&M Manual.

Odor Reduction Station Recirculation Pumps

1. Daily:
 - a. Check oil level in the oil lubricated bearings using installed sight glass and replenish as necessary with one of the following:

Shell	Alvania #2
Gulf	Crown #2
Standard Oil	Amilith #2
2. Weekly:
 - a. Exercise all manual isolation valves.
3. Monthly:
 - a. Check and clean the areas between the recirculation pump drive motor cooling fins and the area through which air is drawn into the fan guard.
 - b. Check mechanical seals of the recirculation pumps for leakage once per month or after 150 hours of operation, whichever comes first.
4. Every 3 Months:
 - a. Inspect the electric motor. Drain accumulated moisture by removing plug in the bottom center of the motor housing.
5. Every 6 Months:
 - a. Grease motor bearings with one of the bearing greases listed below:

Chevron	SR1 NLGI #2
Exxon	Unirex N2

Shell
Texaco

Dolium R
Premium RB

Motors can be re-greased by stopping the motor, removing drain plug, and using a hand operated grease gun until a small amount of new grease is forced out of the drain. Replace inlet plugs and run the motor for 1/2 hour before replacing drain plug.

6. Annually:
 - a. Check motor to pump alignment annually and after any pump/seal maintenance according to procedures in Manufacturer's O&M Manual.
 - b. Replace bearing frame oil with one of the oils indicated above. See Manufacturer's O&M Manual for complete instructions. Approximate oil capacity is 2.5 pints. Do not fill oil through breather connection as overfilling is possible, resulting in oil leakage and excessive temperatures.

Odor Reduction Station NaOH Metering Pump

1. Weekly:
 - a. Check pumping action of the NaOH metering pump by observing the discharge pressure, about 40 psi, along with grasping the discharge line and feeling the pulsations caused by the pump.
 - b. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check oil levels in the gear box for low level and possible contamination. Replenish as necessary with one of the following (Do not mix brands):

PulsaFeeder
Exxon

PULSAlube #1
Nuto Series (API Gravity 28-30;
Viscosity Index 95-160; SSU @ 100
deg F is 450-700; SSU @ 210 deg F is
73-78)

Shell

Tellus Series (API Gravity 28-30;
Viscosity Index 95-160; SSU @ 100 F
is 450-700; SSU @ 210 F is 73-78)

Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The Pulsalube lubricant takes on a yellowish color. Change the oil per the

manufacturer's procedures immediately, if this occurs and examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.

- b. Check the inlet and outlet valves for corrosion.
 - c. Check the oil seals for leakage.
3. Annually:
- a. Drain oil per manufacturer's procedures (first oil change shall be after 6 months) and check oil for possible contamination. Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSA lube lubricant takes on a yellowish color. Examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.
 - b. Change the oil in the gear box with one of the oils listed above.

Odor Reduction Sodium Hypochlorite Metering Pump

1. Weekly:
- a. Check pumping action of the NaOCl metering pump by observing discharge pressure, about 40 psi, along with grasping the discharge line and feeling the pulsations of the pump.
 - b. Exercise all manual isolation valves.
2. Every 3 Months:
- a. Check oil levels in the gear box for low level and possible contamination. Replenish as necessary with one of the following (Do not mix brands):

PulsaFeeder
Exxon

Shell

PULSA lube #1
Nuto Series (API Gravity 28-30;
Viscosity Index 95-160; SSU @ 100
deg F is 450-700; SSU @ 210 deg F is
73-78)
Tellus Series (API Gravity 28-30;
Viscosity Index 95-160; SSU @ 100 F
is 450-700; SSU @ 210 F is 73-78)

Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSA lube lubricant takes on a yellowish color. Change the oil, per the manufacturer's procedures, immediately, if this occurs and examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.

- b. Check the inlet and outlet valves for corrosion.
- c. Check the oil seals for leakage.
- 3. Every 6 Months:
 - a. Re-grease the motor bearing with one of the following:

Chevron	SRI NGLI #2
Shell	Dolium R
- 4. Annually:
 - a. Drain oil per manufacturer's procedures (First oil change shall be after 6 months) and check oil for possible contamination. Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSA lube lubricant takes on a yellowish color. Examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.
 - b. Change the oil in the gear box with one of the oils listed above.

Odor Reduction Sodium Hydroxide (NaOH) Storage Tank

- 1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
- 2. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof off each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.

- c. Visually check the air vent pipe and the tank overflow line for any restrictions.
- 3. Every 6 Months:
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
- 4. Every 3 Years:
 - a. Visually inspect the inside of the tanks. **The inspection program should follow U. S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should be observed.**

Odor Reduction Station NaOCl Storage Tank

- 1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
- 2. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof of each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - c. Visually check the air vent pipe and the tank overflow line for any restrictions.
- 3. Every 6 Months:
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
- 4. Every 3 Years:
 - a. Visually inspect the inside of the tanks. **The inspection program should follow U. S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and**

O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should be observed.

NaOH and NaOCl Containment Sump Pumps

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally specified. The float switches may have to be moved back to their original position.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.
 - d. Check the moisture sensor light and thermal sensor light. If either is on, contact the local representative.
3. Every 2 Years:
 - a. Change dielectric oil surrounding motor with one of the following:

Mobil	D.T.E. Oil Light
BP	Enerpar SE 40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

Odor Reduction Station Water Softener System

1. Weekly:
 - a. Check salt level:
 - Remove brine tank lid.
 - Add salt when the salt level is below the water line.
 - Pour in salt to the top of tank.
 - Close lid.
 - b. Inspect the connection of both vessels for leaks.

2. Monthly:
 - a. Check the duplex water softener for proper operation.
 - b. Calibrate the calcium ion selective meter according to procedures in the Manufacturer's O&M Manual.
3. Annually:
 - a. Clean brine tank.
 - Disconnect brine line
 - Remove salt.
 - Drain water.
 - Rinse with hose.
 - Clean with brush and mild soap.
 - Rinse with hose
 - Reconnect brine line.
 - Fill 1/2 way with water.
 - Fill with salt.
 - Return to service.



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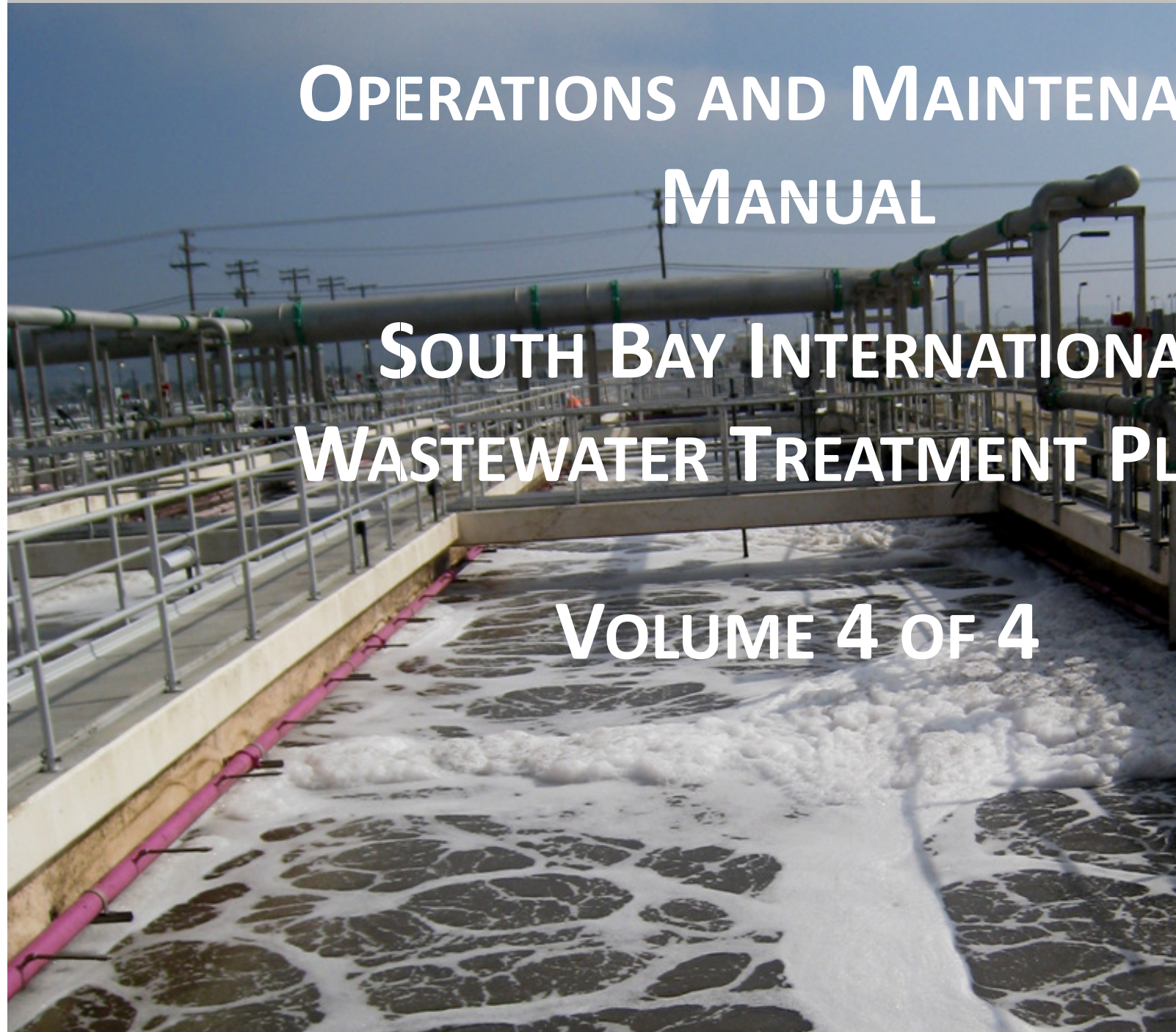
SOUTH BAY
INTERNATIONAL
WATER TREATMENT
PLANT

OLUME 4 OF 4

OPERATIONS AND MAINTENANCE MANUAL

SOUTH BAY INTERNATIONAL WASTEWATER TREATMENT PLANT

VOLUME 4 OF 4



**INTERNATIONAL BOUNDARY
AND
WATER COMMISSION**

**OPERATION AND MAINTENANCE
MANUAL**

**FOR THE
SOUTH BAY**

INTERNATIONAL WASTEWATER TREATMENT PLANT

Volume 4 of 4

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April 2011

5.3 ACTIVATED SLUDGE FACILITIES

Refer to the general preventative maintenance requirements presented in Section 5.0. This section should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately.

5.3.1 Activated Sludge Tanks

RAS Magnetic Flowmeters

The Optiflux 4000/IFC100 flowmeter transmitters used for the measurement of RAS flow, as manufactured by Krohne, may only be installed, mounted, commissioned, and maintained by trained personnel. For any problems, refer to Section 6.3.1 for manufacturer's contact information.

5.3.2 Selector Zone Mixing System

Submersible Mixers

1. Intermediate service shall be every 8,000 operating hours, or every 2 years (whichever occurs first):
 - a. Check power cable for any sharp bends or pinching, and cable jacket for damage. Replace as needed.
 - b. Check power connections and terminal boards for mixers to ensure they are properly tightened.
 - c. Check electrical cabinets and junction boxes to verify they are clean and dry.
 - d. Check insulation resistance between ground and phase lead is greater than 5 megaohms. Conduct phase-to-phase resistance checks. Check resistance of thermal contacts and thermistor.
 - e. Change oil in Oil Housing. Acceptable oils are as follows:
 - i. Mobil Whiterex 309
 - ii. Shell Ondina Oil 15
 - iii. Statoil Medic Way 15
 - iv. Esso Marcol 82

- f. Replace O-rings of the filling plugs and junction cover. Grease new O-rings.
 - g. Check protective devices:
 - i. Verify settings of overload protection.
 - ii. Check covers, guard rails, and other protective devices.
 - h. Check propeller for proper direction of rotation.
 - i. Inspect stator housing for any leakage.
 - j. Check running voltage and amperage.
2. Major Service interval to be coordinated with manufacturer and determined during Intermediate Service. Equipment shall have a minimum of 20,000 operating hours between Major services.

5.3.3 Air Diffusers

Motorized Valve Actuators

1. Routine maintenance includes the following:
 - a. Check actuator to valve fixing bolts for tightness.
 - b. Check valve stems and drive nuts for cleanliness and lubrication.
 - c. Routinely exercise valve through its full range- check with Operations Supervisor and Maintenance Manager for schedule.
 - d. Check actuator enclosure for signs of damage.
 - e. Check lubricant level, replace as needed. Oil for actuator is as follows:
 - i. Factory fill = 80% Texaco Texamatic 9330 (automatic transmission fluid), 20% Kerosene
 - ii. Equivalent automatic transmission fluid lubricants meeting the Dexron® 2 or Mercon® specification may be used.
 - iii. Contact Rotork for food grade lubricating oil alternative.
2. Every 5-years:
 - a. Replace actuator battery.

PA Thermal Mass Flowmeters

The Steel-Mass Model 640S flowmeters used for the measurement of process air flow, as manufactured by Sierra Instruments, will not require routine maintenance. For any problems, refer to Section 6.3.3 for manufacturer's contact information.

Dissolved Oxygen Measurement System

The LDO Dissolved Oxygen Probe and SC100Controller used for the measurement of DO, as manufactured by HACH, require little routine maintenance. For any problems, refer to Section 6.3.3 for manufacturer's contact information.

1. Weekly:
 - a. Remove DO probe from flow, and wipe sensor clean with a wet rag. Inspect for damage.
2. Annually:
 - a. Replace plastic sensor cap from each DO Probe.

Fine Bubble Diffusers

1. Weekly:
 - a. Purge moisture from every operating diffuser grid by opening the ball valve in the purge line at deck elevation.
 - b. "Air Bump" each diffuser grid by increasing the airflow rate to approximately 3 scfm per diffuser (or as coordinated with the Operations Supervisor and Maintenance Manager) for 20-30 minutes.
 - c. Visually observe surface pattern of basins for signs of diffuser fouling (course bubbling) or pipe system failure (large boil in isolated area).
 - d. Log discharge pressure in all process air piping.
2. Annually:
 - a. Drain each tank to clean diffusers, inspect piping and support system, and make any required repairs.

5.3.4 Process Air Preparation Facilities

Process Air Blowers and Accessory Equipment

1. Weekly:

- a. Check oil level in lube oil sump – level should be at top of sight glass.
- b. Check and record all temperature gauge readings.
- c. Check and record all pressure gauge readings.
- d. Check auxiliary oil pump for normal operation.
- e. Note and report any changes in noise or vibration during blower operation.

2. Monthly:

- a. Verify blower motor is clean and stator and rotor ventilation is unobstructed.
- b. Check all alarm and shutdown switches for proper function and indication.
- c. Check oil heat exchanger for debris build-up. Verify cleanliness of heat exchanger tubes. Clean as needed.
- d. Check inlet air filter differential pressure. Change filter element when pressure drop exceeds 2.75" w.g.
- e. Check oil heating element for coating or contamination. Remove accumulation of sediment or sludge deposits around heating element or in tank.

3. Every 4 Months:

- a. Replace grease in Auxiliary Oil Pump Motor bearings.
Recommended grease is as follows:
 - i. Chevron SRI – factory applied grease
 - ii. Exxon Unirex #2
 - iii. Exxon Polyrex
 - iv. Shell Dolium R
 - v. Polystar RB2

- b. Clean wetted parts of lube oil reservoir level switch.

4. Every 6 Months:

- a. Check for blower motor for excessive loading or service factor.
Verify voltage and frequency variation
- b. Verify blower motor winding temperature rise does not exceed rated value.
- c. Verify blower motor insulation resistance is above the recommended minimum.
- d. Check lubricating oil for contamination with water.
- e. Check cooling water for contamination/chemical content.
- f. Replace oil filter cartridges.
- g. Check motor operated blow-off valve actuator oil level.
- h. Check inlet air filter:
 - i. Inspect internals for corrosion or cracking welds.
 - ii. Inspect filter house for leaking air, and repair as needed.
 - iii. Inspect element retainer brackets for damage and tightness.

5. Annually:

- a. Check alignment of blower coupling, tightness of all blower fasteners, and blower components for general signs of fatigue or wear.
- b. Check accuracy and set points of all instrumentation. Re-calibrate as needed.
- c. Change gear oil in motor operated blow-off valve actuator.
Recommended gear oil is as follows:
 - i. Mobil SHC 632
 - ii. Exxon Teresstic SHP 320
- d. Check all bolted connections of inlet air filters. Tighten as needed.

Motorized Isolation Valve Actuators

- 1. Routine maintenance includes the following:
 - a. Check actuator to valve fixing bolts for tightness.

- b. Check valve stems and drive nuts for cleanliness and lubrication.
 - c. Routinely exercise valve through its full range- check with Operations Supervisor and Maintenance Manager for schedule.
 - d. Check actuator enclosure for signs of damage.
 - e. Check lubricant level, replace as needed. Oil for actuator is as follows:
 - i. Factory fill = 80% Texaco Texamatic 9330 (automatic transmission fluid), 20% Kerosene
 - ii. Equivalent automatic transmission fluid lubricants meeting the Dexron® 2 or Mercon® specification may be used.
 - iii. Contact Rotork for food grade lubricating oil alternative.
2. Every 5-years:
- a. Replace actuator battery.

Discharge Thermal Mass Flowmeters

The Steel-Mass Model 640S flowmeters used for the measurement of process air flow, as manufactured by Sierra Instruments, will not require routine maintenance. For any problems, refer to Section 6.3.6 for manufacturer's contact information.

PA Header Temperature Sensor/Transmitter

The Rosemount Series 68 Temperature Sensor and 3144P Pressure Transmitter used for the measurement of process air discharge temperature will not require routine maintenance. For any problems, refer to Section 6.3.6 for manufacturer's contact information.

PA Header Pressure Transmitter

The Rosemount 3051 Pressure Transmitter used for the measurement of process air discharge pressure will not require routine maintenance. For any problems, refer to Section 6.3.6 for manufacturer's contact information.

5.3.5 Intermediate Mixed Liquor Return

IMLR Pumps

1. Intermediate service shall be every 8000 operating hours, or every 2 years (whichever occurs first):
 - a. Check power cable for any sharp bends or pinching, and cable jacket for damage. Replace as needed.
 - b. Check power connections and terminal boards for mixers to ensure they are properly tightened.
 - c. Check electrical cabinets and junction boxes to verify they are clean and dry.
 - d. Check insulation resistance between ground and phase lead is greater than 5 megaohms. Conduct phase-to-phase resistance checks. Check resistance of thermal contacts and thermistor.
 - e. Change oil in Oil Housing. Acceptable oils are as follows:
 - i. Mobil Whiterex 309
 - ii. Shell Ondina Oil 15
 - iii. Statoil Medic Way 15
 - iv. Esso Marcol 82
 - f. Replace O-rings of the filling plugs and junction cover. Grease new O-rings.
 - g. Check protective devices:
 - i. Verify settings of overload protection.
 - ii. Check covers, guard rails, and other protective devices.
 - h. Check propeller for proper direction of rotation.
 - i. Inspect stator housing for any leakage.
 - j. Check running voltage and amperage.
2. Major Service interval to be coordinated with manufacturer and determined during Intermediate Service. Equipment shall have a minimum of 20,000 operating hours between Major services.

Portable Velocity Flowmeter

1. Routine maintenance of the unit is confined to cleaning the sensor and changing the batteries.
 - a. Clean sensor with soap and water after use to avoid noisy readings or "conductivity lost" errors. Use very fine (600) grit sandpaper on the electrode if the problem persists.
 - b. Change batteries (two D size) when "low battery" displays.

5.3.6 Tank Drainage Facility

AST Tank Drain Pump

1. Weekly:
 - a. Observe oil in oil reservoir while pump is off and not pressurized. Refill as needed.
2. Every 500 operating hours, or every three (3) months (whichever occurs first):
 - a. Check that the motor is clean and ventilation is not blocked by dirt or debris. Clean as needed.
 - b. Use a "Megger" to check integrity of insulation. Repair as needed.
 - c. Check all electrical connections to ensure all are tight. **Do not touch electrical connections before first ensuring power is disconnected.**
3. Every 7400 operating hours, or every six (6) months (whichever occurs first):
 - a. Re-grease motor roller bearings using Mobile Polyrex EM, or compatible equivalent.
 - b. Equivalent, compatible greases include:
 - i. Texaco Polystar
 - ii. Rykon Premium #2
 - iii. Pennzoil Pen 2 Lube
 - iv. Chevron SRI

4. Annually:

- a. Inspect suction side check valve for signs of wear, damage, or accumulation of deposits.

Tank Drainage Sump Pumps

Under normal operating conditions no lubrication or other maintenance is required; however the following checks are recommended:

1. Weekly:

- a. Exercise all manual isolation valves.
- b. Clean the sump pit of all trash and debris, since large solids may clog or affect the performance of the pump.

2. Every 3 Months:

- a. Check the level and function of each float switch. Verify proper signal and annunciation of high water alarm.
- b. Inspect impeller and body for clogging or excessive build-up. Check amperage of operating pump, high amperage may indicate clogging.
- c. Inspect seals for wear damage or leaking. Replace as needed.
- d. Check motor chamber for cooling oil level and contamination. Replace cooling oil as needed, and change contaminated oil.
- e. Check the local control panel and SCADA indication of moisture detection or high winding temperature. Notify Maintenance Manager of fault condition.

3. Every 2 Years:

- a. Change cooling oil with one of the following:
 - i. BP Enerpar SE100
 - ii. Conoco Pale Paraffin 22
 - iii. Mobile D.T.E. Oil Light
 - iv. G & G Oil Circulating 22
 - v. Imperial Oil Voltesso-35
 - vi. Shell Canada Transformer-10

- vii. Texaco Diala-Oil-AX
- viii. Woco Premium 100

5.3.7 Channel Aeration Facility

Channel Aeration Blowers

1. Weekly:
 - a. Check Blower oil level at sight glasses (4 per blower), and add oil if level is less than half-full. Change oil initially after first 500 hours of operation using Exxon Mobile SHC 629.
 - b. Check for leaking oil under blower.
2. Monthly:
 - a. Check motor operation for excessive vibration and hot spots.
 - b. Check tension in V-belts, and examine for wear.
3. Every 3 Months:
 - a. Check weighted relief valves for free movement and verify correct setting. Add lubricant (WD-40) as needed.
 - b. Check for proper operation of discharge check valve on non-operating blower(s).
 - c. Clean air filter with vacuum when pressure drop across filter reaches 5" W.C. above "clean filter" value. Adjust cleaning frequency as needed based on operating conditions.
4. Every 6 Months, or at 1000 hours of operation (whichever is sooner):
 - a. Change oil on gear and drive ends of blower using Exxon Mobile SHC 629. Check waste oil for contaminants or unusual content.
 - b. Rotate blower by hand to check for rubbing or excessive gear backlash.
 - c. Re-grease motor bearings using Alvania R3 grease.

5. Every 2 years:
 - a. Check and record clearances of all blower lobes. Confirm clearances with clearance table in manufacturer's O&M Manual.

Portable Thermal Mass Flowmeter

The Steel-Mass Model 640S portable flowmeter used for the measurement of channel aeration flow, as manufactured by Sierra Instruments, will not require routine maintenance. For any problems, refer to Section 6.3.6 for manufacturer's contact information.

5.4 SECONDARY SEDIMENTATION FACILITIES

Refer to the general preventative maintenance requirements presented in Section 5.0. This section should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately.

5.4.1 Sedimentation Tanks

Effluent Weirs and Launderers

1. Weekly:
 - a. Check for algae growth and debris. Hose down effluent weirs and launderers on an as-needed basis to keep algae growth to a minimum.

Influent Channel Diffusers

1. Annually:
 - a. Clean diffusers annually or when air release is non-uniform. Close valve, disconnect from pipe, and lift aeration header assembly out of the channel. Rinse pipe, diffuser diaphragm, and diffuser with clean water. Use a rag to wipe extraneous material from assembly. Inspect cleaned diffusers to determine if any debris has entered the orifice holes, or if any are damaged and need replacing. Inspect gaskets and O-rings for deterioration, and replace as necessary.

Weir Gates

1. Every three (3) months:
 - a. Exercise the gate through one complete cycle.
2. Every six (6) months:
 - a. Lubricate all grease fittings on manual operators with a small amount of heavy duty grease using one of the following:

Mobilgrease Special
Lubriplate #630-AA
Chevron R.M.P. Heavy Duty Grease EPNLGI2
Unocal Megaplex XD-2

- b. Clean and grease operating stems using one of the following:

- Lubriplate #630-2
 - Shell Alvania 2-EP
 - Mobilox 2-EP
 - Valvoline Val-Lith 2-EP
 - Chevron Ultra Duty Grease EP-2
 - Unocal Unoba EP-2

5.4.2 Sludge Collection and Pumping Facilities

Sludge Collectors

WARNING: ALWAYS LOCK OUT THE POWER SUPPLY TO THE COLLECTOR TANK DRIVE BEFORE PERFORMING ANY MAINTENANCE

1. Daily
 - a. Check the motor reducer for abnormal noise and vibration, as well as for oil level.
 - b. Visually inspect the flights for signs of damage. Check the connection bolt for tightness and damage.
2. Monthly
 - a. Inspect the drive chain. If loose, adjust the chain by manipulating the tightener. Check the chain for signs of abrasion. Check the alignment of the drive and drive sprocket and tighten the sprocket, as needed. Check the tightness of the set screw.
3. Every six (6) months:
 - a. Check the shaft and bearing alignment, as well as for whether the end plate bolt is loose.
 - b. Remove the shear pin and start the drive unit to check the moving distance of the switch.
 - c. Inspect the removed shear pin for abrasion and other damage and exchange, if necessary. If the condition is acceptable for continued use, clean and then grease the shear pin before replacing.

- d. Check the drive sprocket bolt and set screw; tighten if necessary.
 - e. Drain the sedimentation basin completely and hose down all submersible equipment
 - f. With the basin drained, check the tension of the collector chain. If loose, remove an appropriate number of links from the main chain, ensuring that the numbers of removed links are balanced on opposite sides of the chain to maintain even tension. Check the connection of the main chain cotter pin. (Note that main chain tension should be checked after the first 30 and 60 days following initial installation. Thereafter, tension should be checked at regular six-month intervals.)
 - g. With the basin drained, check the flight return track angle and bottom rail for damage causing the flights to collide with loose rails. Check the tightness of the flight connecting bolts.
 - h. With the basin drained, check the ear strip for signs of abrasion and exchange, if necessary.
 - i. With the basin drained, check the sprockets for signs of abrasion and inspect the connection bolts.
 - j. With the basin drained, inspect the sleeve bearings, ring seals, and connection bolts for signs of abrasion.
 - k. With the basin drained, inspect wall bearing anchor bolts for signs of abrasion and tighten, if necessary.
4. Annually:
- a. Change the oil in the motor speed reducer. When changing the oil, remember that different brands and types of oil may not be compatible. Therefore, when changing to a different oil, it is recommended that the housing be completely drained and thoroughly flushed with a light flushing oil prior to refilling. If a speed reducer is scheduled to be idled for a long period of time, it is recommended that the unit be completely filled to protect the interior parts from corrosion. Always be sure that the speed reducer contains the proper amount of oil before it is operated. Remember that oil may settle into the reducer slowly creating a false reading. In order to avoid false readings, check the level after allowing 30 minutes for the oil to settle. If the speed reducer oil is overfilled, overheating will occur; if underfilled, the resulting friction can cause overheating.

- b. Consult the manufacturer's Operation and Maintenance Manual for detailed lubricant table.
- 5. Every six (6) months or 3,000 operating hours (for the drive):
 - a. Check oil and oil level.
 - b. Check running nose for possible bearing damage.
 - c. Visually inspect all seals for leakage.
- 6. Every three (3) years at latest (for the drive, if mineral oil is used):
 - a. Change oil, replace anti-friction grease, and replace oil seal.
 - b. Consult the manufacturer's Operation and Maintenance Manual for detailed lubricant table.
- 7. Every five (5) years at latest (for the drive, if synthetic oil is used):
 - a. Change oil, replace anti-friction grease, and replace oil seal.
 - b. Consult the manufacturer's Operation and Maintenance Manual for detailed lubricant table.

RAS Pumps

- 1. Daily:
 - a. Check lubrication system for proper operation.
- 2. Weekly:
 - a. Inspect the packing box for excess leakage. Adjust or replace packing, as necessary.
- 3. Monthly:
 - a. Wipe off dirt, dust, oil, water, and other liquids from external surfaces of the pump motor. These materials can be taken into the motor windings and may cause overheating or insulation breakdown.

- b. Remove dirt, dust, and debris from pump motor ventilating air inlets. Never allow dirt to accumulate near air inlets, and never operate the motor with the air passages blocked.
 - c. Clean the motor internally by blowing with clean, dry, compressed air at pressures between 40-60 psi. Use a vacuum cleaner, as needed.
 - d. When dirt and dust are solidly packed, and/or the windings are covered with oil or grease, disassemble the motor and clean with a suitable solvent. Use only high-flash naphtha, mineral spirits, or Stoddard solvent. Wipe with solvent-dampened cloth, or use suitable soft-bristled brush. Do not soak motor components in solvents. Thoroughly oven-dry solvent-cleaned windings at 150-175 °F before reassembly. After cleaning and drying the windings, check the insulation resistance in accordance with the manufacturer's Operations and Maintenance Manual.
 - e. Inspect oil for evidence of moisture or oxidation. Change oil if necessary.
 - f. Inspect grease-lubricated bearings for moisture or oxidation by purging a small quantity of grease through the drain. Completely remove and replace the grease if any contamination is present.
 - g. Rotate the motor shaft to maintain a lubricant film on the bearing races and journals.
4. Annually:
- a. Monitor the pumps for any changes in alignment, noise level, and vibration, and correct as-needed.
 - b. Change oil, wiping the excess from the threads of the drain plug and drain hole. Coat the drain plug threads with Gasolia P/N SS08 or equivalent thread sealant before replacing. Frequent starting and stopping, damp or dusty environments, extreme temperatures, or other severe service conditions will necessitate more frequent oil changes. Consult the manufacturer's Operation and Maintenance Manual for detailed lubricant table.

WAS Pumps

1. Monthly:

- a. Inspect the motor to ensure that the windings are free of dust, grease, oil, and dirt. If necessary, the windings may be cleaned by wiping or suction cleaners with non-metallic nozzles. Gummy deposits of dirt and grease may be removed by using a commercially available low volatile solvent.
- b. Check motor terminal connections, assembly screws, bolts, and nuts to ensure tightness.
- c. Check the insulation resistance of the motors to evaluate whether any deterioration has occurred. Note that each monthly inspection should be conducted under approximately similar temperature and humidity conditions. If the inspection indicates the presence of excessive moisture, the motor should be reconditioned by re-winding and/or re-insulating, as necessary.
- d. Inspect V-belt drive sheaves for worn grooves or damage. If excessive wear is observed, replace the worn components with new sheaves. If the sheaves are satisfactory, check their alignment in accordance with the detailed instructions in the manufacturer's Operations and Maintenance Manual.
- e. Inspect all additional V-belt drive components, including belts, bearings, shafts, and guards. Repair or replace damaged and worn parts, as necessary.

2. Every three (3) months:

- a. Lubricate motor roller bearings using one of the following products:

Chevron:	Black Pearl EP No.2
Texaco:	Premium RB

3. Every six (6) months:

- a. Lubricate motor ball bearings using one of the following products:

Chevron:	SRI No. 2
Exxon:	Unirex N2
Shell:	Dolium R
Texaco:	Premium RB

4. Every two (2) years at latest, or 10,000 service hours (for the gearbox, if mineral oil is used):

- a. Change oil in the gearbox. Shorter intervals are recommended for extreme operating conditions, including high humidity, aggressive environments, large temperature variations, etc.
- b. The following conventional mineral oils are recommended for the gearbox:

Mobil:	Mobilgear 630
Shell:	Omala 220
Castrol:	5EP
Klüber:	Klüberoil GEM 1-150
BP:	Energol GR-XP 220
Tribol:	Tribol 1100/220

- c. Consult the manufacturer's Operations and Maintenance Manual for a chart indicating the oil capacity, which varies with gearbox mounting position. Note that acceptable oil fill level is within ½ inch of the bottom of the fill plug threads.

5. Every four (4) years at latest, or 20,000 service hours (for the gearbox, if synthetic oil is used):

- a. Change oil in the gearbox. Shorter intervals are recommended for extreme operating conditions, including high humidity, aggressive environments, large temperature variations, etc.
- b. The following conventional mineral oils are recommended for the gearbox:

Mobil:	Mobil SHC 630
Shell:	Omala 220 HD
Castrol:	Isolube EP 220
Klüber:	Klübersynth EG 4-220
Tribol:	Tribol 1510/220

- c. Consult the manufacturer's Operations and Maintenance Manual for a chart indicating the oil capacity, which varies with gearbox mounting position. Note that acceptable oil fill level is within ½ inch of the bottom of the fill plug threads.

5.4.3 Secondary Skimmings Processing Facilities

Rotary Scum Skimmers

1. Weekly
 - a. Check for an accumulation of solids. If there is a build-up of algae, solids, or other material, increase the frequency of cleaning and sluicing of the skimmer pipe. Use a high pressure spray and wash the pipe off once per week.
 - b. Check for excessive scum or septic conditions.
2. Monthly
 - a. Check and clean the areas around the actuator compartment cover.
3. Every six (6) months:
 - a. Inspect gear case lubrication. If grease is lacking or contaminated with dirt, water, or foreign matter, units should be flushed with a commercial degreaser approved by the manufacturer, and subsequently re-packed with lubricant approved by the manufacturer.
 - b. Inspect the water sprayer actuators and re-apply a lubricant approved by the manufacturer, as needed.

Secondary Skimmings Pumps

1. Weekly
 - a. Inspect the seal box mechanical seal for leakage, and repair or replace, as needed.
2. Every three (3) months:
 - a. Listen for metal-to-metal scraping or other noises that are unusual during normal operation.
 - b. Inspect the V-belts for wear and check for proper tension.
 - c. Check the pump suction and discharge gauges, as well as the pump speed, to confirm operation at the proper set-points.

- d. Check the bearing temperature and compare with prior readings for consistency of operation.
3. Every six (6) months:
- a. Check for changes in pump alignment and correct, as needed.
 - b. Tighten any loose fasteners.
 - c. Take an amperage reading from the motor to verify normal operation.
 - d. Inspect the motor fan guard and remove any accumulated debris
 - e. Inspect the shaft sleeve for wear.
 - f. Check the pump shaft for run-out and straightness.
 - g. Lubricate the motor bearings by applying grease one of the following grease products to the zerk fittings:

Shell:	Dolium R (recommended)
Chevron:	SRI-2

Do not over-apply grease to the bearings. Refer to the manufacturer's Operations and Maintenance Manual for greasing instructions.

- h. Change the motor oil using one of the following:

Exxon:	Teresstic ISO 68
Shell:	Turbo T-68
Mobil:	DTE 25

4. Annually:
- a. Inspect coatings for and touch-up, as needed.
 - b. Inspect the pump impeller, case, suction flange, and wear plate for signs of wear.
 - c. Check for changes in pumps vibration and correct, as needed.

Secondary Skimmings Sump Pumps

1. Annually:

- a. Visually check the oil in the pump for level and evidence of contamination annually or whenever the pump is removed from service. Detailed instructions for checking, testing, and replacing the oil are provided in manufacturer's Operation and Maintenance Manual. Replacement oil should be one of the following products:

BP:	Enerpar SE 100
Conoco:	Pale Paraffin 22
Mobil:	DTE Oil Light
G&G Oil:	Circulating 22
Imperial Oil:	Voltesso-35
Shell:	Transformer-10
Texaco:	Diala-Oil-AX
Woco:	Premium 100

- b. Inspect the pump impeller and body for excessive build-up or clogging. Clean and/or repair, as needed.
- c. Inspect the bearings and replace, if required.
- d. Inspect the motor, looking for signs of wear on the rotor. If the rotor or stator windings are defective, the entire motor must be replaced.
- e. Inspect the seal for wear or leakage and replace, if required.

5.4.4 RAS Chlorination

Preventive maintenance associated with RAS chlorination is discussed in Section 5.5.1.

5.4.5 Tank Drainage Facilities

Tank Drain Pump

1. Monthly:
 - a. Check the double mechanical seal oil reservoir level and refill as-needed with a SAE 30 non-detergent oil.
 - b. Check bearing lubrication oil level and refill as-needed with a SAE 30 non-detergent oil.
2. Every three (3) months or 500 hours of operation (whichever occurs first):
 - a. Check to ensure that the motor is clean and free of dirt, oil, grease, moisture, or other foreign substances.
 - b. Use a “Megger” to ensure that the integrity of the pump motor winding insulation has been maintained. Record the Megger readings and immediately investigate any significant drop in insulation resistance.
 - c. Check all motor electrical connections to ensure tightness.
3. Annually:
 - a. Remove the elbow cover and inspect the check valve for damage or deterioration.
 - b. Re-lubricate the pump motor bearings with one of the following grease products:

Exxon Mobil:	Polyrex EM (recommended)
Texaco:	Polystar
Rykon:	Premium #2
Pennzoil:	Pen 2 Lube
Chevron:	SRI
4. As-Needed:
 - a. As per the manufacturer’s Operation and Maintenance Manual, the pump internal components, including the volute, seal plate, impeller, shaft, and O-rings, should be inspected for wear or deterioration only if the pump does not appear to be functioning properly.

Tanks Drainage Sump Pumps

1. Annually:

- a. Visually check the oil in the pump for level and evidence of contamination annually or whenever the pump is removed from service. Detailed instructions for checking, testing, and replacing the oil are provided in manufacturer's Operation and Maintenance Manual. Replacement oil should be one of the following products:

BP:	Enerpar SE 100
Conoco:	Pale Paraffin 22
Mobil:	DTE Oil Light
G&G Oil:	Circulating 22
Imperial Oil:	Voltesso-35
Shell:	Transformer-10
Texaco:	Diala-Oil-AX
Woco:	Premium 100

- b. Inspect the pump impeller and body for excessive build-up or clogging. Clean and/or repair, as needed.
- c. Inspect the bearings and replace, if required.
- d. Inspect the motor, looking for signs of wear on the rotor. If the rotor or stator windings are defective, the entire motor must be replaced.
- e. Inspect the seal for wear or leakage and replace, if required.

5.5 CHLORINATION, DECHLORINATION AND NON-POTABLE WATER FACILITIES

Refer to the general preventative maintenance requirements presented in Section 5.0. This section should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately.

5.5.1 Chlorination Facilities

Sodium Hypochlorite Storage Tank

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
2. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof of each tank, and all pipes, duct, valves, manholes for any signs of damage or improper installation.
 - c. Visually check the air vent pipe and the tank overflow line for any restrictions.
3. Every 6 Months:
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
4. Every 3 Years:
 - a. Visually inspect the inside of the tanks. **The inspection program should follow U. S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should be observed.**

Effluent Chlorination Pumps, Pre-chlorination Pump, and RAS Chlorination Pump

1. Weekly:

- a. Check pumping action of metering pumps by grasping output line and determining that obvious pulsation is felt during operations.
- b. Verify that pulsation dampeners are pressurized, and repressurize with a portable air compressor as necessary.
- c. Exercise all manual isolation valves.

2. Every 3 Months:

- a. Check oil levels in the gear box for low level and possible contamination. Replenish as necessary with one of the following (do not mix brands):

PulsaFeeder

PULSAlube #1

Exxon

Nuto Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 deg F is 450-700; SSU @ 210 deg F is 73-78)

Shell

Tellus Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 deg F is 450-700; SSU @ 210 deg F is 73-78)

Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSAlube lubricant takes on a yellowish color. Change the oil per the manufacturer's procedures immediately, if this occurs and examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or is may be drained from the ports at the side of each chamber.

- b. Check the inlet and outlet valves for corrosion.
- c. Check the oil seals for leakage.

3. Every 6 Months:
 - a. Regrease the motor bearing with one of the following:

Chevron	SRI #2
Shell	Dolium R
4. Annually:
 - a. Drain oil per manufacturer's procedures (first oil change shall be after 6 months) and check oil for possible contamination. Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSAlube lubricant takes on a yellowish color. Examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.
 - b. Change the oil with one of the oils indicated above.
 - c. Verify that the backpressure valve at the chlorine discharge point is set at 40 psi.
 - d. Verify that pressure relief valves are set at 55 psi.

NPW Chlorination Pumps

1. Weekly:
 - a. Check pumping action of metering pumps by grasping output line and determining that obvious pulsation is felt during operations.
 - b. Verify that pulsation dampeners are pressurized, and repressurize with a portable air compressor as necessary.
 - c. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check oil levels in the gearbox and the pump housing for low level and possible contamination. Replenish or replace as necessary with the specified oils:

Gearbox:	PULSAlube 8G
Pump Housing:	PULSAlube 7H

- b. Check the inlet and outlet valves for corrosion.
- 3. Annually:
 - a. Drain hydraulic oil from the pump housing per manufacturer's published procedures and check oil for possible contamination. Replace with PULSAlube 7H until the oil level is between the max and min as indicated on the dipstick (approximately 1 liter).
 - b. During every hydraulic oil change, remove and clean the check valve screen for the Hydraulic Performance Valve per manufacturer's published procedure.
- 4. Biennially:
 - a. Drain gearbox oil per manufacturer's published procedures and check for possible contamination. Replace with PULSAlube 8G oil to the recommended level (approximately 150 ml).
 - b. Remove and inspect the pump diaphragm per manufacturer's published procedures. Replace as needed.

Containment Area Sump Pump

- 1. Weekly:
 - a. Exercise all manual isolation valves.
- 2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally specified. The float switches may have to be moved back to their original position.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.
 - d. Check the moisture sensor light and thermal sensor light. If either is on, contact the local representative.

3. Every 2 Years:

- a. Change dielectric oil surrounding motor with one of the following:

Mobil	DTE Oil Light
BP	Enerpar SE 40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

5.5.2 Dechlorination Facilities

Sodium Bisulfite Storage Tanks

1. Weekly:

- a. Exercise all manual isolation valves.
- b. Check for any leaks and repair as needed.

2. Every 3 Months:

- a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
- b. Visually observe the roof of each tank, and all pipes, duct, valves, manholes for any signs of damage or improper installation.
- c. Visually check the air vent pipe and the tank overflow line for any restrictions.
- d. Visually observe the tank and piping insulation for cracking, any signs of damage or improper installation and any other unusual problems.
- e. Visually check the heat tracing wire for any signs of damage or any other unusual problems.

3. Every 6 Months:
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
4. Every 3 Years:
 - a. Visually inspect the inside of the tanks. **The inspection program would follow U. S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tank should be observed.**

Dechlorination Pumps

1. Weekly:
 - a. Check pumping action of metering pumps by grasping output line and determining that obvious pulsation is felt during operations.
 - b. Verify that pulsation dampeners are pressurized, and repressurize with a portable air compressor as necessary.
 - c. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check oil levels in the gear box for low level and possible contamination. Replenish as necessary with one of the following (Do not mix brands):

PulsaFeeder	PULSA lube #1
Exxon	Nuto Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 deg F is 450-700; SSU @ 210 deg F is 73-78)
Shell	Tellus Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 deg F is 450-700; SSU @ 210 deg F is 73-78)

Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSAube lubricant takes on a yellowish color. Change the oil per the manufacturer's procedures immediately, if this occurs and examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.

- b. Check the inlet and outlet valves for corrosion.
- c. Check the oil seals for leakage.
- 3. Every 6 Months:
 - a. Regrease the motor bearing with one of the following:

Chevron	SRI #2
Shell	Dolium R
- 4. Annually:
 - a. Drain oil per manufacturer's procedures (first oil change shall be after 6 months) and check oil for possible contamination. Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSAube lubricant takes on a yellowish color. Examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.
 - b. Change the oil with one of the oils indicated above.
 - c. Verify that the backpressure valve at the sodium bisulfite discharge point is set at 40 psi.
 - d. Verify that pressure relief valves are set at 55 psi.

Containment Area Sump Pump

- 1. Weekly:
 - a. Exercise all manual isolation valves.
- 2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally

specified. The float switches may have to be moved back to their original position.

- b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.
 - d. Check the moisture sensor light and thermal sensor light. If either is on, contact the local representative.
3. Every 2 Years:
- a. Change dielectric oil surrounding motor with one of the following:

Mobil	DTE Oil Light
BP	Enerpar SE 40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

5.5.3 Non-Potable Water Pump Station No.1 Facilities

NPW Wetwell

1. Daily:
 - a. Verify that the wetwell level is within the range set by the float valve.
2. Weekly:
 - a. Exercise all manual isolation valves (including wetwell inlet valve and below-ground wetwell drain valve).
3. Every 3 Months:
 - a. Remove any trash or debris that may be in the wetwell.
 - b. Check the high level, high high level, low level, and low low level operational and alarm setpoints. Adjust the setpoints and/or float switches as directed by your Operations Supervisor.

4. Every 6 Months:

- a. Inspect gear case lubrication for the motor-operated shut-off valve every 6 months or 500 cycles, whichever comes first. The “worm” should be totally immersed in grease. Do **not** grease drive bearings unless they are leaking. Excess grease will damage seals. If grease is lacking or contaminated with dirt, water, or foreign matter, units should be flushed with a commercial degreaser/cleaner such as Exxon Varsol #18 which does not affect seal materials. Re-pack unit allowing for grease thermal expansion with one of the following:

Exxon

Nebula EP-0 (calcium based)

Alternative

NLGI Grade 0 or 1, EP additive, water and heat resistant, non-separating, does not create more than 8% swell in Buna N or Viton, not corrosive to steel, Dropping point 316°F

- b. Grease the geared limit switch for the motor-operated shut-off valve with Exxon Beacon 325. In accordance with manufacturer’s recommendation, there is **NO SUBSTITUTE** for the grease for the geared limit switch.

5. Annually:

- a. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil

Alvania #2

Hydropneumatic Tank

1. Weekly:

- a. Exercise all manual isolation valves.
- b. Visually observe the tank and appurtenances and all appurtenances for any signs of damage or any leaks.

2. Every 3 Months:
 - a. Test the pressure relief valve on top of the tank by lifting its central plunger with a screwdriver to verify that it is operational.
3. Annually:
 - a. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell OilAlvania #2

Hydropneumatic Tank Air Compressors/Air Receiver

1. Daily:
 - a. Check each compressor's oil level. The level should be maintained in the bottom half of the sight glass.
2. Weekly:
 - a. Drain condensate from the air receiver by opening the drain cock.
 - b. Exercise all manual isolation valves.
3. Monthly:
 - a. Check the operation of the safety valve by lifting its central plunger with a screwdriver.
 - b. Remove any dirt from cooling fins with an air jet.
 - c. Verify that the regulating system operates properly.
 - d. Inspect the air filter and replace it if necessary.
 - e. Cycle the solenoid valve on and off by disconnecting and reconnecting power. This will help ensure proper opening and closing.

4. Every 6 Months:

- a. Clean the solenoid valve. A periodic cleaning of the solenoid valve is desirable to assure proper operation. If valve operation is sluggish (even though voltage to the coil is correct), or if you detect excessive noise or leakage, the valve should be disassembled and cleaned.

While carrying out periodic cleaning, carefully inspect all internal valve parts for wear or damage. Replace parts as necessary. Always turn off air supply and electrical power and depressurize valve before disassembling it for cleaning or repairs. It is not necessary to remove the pipeline to disassemble the valve.

5. Annually:

- a. Test the tank's safety relief valve.
- b. Replace the compressor's air filter.
- c. Change the oil in the compressor using a mineral oil SAE 10W20, with a viscosity grade of SAE 10W20 or SAE 10W. The oil should meet the requirements of the American Petroleum Institute, classification code SE-CC, SE-DC, or SF-CD.
- d. Inspect the internals of the air receiver for carbon deposits, and clean if necessary.

6. Every 2 Years:

- a. Inspect all valves. A faulty valve must be replaced immediately. Serious damage occurs if a compressor is running with a broken valve disk. It is highly recommended to replace the valves and gaskets each time the cylinder heads are disassembled, because a new position of old valves results in accelerated wear and damage of the valves.

Non-Potable Water Pumps

1. Weekly:

- a. Exercise all manual isolation valves.

3. Every 3 Months:
 - a. Remove any trash or debris that may be in the wetwell.
 - b. Check the low level operational and alarm setpoints. Adjust the setpoints and/or float switches as directed by your Operations Supervisor.
 - c. Operate the weir gate.

4. Every 6 months:

- a. Grease fittings on manual operators with a small amount of heavy duty grease with one of the following types of lubricants:

Mobil	Mobilgrease Special
Lubriplate	#630-AA
Chevron	R.M.P. Heavy Duty Grease EPNLG12
Unocal	Megaplex XD-2

(refer to manufacturer's O&M manual for recommended greases. Follow the manufacturer's published regreasing instructions).

- b. Clean and grease operating stems on the weir gate with one of the following types of lubricants:

Lubriplate	#630-2
Shell	Avania 2 – EP
Mobil	Mobilox 2 – EP
Valvoline	Val-Lith 2-EP
Chevron	Ultra Duty Grease EP-2
Unocal	Unoba EP-2

(refer to manufacturer's O&M manual for recommended greases)

Follow the manufacturer's published regreasing instructions).

Non-Potable Water Pumps

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Monthly:
 - a. Check performance of pumps. Listen for unusual noises, and check for vibration.
 - b. Check mechanical seals of the pumps for leakage once per month or after 150 hours of operation, whichever occurs first.
 - c. Check and clean the areas between the pump drive motor cooling fins and the area through which air is drawn into the fan guard.
 - d. Check to see that pumped liquid is going through the stuffing box. Check that the gland bolts on the mechanical seal have not loosened.
2. Annually:
 - a. Lubricate the main pump motor's drive end bearings with a synthetic base oil type. Refer to the manufacturer's O&M manual for approved oil specifications for use with anti-friction bearings.

Follow the manufacturer's published lubrication instructions.
 - b. Lubricate the main pump motor's opposite end bearings with one of the following types of greases:

Chevron	Grease No. 83343
Shell	SRI No.2 Polyrex-EM

(refer to manufacturer's O&M manual for recommended greases)

Follow the manufacturer's published regreasing instructions.
 - c. Lubricate the jockey motor's drive end and opposite end bearings with one of the following types of greases:

Chevron

Grease No. 83343

Shell

SRI No.2 Polyrex-EM

(refer to manufacturer's O&M manual for recommended greases)

Follow the manufacturer's published regreasing instructions.

- d. Clean the motor internals by use of dry compressed air at 40 to 60 psi.
- e. Check for changes in the pump alignment, noise level and pump vibration.

5.6 WASTE ACTIVATED SLUDGE THICKENING FACILITIES

Refer to the general preventative maintenance requirements presented in Section 5.0. This section should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately.

5.6.1 Dissolved Air Floatation (DAF) Tanks

DAF Unit Sludge Collectors

WARNING: ALWAYS LOCK OUT THE POWER SUPPLY TO THE COLLECTOR TANK DRIVE MOTOR BEFORE PERFORMING ANY MAINTENANCE.

1. Daily

- a. Check for damaged or broken collector arms. Record and report damage to your Maintenance Supervisor.
- b. Check for wear on the Collector Drive worm gears. Record and report observed wear to your Maintenance Supervisor.
- c. Check drive(s) roller chain and sprockets for wear and elongation of the chain. Report observed wear and/or elongation to your Maintenance Supervisor.
- d. Check the drives for leaks, excessive noise and temperature (hand touch). Record and report all noted problems to your Maintenance Supervisor.
- e. Check the drive control settings both locally and at SCADA to confirm the requirements of your Operations Supervisor.

2. Weekly

- a. Check oil in the Collector Drives. Oil must be kept clean. Replace oil as necessary with one of the following:
 - Mobil
 - Exxon
 - Shell
 - Texaco
 - Mobilgear 632
 - SHC 630
 - Spartan EP 320
 - Omala 320
 - Meropa 320

Check oil level in the Collector Drives, when the drives are stopped, to ensure the oil is maintained at the proper level. Add oil as necessary using the oils indicated above. Do not overfill with oil since it will overflow the drive. The gear is only partly submerged with oil. Lubrication of the full contact surface of the teeth is accomplished by the pumping action of the meshing teeth.

- b. Run the drive over its entire speed range to maintain lubrication of the shafts.
- c. Keep drive platform and walkway clean of oil, debris and tools. Make sure all guards are in place.
- d. Check that the sludge collector equipment is properly adjusted and working efficiently.

3. Monthly

- a. Check for water condensation in oil. If water is present, drain completely, flush out and fill to correct level with one of the oils indicated above. The vent opening located in the top screw plug of the sight glass (if used) must be kept clean. If the vent opening is clogged or dirty, the glass will not show the oil level correctly and may not show an oil level at all.
- b. Check drive chain for tension and adjust as necessary. Chains that are too tight can damage drive motor/reducer bearings, or cause broken chains. Loose chains will clatter and can come off the sprockets. Chain should be installed fairly tight with only a small amount of slack. New chains will loosen up slightly as the joints seat themselves causing initial elongation of the chain.
- c. Lubricate drive chain with one of the following:
 - Mobil
 - Exxon
 - Shell
 - Texaco
 - Mobilgear 532
 - Spartan EP 320
 - Omala 320
 - Meropa 320
- d. Check drive control. Actuate the cams and move control pointer by hand, slowly through complete range. If the drive unit stops to an overload, do not attempt to restart the unit until the cause of the overload has been located and corrected.
- e. Grease vari-drive shafts with one of the following:
 - Mobil
 - Exxon
 - Shell

- Texaco
 - Mobilux 2
 - Unirex N2
 - Alvania 2
 - Premium RB 2
- f. Use care to avoid overgreasing since excess grease will throw out onto the belt and disc faces.
 - g. Check and clean the area between the drive motor cooling fins and the area through which air is drawn into the fan guard. Check that the motor bearings are sealed and the grease content is adequate for the life of the bearings.
 - h. Check collector mechanism for loose bolts and nuts and for broken welds.
 - i. Shear pins in the shear pin hubs should be removed and inspected as should be the shear pin bushings for damage or excessive wear. Replace any damaged material. While the shear pin is removed, be sure to inspect the hub to see that it rotates freely and independently from the drive sprocket. This rotation should cause the release of the trip cam which activates the limit switch. BE SURE that the shear pin mechanism operates properly.
4. Every 1000 or 1500 Operation Hours
 - a. Grease collector mechanism roller units with Mobilith AW-2 grease or equivalent NLGI No.2 grease.
 5. Every 6 months:
 - a. Inspect the collector chain sprockets. If excessive wear is discovered, the rim segments can be reversed to lengthen the sprocket life.
 - b. Inspect the carrying and return wear shoes. If they are worn, replace them.
 - c. Regrease vari-drive bearings, more often if the application is damp, or dusty. (Sealed bearings are lubricated for life and require no further greasing - the instruction tag will show you the bearing location requiring period regreasing).
 6. Annually
 - a. Regrease drive motor bearings with one of the following:
 - Mobil
 - Exxon
 - Shell
 - Texaco
 - Mobilux 2

- Unirex N2
 - Alvania 2
 - Premium RB 2
- b. Motors can be regreased by stopping the motor, removing the drain plug and pumping new grease into fill hole. Run motor with drain plug removed to discharge excess grease. Replace drain plug.
 - c. Check connections between the collector arms and center shaft and center shaft to adapter shaft.

DAF Tanks

1. Daily

- a. Check for uniform floc formation in the WAS influent center well diffuser. If necessary calibrate and adjust the polymer flow to the DAF units.
- b. Check and record the WAS flow rate and adjust the inlet plug valves. Only slight adjustments should be made at anyone time. The WAS flow should be constant and should match the requirement established by your Operations Supervisor.
- c. Check the surface quality of the TWAS in the DAF unit to make sure that it is relatively dry. If the surface of the sludge appears wet, check and adjust the speed of the scraper arms, pressurization and polymer addition systems settings. All adjustments should be recorded and reported to your Operations Supervisor.
- d. Check the depth of the sludge blanket. The recommended blanket depth is between 12 and 24 inches. To increase the depth, reduce the skimmer speed and/or increase the feed rate. To reduce the blanket depth, do the reverse. All adjustments should be recorded and reported to your Operations Supervisor.
- e. Check the effluent for large flocs or excessive solids overflowing the weirs, which would indicate a problem with the pressurization system or the depth of sludge blanket. A very turbid effluent without flocs would indicate a chemical and/or air deficiency or overloading of the system. Record and report all noted problems to your Operations Supervisor.

2. Every 6 Months

- a. Lubricate hand wheel linkage for minimum wear and continued smooth operation.

3. Annually

- a. Remove rust spots and repaint as necessary.
- b. Check squeegees, if used, for damage or wear and replace as necessary. Remove, disassemble and inspect the roller assemblies.

- c. Check wipers for damage or wear. Replace as necessary.

5.6.2 Pressurization and Air Injection System

DAF Air Compressors

1. Daily
 - a. Check oil level in the DAF Standby Air Compressor tank and replenish as necessary with a high quality grade of nondetergent industrial oil containing rust and oxidation inhibitors. For temperatures above 32°F use the equivalent of SAE 30 viscosity oil; and in temperatures below 32°F use the equivalent of SAE 20 viscosity oil.
 - b. Drain moisture from DAF standby air compressor tank by opening tank drain cock located in bottom of tank.
2. Weekly
 - a. Turn power to the DAF Standby Air Compressor off. Clean dust and foreign matter from cylinder head, motor, fan blade, air lines, inter-cooler and tank.
 - b. Remove and clean intake air filters of the DAF Standby Air Compressor.
 - c. Check V-Belts of the DAF Standby Air Compressor for tightness. Drive belts must be kept tight enough to prevent slipping. Belt tension should be adjusted to allow approximately 3/8 inch play.
3. Every 90 days or 500 hours, whichever occurs first:
 - a. Change crankcase oil in the DAF Standby Air Compressor. Use type and grade oil as specified in paragraph 1.a.
 - b. Check entire system of the DAF Standby Air Compressor for air leakage around fittings, connections, and gaskets, using soap solution and brush.
 - c. Tighten the DAF Standby Air Compressor nuts and cap screws as required.
 - d. Check and clean compressor valves, replace when worn or damaged. Valves must be replaced in original positions. Valve gaskets, when applicable, should be replaced each time valves are serviced.
4. Annually
 - a. Grease DAF Standby Air Compressor motor bearings with a Shell Dolium R grease.

DAF Pressurization System

2. Daily

- a. Check the pressurization pumps and DAF standby air compressor (if used) operation to see that they are operating smoothly and quietly. Record and report any unusual operation to your Maintenance Supervisor.
- b. Check pressurization pumps and DAF standby air compressor for leaks, excessive noise, and temperature (hand touch). Record and report all noted problems to your Maintenance Supervisor.
- c. Check oil level in the Pressurization Pump lubrication reservoir and replenish as necessary with SAE 20 high quality turbine type oil with rust and oxidation inhibitors. Check seal water flow to mechanical seals of the pressurization pumps and adjust the flow to a few drops for cooling and lubrication.
- d. Check control settings of the pressurization pumps both locally and at SCADA to confirm the requirements of your Operations Supervisor.
- e. Check and record the pressurization pumps run times at the MCC-DAF weekly.
- f. Check the water level in the pressurization tank at the sight glass and check for normal operation of the release valve.
- g. Check and record the pressures in the system. These pressures should be set within the following ranges as established by your Operations Supervisor:
 - Back pressure valve 55-65 psi
 - Retention tank 55-70 psi
 - Pressurization pump 55-75 psi

If pressures have varied from the set point established by your Operations Supervisor, adjust as necessary. All adjustments should be recorded and reported to your Operations Supervisor.

- h. Check and record the flow through the system:
 - Pressurized flow from pressurization pump in gpm
 - Air flow to retention tank in SCFM

Adjust if necessary check valve at the discharge pipe of pressurization pump, air flow valve and rotameter at the air control panel discharge line, and back pressure valve. All adjustments should be recorded and reported to your Operations Supervisor.

- i. The air release valve should release small amounts of air, as required, to maintain the proper water level to confirm the requirements of your Operations Supervisor.
- j. If the water level is below the proper level, the excess air will form large bubbles that tend to rise rapidly, break up the floc particles and disrupt

the TWAS in the DAF unit. On the other hand, a high water level will produce a less than adequate float solids concentration, resulting in an increase in the turbidity of the effluent.

- k. Adjust the water level at the pressurization tank to within the desired "controlled level". All adjustments should be recorded and reported to your Operations Supervisor.
- l. Exercise the hand wheel weekly on the backpressure control valve to prevent it from sticking. Record and report any unusual operation to your Maintenance Supervisor.

3. Monthly

- a. Check for water condensation in oil in the Pressurization Pump lubrication reservoir. If water is present, drain completely, flush out and fill to correct level with one of the oils indicated above.
- b. Check mechanical seals of the Pressurization Pumps for leakage once per month or after 150 hours of operation whichever occurs first.
- c. Check and clean the areas between the Pressurization Pumps drive motor cooling fins and the area through which air is drawn into the fan guard.

4. Every 2000 Hours or 3 Months, whichever occurs first:

- a. Grease Pressurization Pump Motors bearings and couplings with a lithium grease. Fill grease until grease comes out relief fittings.

5.6.3 TWAS Pumping and Metering System

TWAS Pumps

The bearings of the TW AS Pumps are lubricated with Mobilux EP2 grease (Mobil Chemical Co.) at the factory and will only need to be relubricated when the shaft/bearing assembly is removed from the pump. Both gear joints are packed with MPG-2 Multi-Purpose grease (Dubois Chemical Div.) during assembly, and will only need to be relubricated when gear joints are disassembled.

1. Daily

- a. Check the TWAS pump operation to see that they are operating smoothly and quietly. Record and report any unusual operation to your Maintenance Supervisor.
- b. Check the TWAS pumps for leaks, excessive noise and temperature (hand touch). Record and report all noted problems to your Maintenance Supervisor.
- c. Check the seal water flow to the mechanical seals of the TW AS pumps and adjust the flow to a few drops for cooling and lubrication.

- d. Check that the check valves on both operating TWAS pumps are open. This condition is alarmed at LCD-OAF, but a visual check provides added redundancy. Record and report all noted problems to your Maintenance Supervisor.
- e. Check the control settings both locally and at SCADA to confirm the requirements of your Operations Supervisor.
- f. Check and record TWAS pumps run times at SCADA weekly.
- g. Check and record the instantaneous and totalized TWAS flows to the digesters at the TWAS flow meter located at SCADA.
- h. Check the alarm status lights at the bubbler panel for low air supply. Record and report all alarm conditions to your Operations Supervisor and Maintenance Supervisor.
- i. Check and adjust the air flow to the bubbler. The air flow to the bubbler should be about 3 acfu. All adjustments should be recorded and reported to your Operations Supervisor.
- j. Check the local control settings and level gauges at the bubbler panel to confirm the requirements of your Operations Supervisor.

2. Weekly

- a. Check that the TWAS Equipment is properly adjusted and working efficiently.
- b. Purge bubbler tubing to clear accumulated grease.

3. Monthly

- a. Check and clean the area between the TWAS pump motor cooling fins and the area through which air is drawn into the fan guard.
- b. Lubricate packing rings of the TWAS Pumps with a MPG-2 Multi-Purpose Grease (Dubois Chemical Div). Grease can be added through the zerk fittings installed in the side of the stuffing box.

4. Every Six (6) Months

- a. Check Bubbler Tubing for corrosion or looseness.

5. Annually

- a. Grease TWAS Pump motor bearings with a Shell Dolium R grease. Lubricate motors at standstill. Clean tip of fitting and apply grease gun. Use 1 to 2 full strokes.

5.6.4 DAF Polymer Addition System

Polymer Containment Area Sump Pump

Under normal operating conditions no lubrication or other maintenance is required; however the following checks are recommended:

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Clean the sump pit of all trash and debris, since large solids may clog or affect the performance of the pump.
2. Every 3 Months:
 - a. Check the level and function of each float switch. Verify proper signal and annunciation of high water alarm.
 - b. Inspect impeller and body for clogging or excessive build-up. Check amperage of operating pump, high amperage may indicate clogging.
 - c. Inspect seals for wear damage or leaking. Replace as needed.
 - d. Check motor chamber for cooling oil level and contamination. Replace cooling oil as needed, and change contaminated oil.
 - e. Check the local control panel and SCADA indication of moisture detection or high winding temperature. Notify Maintenance Manager of fault condition.
3. Every 2 Years:
 - a. Change cooling oil with one of the following:
 - i. BP Enerpar SE100
 - ii. Conoco Pale Paraffin 22
 - iii. Mobile D.T.E. Oil Light
 - iv. G & G Oil Circulating 22
 - v. Imperial Oil Voltesso-35
 - vi. Shell Canada Transformer-10
 - vii. Texaco Diala-Oil-AX
 - viii. Woco Premium 100

DAF Bulk Polymer Storage Tank and Mix Tank

1. Daily
 - a. Check polymer solution levels in the bulk polymer storage tank and the polymer mix tank to confirm that sufficient supply is available.
 - b. Check the SCADA for mix tank level alarm and confirm that the make-up water solenoid valve is closed on a high level alarm. Record and report all alarm conditions and noted problems to your Maintenance Supervisor.

DAF Bulk Polymer Transfer Pump

1. Daily

- a. Check oil level in the Bulk Polymer Transfer Pump Gear motors gear cases and replenish as necessary with an SAE 20 best grade of automotive engine oils. Red plugs indicate oil level check point. Frequent inspections with the unit not running (preferably when warm) should be made by removing this plug to check for proper lubricant level. If the level is low, add lubricant through one of the upper openings until it begins coming out of the oil level hole. Replace the oil level plug securely.
- b. Check the bulk polymer transfer pump and the polymer solution feed pumps operation to see that they are operating smoothly and quietly. Record and report any unusual operation to your Maintenance Supervisor.
- c. Check the bulk polymer transfer pump and the polymer solution feed pumps for leaks, excessive noise, and temperature (hand touch). Record and report all noted problems to your Maintenance Supervisor.
- d. Check seal water flow to mechanical seals of the bulk polymer transfer and polymer solution feed pumps and adjust the flow to a few drops for cooling and lubrication.
- e. Check these pumps for correct operating speed and correct speed level at the variable speed control to confirm the requirements of your Operations Supervisor.
- f. Check control settings both locally and at SCADA to confirm the requirements of your Operations Supervisor.
- g. Calibrate the bulk polymer transfer pump and the polymer solution feed pumps monthly to make sure the flows are within the typical range to confirm the requirement of your Operations Supervisor.

2. Monthly

- a. Check for water condensation in oil in the gear motors gear cases. If water is present, drain completely, flush out and fill to correct level with one of the oils indicated above.
- b. Grease the packing glands of the Bulk Polymer Transfer Pump with a MPG-2 Multi-Purpose Grease (Dubois Chemical Div.) This can be done through the grease fittings which lead to the lantern rings in the mid section of the packings. Do not use a one piece spiral wrap of packing.
- c. Check and clean the area between the Bulk Polymer Transfer Pump drive motor cooling fins and the area through which air is drawn into the fan guard.

3. Every 1500 hours of normal operation
 - a. Regrease the Bulk Polymer Transfer Pump and Polymer Solution Feed Pumps bearings with one of the following:
 - DOW Corning, DC33
 - Keystone Lubricating Co., Keystone #89
 - Texaco, Regal AFB 2
 - Shell Oil Co., Cyprina #3
 - Humble Oil & Refining Co., Beacon 325
 - American Oil Co., Supermil Grease, #A72832
 - Mobil, EPI
 - Shell Oil Co., Alvania #2

When relubricating the bearings, the bearing-shaft assembly should be removed and cleaned of old grease. Add only enough grease to fill the area between the bearings 1/3 full. Add a few drops of oil to the bearing seals before reassembling. It is normal for bearings to run warm to the touch for the first few hours of operation.

DAF Polymer Mixer

1. Daily
 - a. Check the mixer drive for leaks, excessive noise and temperature (hand touch).
2. Monthly
 - a. Check and clean the mixer motor from the coatings of dirt, dust or grease.

DAF Polymer Feed Pumps

1. Daily
 - a. Check oil level in the Polymer Solution Feed Pump Gear motors gear cases and replenish as necessary with an SAE 20 best grade of automotive engine oils. Red plugs indicate oil level check point. Frequent inspections with the unit not running (preferably when warm) should be made by removing this plug to check for proper lubricant level. If the level is low, add lubricant through one of the upper openings until it begins coming out of the oil level hole. Replace the oil level plug securely.
 - b. Check the bulk polymer transfer pump and the polymer solution feed pumps operation to see that they are operating smoothly and quietly. Record and report any unusual operation to your Maintenance Supervisor.

- c. Check the bulk polymer transfer pump and the polymer solution feed pumps for leaks, excessive noise, and temperature (hand touch). Record and report all noted problems to your Maintenance Supervisor.
- d. Check seal water flow to mechanical seals of the bulk polymer transfer and polymer solution feed pumps and adjust the flow to a few drops for cooling and lubrication.
- e. Check these pumps for correct operating speed and correct speed level at the variable speed control to confirm the requirements of your Operations Supervisor.
- f. Check control settings both locally and at SCADA to confirm the requirements of your Operations Supervisor.
- g. Calibrate the bulk polymer transfer pump and the polymer solution feed pumps monthly to make sure the flows are within the typical range to confirm the requirement of your Operations Supervisor.

2. Monthly

- a. Check for water condensation in oil in the gear motors gear cases. If water is present, drain completely, flush out and fill to correct level with one of the oils indicated above.
- b. Grease the packing glands of the Polymer Solution Feed Pumps with a MPG-2 Multi-Purpose Grease (Dubois Chemical Div.) This can be done through the grease fittings which lead to the lantern rings in the mid section of the packings. Do not use a one piece spiral wrap of packing.
- c. Check and clean the area between the Polymer Solution Feed Pumps drive motor cooling fins and the area through which air is drawn into the fan guard.

5.7 UNSTABILIZED SLUDGE STORAGE FACILITIES

Refer to the general preventive maintenance requirements described in Section 5.0. This section should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately

5.7.1 Sludge Storage Tanks

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Remove scum layer according to the following procedures:
 - Lower sludge level in the tank to approximately 10.5 ft above grade.
 - Stop the mixing system according to the procedures listed in Section 4.7.3.
 - Open the appropriate isolation valves on the scum removal pipes and drain top layer of the tank.
 - Flush scum removal lines with NPW by using the respective flushing connections.
3. Annually:
 - a. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil

Alvania #2

5.7.2 Sludge Mixing System

Unstabilized Sludge Storage Tank 1 Sludge Mixing System

The pump bearing retainers for the Unstabilized Sludge Storage Tank 1 sludge mixing pumps are equipped with lip seals to help prevent dirt and water from getting into the bearing housing. At start-up a drop or two of oil may be needed if the seals make a squealing sound. After that, no service for the seals is required. At rebuild, replace the seals and orient them as shown on the assembly drawing.

The sludge mixing pumps for Unstabilized Sludge Storage Tank 1 are equipped with oil lubricated bearings. The bearing housing is shipped empty and must be filled with oil prior to starting the pumps.

1. Daily:

- a. Check oil levels in the oil lubricated bearings and replenish as necessary with one of the following:

Mobil	DTE Medium
Exxon	Teresstic 68
Shell	Tellus 68

The bearing housing is equipped with a breather cap on top and a sight gauge on the side. Oil is added by removing the breather and filling the housing until the oil level is about half way up the sight gauge.

Do not overfill the bearing housing as foaming and high bearing temperatures may result.

2. Weekly:

- a. Exercise all manual isolation valves.
b. Check V-belts of the sludge mixing pumps for tightness. Drive belts must be kept tight enough to prevent slipping. Adjust as necessary.

3. Monthly:

- a. Check mechanical seals of the sludge mixing pumps for leakage once per month or after 150 hours of operation, whichever occurs first.
b. Check and clean the areas between the sludge mixing pump drive motor cooling fins and the area through which air is drawn into the fan guard.
c. Check for water condensation in oil in the sludge mixing pump lubrication reservoir. If water is present, drain completely, flush out and fill to correct level with one of the oils indicated above.

4. Every 6 Months:

- a. Regrease sludge mixing pump bearings with one of the following:

Mobil	DTE Medium
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Exxon
Shell

Teresstic 68
Tellus 68

The bearing housing is equipped with a breather cap on top and a sight gauge on the side. Oil is added by removing the breather and filling the housing until the oil level is about half way up the sight gauge.

Do not overfill the bearing housing as foaming and high bearing temperatures may result.

- b. Regrease sludge mixing pump motor bearings with one of the following:

Sun Oil
Mobil
Shell
Texaco
Exxon

Multi-Purpose #2EP
Mobilux #2EP
Alvania #2EP
Multipak #2EP
Lidok #2EP

Motors can be regreased by stopping the motor, removing drain plug and pumping new grease into fill hole. **Use a low pressure grease gun and avoid overgreasing.** Run motor with drain plug removed until excess grease has been discharged (minimum 10 minutes). Stop motor and replace drain plug.

- 5. Annually:

- a. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil

Alvania #2

Unstabilized Sludge Storage Tank 2 Sludge Mixing System

- 1. Daily:

- a. Inspect pump for proper operation. Clean/clear as needed.

- 2. Weekly:

- a. Exercise all manual isolation valves.

3. Monthly:

- a. The sludge mixing pumps for Unstabilized Sludge Storage Tank 2 are equipped with grease lubricated bearings. Check bearing housing for lubrication at least every 1500 hours of operation. The grease must be water repellent, of calcium, lithium, or combined qualities, with a dropping point of 350 °F or more. All bearings are lubricated at the factory prior to shipment with the following type of grease. Use this type, or equivalent, for greasing:

Mobil	Mobilux EP No.2 or
Chevron	Industrial Grease Medium
Texaco	Marafax EP2

Bearing frames have a grease cup for greasing the pumpside bearing labyrinth. Occasionally give the grease cup a turn to ensure the labyrinth is well sealed with grease (the grease is an additional barrier against entry of splashed water into the pumpside bearing).

Follow the manufacturer's published regreasing instructions.

- b. Check performance of pumps. Listen for unusual noises, and check for vibration.

4. Every 6 months:

- a. Check sheave belt tension and adjust if necessary.
- b. Inspect sheaves for proper operation. Check alignment/belt for wear.
- c. Check motor lubrication and lube as required with one of the following:

Shell	Dolium R
Texaco	Premium RB #2
Chevron	SR 1 #2
Exxon	Unirex #2

Follow the Manufacturer's published lubrication instructions.

5. Annually:

- a. Check motor to pump alignment annually and after any pump/seal maintenance according to procedures in Manufacturer's O&M Manual.

5.7.3 Ferric Chloride Addition System

Refer to Section 5.2.6.2.

5.7.4 Odor Reduction Station

Odor Reduction Station Exhaust Fans

1. Monthly:
 - a. Check fan for excessive vibration or noise. Do not operate fan if excessive noise or vibration is present. Shut down immediately.
 - b. Inspect fan two weeks after start-up and then check periodically once a month until experience indicates that a longer or shorter period of maintenance is necessary.
 - c. Check V-belts for proper tension, alignment, or excessive wear. Check sheave's grooves for excessive wear, rough spots, and foreign matter. Belt should not squeal or slip when the fan is started.
 - d. Check tightness of all fasteners, including screw on bearing locking collar, and taper lock bushing on shaft.
 - e. Check fan bearings for adequate lubrication, wear, tightness, and overheating. If bearings are in need of lubrication, re-grease with one of the following lithium based greases, No. 2 NLGI:

BP Oil	EP-2
ARCO	MIP #2
Gulf	Crown #2
Mobil	Multilith #2
Texaco	MP #2
Chevron	SRI #2
Shell	Alvania #2
 - f. Check condensate in housing to be sure it is not clogged.
 - g. Inspect housing for foreign material build-up and visual sign of damage.
 - h. Check impeller and blades for the following:
 - Build-up of foreign matter
 - Signs of visual damage or abrasion
 - Hairline or star shaped cracks
 - Delamination
 - i. Check fan inlet ductwork for foreign matter.
 - j. Check gaskets and shaft seals for damage, cracks, and compressibility. Replace as necessary.

- k. Check and clean the areas between the fan motor cooling fins and the area through which air is drawn into the fan guard.
2. Every 6 Months:
 - a. Re-grease motor bearings with one of the following:

Chevron	SRI #2
Exxon	Unirex N2
Shell	Dolium R
Texaco	Premium RB
 - b. Exercise dampers by rotating to open and close positions while the fan system is running.

RETURN DAMPER TO THE BALANCED POSITION.

Odor Reduction Station Scrubber

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
2. Every 3 Months:
 - a. Visually observe the scrubber and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the shell of each scrubber, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - c. Visually check the overflow line for any restrictions.
3. Every 6 Months:
 - a. Determine the increase in pressure drop across the packing section of the scrubber and the mist eliminator since the last cleaning.
 - b. Visually inspect both the packing section and the mist eliminator for signs of fouling or plugging. If cleaning is necessary follow cleaning procedures per the Manufacturer's O&M Manual.
 - c. Clean outside with soap and water to help maintain the original appearance of the scrubber.

4. Every 3 Years:
 - a. Visually inspect the inside of the scrubber. **The inspection program should follow U. S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the scrubber should be observed.**

Odor Reduction Station pH and ORP Controllers

1. Weekly:
 - a. Calibrate the pH and ORP meter according to the Manufacturer's O&M Manuals. Initially perform this task weekly, if meter does not drift significantly a less frequent time interval may be appropriate.
 - b. Clean the pH and ORP sensor using a soap solution according to the Manufacturer's O&M Manual. When scaling occurs and soap solution does not adequately clean the pH or ORP sensor, clean sensor with a dilute acid procedure outlined in the Manufacturer's O&M Manual.

Odor Reduction Station Recirculation Pumps

1. Daily:
 - a. Check oil level in the oil lubricated bearings using installed sight glass and replenish as necessary with one of the following:

Shell	Alvania #2
Gulf	Crown #2
Standard Oil	Amilith #2
2. Weekly:
 - a. Exercise all manual isolation valves.
3. Monthly:
 - a. Check and clean the areas between the recirculation pump drive motor cooling fins and the area through which air is drawn into the fan guard.
 - b. Check mechanical seals of the recirculation pumps for leakage once per month or after 150 hours of operation, whichever comes first.

4. Every 3 Months:
 - a. Inspect the electric motor. Drain accumulated moisture by removing plug in the bottom center of the motor housing.
5. Every 6 Months:
 - a. Grease motor bearings with one of the bearing greases listed below:

Chevron	SR1 NLGI #2
Exxon	Unirex N2
Shell	Dolium R
Texaco	Premium RB

Motors can be re-greased by stopping the motor, removing drain plug, and using a hand operated grease gun until a small amount of new grease is forced out of the drain. Replace inlet plugs and run the motor for 1/2 hour before replacing drain plug.
6. Annually:
 - a. Check motor to pump alignment annually and after any pump/seal maintenance according to procedures in Manufacturer's O&M Manual.
 - b. Replace bearing frame oil with one of the oils indicated above. See Manufacturer's O&M Manual for complete instructions. Approximate oil capacity is 2.5 pints. Do not fill oil through breather connection as overfilling is possible, resulting in oil leakage and excessive temperatures.

Odor Reduction Station NaOH Metering Pump

1. Weekly
 - a. Check pumping action of the NaOH metering pump by observing the discharge pressure, about 40 psi, along with grasping the discharge line and feeling the pulsations caused by the pump.
 - b. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check oil levels in the gear box for low level and possible contamination. Replenish as necessary with one of the following (Do not mix brands):

PulsaFeeder	PULSAlube #1
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Exxon	Nuto Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 deg F is 450-700; SSU @ 210 deg F is 73-78)
Shell	Tellus Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 F is 450-700; SSU @ 210 F is 73-78)

Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSAlube lubricant takes on a yellowish color. Change the oil per the manufacturer's procedures immediately, if this occurs and examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.

- b. Check the inlet and outlet valves for corrosion.
 - c. Check the oil seals for leakage.
3. Every 6 Months:
- a. Regrease the motor bearing with one of the following:

Chevron	SRI #2
Shell	Dolium R
4. Annually:
- a. Drain oil per manufacturer's procedures (First oil change shall be after 6 months) and check oil for possible contamination. Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSAlube lubricant takes on a yellowish color. Examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.
 - b. Change the oil with one of the oils listed above.

Odor Reduction Sodium Hypochlorite Metering Pump

- 1. Weekly
 - a. Check pumping action of the NaOCl metering pump by observing discharge pressure, about 40 psi, along with grasping the discharge line and feeling the pulsations of the pump.
 - b. Exercise all manual isolation valves.

2. Every 3 Months:

- a. Check oil levels in the gear box for low level and possible contamination. Replenish as necessary with one of the following (Do not mix brands):

PulsaFeeder	PULSAlube #1
Exxon	Nuto Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 deg F is 450-700; SSU @ 210 deg F is 73-78)
Shell	Tellus Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 F is 450-700; SSU @ 210 F is 73-78)

Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSAlube lubricant takes on a yellowish color. Change the oil, per the manufacturer's procedures, immediately, if this occurs and examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.

- b. Check the inlet and outlet valves for corrosion.
c. Check the oil seals for leakage.

3. Every 6 Months:

- a. Regrease the motor bearing with one of the following:

Chevron	SRI #2
Shell	Dolium R

4. Annually:

- a. Drain oil per manufacturer's procedures (First oil change shall be after 6 months) and check oil for possible contamination. Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSAlube lubricant takes on a yellowish color. Examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.
b. Change the oil one of the oils listed above.

Odor Reduction Sodium Hydroxide (NaOH) Storage Tank

1. Weekly
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
2. Every 3 Months
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof off each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - c. Visually check the air vent pipe and the tank overflow line for any restrictions.
 - d. Visually observe the tank and piping insulation for cracking, any signs of damage, or improper installation, and any other unusual problems.
 - e. Visually observe the heat tracing ware for any sign of damage or any other unusual problem.
3. Every 6 Months
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
4. Every 3 Years
 - a. Visually inspect the inside of the tanks.
The inspection program should follow U. S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should be observed.

Odor Reduction Station NaOCl Storage Tank

1. Weekly
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.

2. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof of each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - c. Visually check the air vent pipe and the tank overflow line for any restrictions.
3. Every 6 Months
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
4. Every 3 Years
 - a. Visually inspect the inside of the tanks.
The inspection program should follow U. S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should observed.

NaOH and NaOCl Containment Sump Pumps

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally specified. The float switches may have to be moved back to their original position.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.
 - d. Check the moisture sensor light and thermal sensor light. If either is on, contact the local representative.

3. Every 2 Years:
 - a. Change dielectric oil surrounding motor with one of the following:

Mobil	D.T.E. Oil Light
BP	Enerpar SE 40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

Odor Reduction Station Water Softener System

1. Weekly
 - a. Check salt level:
 - Remove brine tank lid.
 - Add salt when the salt level is below the water line.
 - Pour in salt to the top of tank.
 - Close lid.
 - b. Inspect the connection of both vessels for leaks.
2. Monthly
 - a. Check the duplex water softener for proper operation.
 - b. Calibrate the calcium ion selective meter according to Manufacturer's O&M Manual.
3. Annually
 - a. Clean brine tank.
 - Disconnect brine line
 - Remove salt.
 - Drain water.
 - Rinse with hose.
 - Clean with brush and mild soap.
 - Rinse with hose
 - Reconnect brine line.
 - Fill 1/2 way with water.
 - Fill with salt.
 - Return to service.

5.8 SLUDGE DEWATERING FACILITIES

Refer to the general preventative maintenance requirements presented in Section 5.0. This section should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately.

5.8.1 Dewatering System Pumping Facilities

Sludge Grinder

1. Daily:
 - a. Check oil levels in the reducer and replenish as necessary with one of the following:

Texaco	Meropa 220
Mobil Oil	Mobilgear 630
Shell Oil	Omala Oel 220
ESSO	Spartan EP 220
Castrol	Alpha SP 220

Proper oil level must be maintained in the reducer. The reducer has a filler/breather plug, level plug, and drain plug. The filler/breather plug must be located at the top of the reducer. Remove it using a wrench to replace oil. The breather is designed to release pressure caused by operating heat. Do not restrict the operation of the vent with paint or other obstruction. This could cause damage to the oil seals and the unit.

The level plug is located on the side of the reducer. To check the oil level, remove this plug. The correct level of lubricant is to the bottom of this hole.

2. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Grease the grinder gears with one of the following:

Petrolon	Slick 50 Grease QMI
Royal Lub.	Royco 22
Sentinel	Sentinel Lubricant

Grease the gears by pumping through grease fitting. Used grease must be removed (with POWER OFF) from the space under the gear.

3. Monthly:
 - a. Check the grinder seals for leakage once per month or after 150 hours of operation, whichever occurs first.
 - b. Check and clean the areas between the grinder drive motor cooling fins and the area through which air is drawn into the fan guard.
4. Every 6 Months:
 - a. Change reducer oil with one of the oils indicated above.
 - b. Grease the motor bearings with one of the following:

Shell Oil	Dolium R
Chevron	SRI NLGI #2
 - c. Grease the bearings on either side of the grinder. There is one grease fitting located on the bearing housing of each bearing. Pump 3 shots of grease into the lubrication fitting with Petrolon Slick 50 or an equal grease as indicated above for the grinder gears.
 - d. Visually inspect cutter for wear. Replace as necessary.
5. Annually:
 - a. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil	Alvania #2
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BFP Sludge Feed Pumps

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check V-belts of the BFP sludge feed pumps for tightness. Drive belts must be kept tight enough to prevent slipping. Adjust as necessary.
2. Monthly:
 - a. Check mechanical seals of the BFP sludge feed pumps for leakage once per month or after 150 hours of operations, whichever occurs first.
 - b. Check and clean the areas between the BFP sludge feed pump drive motor cooling fins and the area through which air is drawing through the fan guard.

3. Every 6 Months:

- a. Measure the capacity of the pump. Because the pump is designed to yield a specific capacity (G.P.M.) against a specific pressure, a decrease in capacity normally indicates a reduction in compression fit between rotor and stator, i.e., element wear. If a gradual reduction is discovered and all other system parameters are unchanged, wear is the most probable cause for the deterioration in capacity. Remove and inspect the stator for wear. Measure the rotor crest-to-crest. Refer to the pump "Operation-Assembly Instructions" for information on component reuse and replacement. Get a feel for the amount of wear in a given operation time.

WARNING: NEVER LET THE PUMP RUN DRY. ALWAYS BE SURE TO HAVE A FLUID PASSING THROUGH THE ELEMENTS WHEN THEY ARE BEING ROTATED.

- b. Inspect the grease seal. If you notice that an appreciable amount of grease has escaped a grease seal, wipe it clean and visually inspect the seal. If no obvious deficiencies can be seen, continue to monitor. The escaped lubricant could merely be excess in the cavity. If it continues for close to a week, add, through the "zerk" fitting, an amount of the proper lubricant equal to the escaped amount. Replace the seals at the earliest convenience. Use the following grease for the pump bearing:

Mobil

Mobilux EP2

4. Annually:

- a. Completely disassemble the pump as described in the "Operation-Assembly Instructions" in the manufacturer's O&M Manual.
 - 1) Replace all o-rings and gaskets (these are inexpensive components protecting expensive components).
 - 2) Use a clean degreasing agent to remove all bearing grease and closely inspect bearings for roughness and "scoring" of "races". Check lip seals. Replace all worn or damaged parts.
 - 3) Inspect shaft quill. Check for .031" wear grooves. Replace if necessary.
 - 4) Examine all gear joint components. Replace gear joint seals. Check thrust plates for wear. This can be done by measuring the height of the inside diameter. Measure all four. Progressing cavity pumps, pumping in one direction, will exhibit wear only on one of the two thrust plates in each joint. If worn, replace.

- 5) Inspect ring gears and gear balls. You should see wear only on one side of each tooth. If this wear is greater than 1/4 the tooth thickness, replace both parts.
- 6) Check keys and replace if worn.
- 7) Inspect elements as described above and in "Operation-Assembly Instructions". Follow guidelines given for reuse and replacement.

When rebuilding the pump, follow the procedure outlined in the manufacturer's assembly instruction. Care should be taken to assure proper lubrication. Be sure to use the prescribed lubricants. For the gear joints, the proper grease to use is as follows:

Dubois Chemical	MPG-2 Multi-Purpose Grease #03010
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- b. Re-grease the motor ball bearings with one of the following:

Chevron	SRI NLGI #2
Shell Oil	Dolium R
Texaco	Premium RB

The motor bearings may be lubricated with the motor running or stationary. Stationary with motor warm is preferred. Remove drain plug and loosen any hardened grease that may block drain, add 0.5 cubic inches of the grease using a hand operated grease gun, run the motor for 2 hours, and then replace the drain plug. Grease may not relieve from drain. Use only the recommended volume of 0.5 cubic inches.

- c. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil	Alvania #2
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5. Every 2 years:
 - a. Replace the connecting rod for the pump.

5.8.2 Dewatering System Polymer Conditioning Facilities

Bulk Polymer Storage Tanks

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.

2. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof of each tank, and all pipes, duct, valves, manholes for any signs of damage or improper installation.
 - c. Visually check the air vent pipe and the tank overflow line for any restrictions.
3. Every 6 Months:
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
4. Every 3 Years:
 - a. Visually inspect the inside of the tanks.
The inspection program should follow U.S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update, and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should be observed.

Solids Processing Polymer Storage Area Sump Pump

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally specified. The float switches may have to be moved back to their original position.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.
 - d. Check the moisture sensor light and thermal sensor light. If either is on, please contact the local representative.

3. Every 2 Years:
 - a. Change dielectric oil surrounding motor with one of the following:

Mobil	D.T.E. Oil Light
BP	Enerpar SE 40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

Bulk Polymer Transfer Pumps

The ball bearings for the D.C. motor are deep grooved, double shielded with sufficient lubricant packed onto the bearing by the manufacturer for “life lubrication”. No grease fittings are provided as the initial lubricant is adequate for up to 5 years of operation under normal conditions.

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check V-belts of the polymer pumps for tightness. Drive belts must be kept tight enough to prevent slipping. Adjust as necessary.
2. Monthly:
 - a. Check mechanical seals of the polymer pumps for leakage once per month or after 150 hours of operations, whichever occurs first.
 - b. Check and clean the areas between the polymer pump drive motor cooling fins and the area through which air is drawn into the fan guard.
 - c. Inspect pump and motor for damaged wiring or conduit.
3. Every 6 Months:
 - a. Measure the capacity of the pump. Because the pump is designed to yield a specific capacity (G.P.M.) against a specific pressure, a decrease in capacity normally indicates a reduction in compression fit between rotor and stator, i.e., element wear. If a gradual reduction is discovered and all other system parameters are unchanged, wear is the most probable cause for the deterioration in capacity. Remove and inspect the stator for wear. Measure the rotor crest-to-crest. Refer to the pump “Operation-Assembly Instructions” for information on component reuse and replacement. Get a feel for the amount of wear in a given operation time.

WARNING: NEVER LET THE PUMP RUN DRY. ALWAYS BE SURE TO HAVE A FLUID PASSING THROUGH THE ELEMENTS WHEN THEY ARE BEING ROTATED.

- b. Inspect the grease seal. If you notice that an appreciable amount of grease has escaped a grease seal, wipe it clean and visually inspect the seal. If no obvious deficiencies can be seen, continue to monitor. The escaped lubricant could merely be excess in the cavity. If it continues for close to a week, add, through the "zerk" fitting, an amount of the proper lubricant equal to the escaped amount. Replace the seals at the earliest convenience. Use the following grease for the pump bearing:

Shell Oil	Cyprina #3 or Alvania #2
Texaco	Regal AFB2
Mobil	Mobilux EP1
Dow Corning	DC 33
Keystone Lub. Co.	Keystone #89

- c. Check brushes of the motor to make certain that they move freely in the holders and make proper contact with the commutator. Replace worn brushes.
- d. Check condition of the motor's commutator. The commutator should remain a polished surface. Blackening may indicate rough or eccentric commutator. Occasional wiping (power off) with dry canvas or non-lining cloth may suffice. If rough or excessively dirty, smooth with very fine (00) sandpaper lightly with armature rotating. Never use emery cloth. Never allow the brushes to wear so short that spring tension is lost. The resultant sparking will seriously damage the commutator.

WARNING: DEPRESSING THE "STOP" SWITCH DOES NOT REMOVE POWER FROM THE MOTOR. THEREFORE, THE A-C LINE DISCONNECT SHOULD BE TURNED "OFF" AND LOCKED OUT WHENEVER THE MOTOR IS BEING SERVICED.

- 4. Annually:
 - a. Re-lubricate pump bearings with one of the greases listed above.

The pump is equipped with ball bearings in the drive end. The bearings are lubricated at the factory and do not need additional lubrication for 8500 hours of normal operation.

When re-lubricating the bearings, the bearing-shaft assembly should be removed (See Disassembly instructions in the O&M Manual by Moyno Industrial Products) and cleaned of old grease. Add only enough grease to fill the area between the bearings 1/3 full. Add a few drops of oil to bearing seals before reassembling. It is normal for bearings to run warm to the touch for the first few hours of operation.

- b. Completely disassemble the pump as described in the “Operation-Assembly Instructions” of the manufacturer’s Operation and Maintenance Manual.
 - 1) Use a clean degreasing agent to remove all bearing grease and closely inspect bearings for roughness and “scoring” of “races”. Check lip seals. Replace all worn or damaged parts.
 - 2) Inspect shaft quill. Check for wear grooves. Replace if necessary.
 - 3) Examine all pin joint components. Replace connecting rod washers. Check pins for wear and replace if worn. Check the pin holes in connection rod, drive shaft, and rotor head for wear and replace if necessary.
 - 4) Inspect rotor and stator as described above and in “Operation-Assembly Instructions”. Follow the guidelines given for reuse and replacement.

When rebuilding the pump, follow the procedure outlined in the assembly instructions. Care should be taken to assure proper lubrication. Be sure to use the prescribed lubricants.

Polymer Mixing Tanks

1. Daily:
 - a. Check the water flowing through the make-up water solenoid valve and make sure that water is free of dirt and foreign matter as possible.
2. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
3. Monthly:
 - a. Cycle the make-up water solenoid valve on and off by disconnecting and reconnecting power. This will help ensure proper opening and closing.

4. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof of each tank, and all pipes, duct, valves, manholes for any signs of damage or improper installation.
 - c. Visually check the tank overflow line for any restrictions.
5. Every 6 Months:
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
 - b. Clean the make-up water solenoid valve. A periodic cleaning of the solenoid valve is desirable to assure proper operation. If valve operation is sluggish (even though voltage to the coil is correct), or if you detect excessive noise or leakage, the valve should be disassembled and cleaned.

While carrying out periodic cleaning, carefully inspect all internal valve parts for wear or damage. Replace parts as necessary. **Shut down mixing tank.** Always turn off water supply and electrical power and depressurize valve before disassembling it for cleaning or repairs. It is not necessary to remove the water supply pipeline to disassemble the valve.

6. Every 3 Years:
 - a. Visually inspect the inside of the tanks.
The inspection program should follow U.S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update, and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should be observed.

Polymer Mixers

The mixer gearboxes are permanently lubricated and sealed by the manufacturer. Driveshaft bearings are permanently lubricated and sealed.

1. Every 6 Months:
 - a. Clean both the gear drive and motor exterior surfaces of any accumulation of dirt, grime, or other coatings. Surface coatings will significantly decrease heat dissipation.
 - b. Re-torque all mounting hardware. Shaft coupling hardware, and impeller hardware to the recommended torque values given in Table 2

of Chemineer's Manual 231. Checking hardware torque is **strongly** recommended if mixer has been left out of service for an extended period of time.

Polymer Feed Pumps

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check V-belts of the polymer feed pumps for tightness. Drive belts must be kept tight enough to prevent slipping. Adjust as necessary.
2. Monthly:
 - a. Check mechanical seals of the polymer pumps for leakage once per month or after 150 hours of operations, whichever occurs first.
 - b. Inspect pump and motor for damaged wiring or conduit.
3. Every 6 Months:
 - a. Measure the capacity of the pump. Because the pump is designed to yield a specific capacity (G.P.M.) against a specific pressure, a decrease in capacity normally indicates a reduction in compression fit between rotor and stator, i.e., element wear. If a gradual reduction is discovered and all other system parameters are unchanged, wear is the most probable cause for the deterioration in capacity. Remove and inspect the stator for wear. Measure the rotor crest-to-crest. Refer to the pump "Operation-Assembly Instructions" for information on component reuse and replacement. Get a feel for the amount of wear in a given operation time.

WARNING: NEVER LET THE PUMP RUN DRY. ALWAYS BE SURE TO HAVE A FLUID PASSING THROUGH THE ELEMENTS WHEN THEY ARE BEING ROTATED.

- b. Inspect the grease seal. If you notice that an appreciable amount of grease has escaped a grease seal, wipe it clean and visually inspect the seal. If no obvious deficiencies can be seen, continue to monitor. The escaped lubricant could merely be excess in the cavity. If it continues for close to a week, add, through the "zerk" fitting, an amount of the proper lubricant equal to the escaped amount. Replace the seals at the earliest convenience. Use the following grease for the pump bearing:

Shell Oil
Texaco
Mobil

Cyprina #3 or Alvania#2
Regal AFB2
Mobilux EP1

Dow Corning
Keystone Lub. Co.

DC 33
Keystone #89

- c. Check condition of the brushes. Replace brushes with new brushes of the same grade before wear permits the rivet or tamped pigtail to score the commutator. It is best to change out the complete set.

WARNING: HIGH VOLTAGE AND ROTATING MACHINERY CAN CAUSE SERIOUS OR FATAL INJURY. BRUSHES SHOULD NOT BE TOUCHED OR REPLACED WHILE MACHINE IS ENERGIZED OR ROTATING.

- d. Check condition of commutator. A commutator should be clean and smooth with a medium polish and a light brown color. Keep clean by wiping with a canvas pad. **Do not use lubricant or emery abrasive.** If commutator is rough, it may need to be resurfaced (see manufacturer's O&M manual for detailed description).

4. Annually:

- a. Re-lubricate bearing with one of the greases indicated above.

The pump is equipped with ball bearings in the drive end. The bearings are lubricated at the factory and do not need additional lubrication for 8500 hours of normal operation.

When re-lubricating the bearings, the bearing-shaft assembly should be removed (See Disassembly instructions in the O&M Manual by Moyno Industrial Products) and cleaned of old grease. Add only enough grease to fill the area between the bearings 1/3 full. Add a few drops of oil to bearing seals before reassembling. It is normal for bearings to run warm to the touch for the first few hours of operation.

- b. The drive end bearing of the motor should be re-greased annually due to severe conditions. Bearing fits in machined cavity in bracket with inner cap. To re-grease bearings remove bracket (four nuts hold bracket to frame) and inner cap (two bolts). Clean old grease from bearing and cavity and repack with one of the following:

Chevron
Shell

SRI NGLI #2
Dolium R

- c. Re-grease the commutator end bearing of the motor. The bearing has single shield and single seal with seal on side facing commutator. To

re-grease bearing, snap out brushes and remove bracket (four nuts hold bracket to frame). Clean old grease from around bearing and cavity and repack around bearing and cavity with one of the following:

Chevron	SRI NGLI #2
Shell	Dolium R

- d. Completely disassemble the pump as described in the “Operation-Assembly Instructions” of the manufacturer’s Operation and Maintenance Manual.
 - 1) Use a clean degreasing agent to remove all bearing grease and closely inspect bearings for roughness and “scoring” of “races”. Check lip seals. Replace all worn or damaged parts.
 - 2) Inspect shaft quill. Check for wear grooves. Replace if necessary.
 - 3) Examine all pin joint components. Replace connecting rod washers. Check pins for wear and replace if worn. Check the pin holes in connection rod, drive shaft, and rotor head for wear and replace if necessary.
 - 4) Inspect rotor and stator as described in “Operation-Assembly Instructions”. Follow the guidelines given for reuse and replacement.

When rebuilding the pump, follow the procedure outlined in the assembly instructions. Care should be taken to assure proper lubrication. Be sure to use the prescribed lubricants.

5.8.3 Belt Filter Presses

Cleaning of the belts can be done while the unit is running through the washwater spray tubes, without interrupting the dewatering process.

Pump liquid provides internal lubrication of the washwater booster pump mechanical seals. **If pump is run dry, rotating parts will seize and mechanical seal will be damaged. Do not operate the washwater booster pumps at or near zero flow. Rotating parts require liquid to prevent scoring or seizing.**

1. Daily:

- a. Clean the pipe nozzles of the washwater spray tubes. This is done without interrupting the dewatering process by turning the handwheels counter-clockwise to the limit stop and immediately turning back of the handwheel in clockwise direction. If nozzles show wear or corrosion, replace nozzle.
- b. Check oil level in the hydraulic unit oil container and replenish as necessary with one of the following oils:

Mobil	Mobil D.T.E. Oil - Medium
Texaco	Rando Oil HO68
Gulf	Harmony 68 A.W.
Shell	Tellus 68
Chevron	Awhyd Oil #68
Phillips	Magnus 315

At initial start-up of the hydraulic system make sure that there is an adequate oil filling. Filling quantity is about 20 gallons.

Without oil filling, the electric motor of the hydraulic unit must never be switched on.

- c. Clean the belts daily by performing a wash down cycle for a minimum period of 45 minutes to remove any polymer build-up and debris within the belt.
- d. Check oil level for the primary drive gears of belt drive reducer. Replenish as necessary with one of the following oils:

Texaco	Meropa 220
Gulf	EP Lubricant S-100
Shell	Omala Oil 220
Mobil	Mobilgear 630
Chevron	Non-Leaded Gear Compound 220

- e. Check the water flowing through the washwater booster pump solenoid valve and make sure that water is as free of dirt and foreign matter as possible.
- f. Inspect the taglines to ensure they are not tangled, hung up, or obstructed in any fashion that may prevent the taglines engaging the switch.
- g. Check emergency tagline by manually tripping circuit and resetting.
- h. Check emergency stop button operation.

2. Weekly:

- a. Inspect wear items, specifically, chicanes, scraper blades, gravity drainage grid, dewatering belts, rubber seals on the sludge restrainers and the wash stations. Replace as required. Note: Replace wearstrips **before** belts contact metal support grid.
- b. Inspect frame and roller coatings for wear. Repair corrosion as required. Contact Manufacturer for roller recoating information.
- c. Inspect racks and pinions for cleanliness and wear. Clean as required.
- d. Inspect tension cylinders for leaks. Repair as required.
- e. Inspect bearings by ensuring that roller flinger is in place and that grease is visible on bearing/shaft seal.
- f. Inspect steering assembly by performing the following:
 - Ensure sensing paddles are moving with belts.
 - Ensure both steering cylinders are responding to the sensing paddles.
 - Ensure belts are tracking in approximately the center of the belt press.
 - Ensure belt misalignment limit switches are functioning.
- g. Exercise all manual isolation valves.

3. Monthly:

- a. Clean the filter belts with 16 oz. of dry detergent and 16 oz. of Clorox bleach to 5 gallons water. The wash down with soap can either be applied directly onto the belts or injected into the spray wash system for a period of no less than 1 - 2 hours.

Note: Do **NOT** steam clean the filter belts. Steam cleaning will damage the belts. Use a maximum of 1,500 psi water.

- b. Check and clean the area between the belt filter press drive motor cooling fins and the area through which air is drawn into the fan guard. The motor bearings are sealed and the grease content is adequate for the life of the bearings.
- c. Check mechanical seals of the washwater booster pumps for leakage once per month or after 150 hours of operation, whichever occurs first.
- d. Check and clean the areas between the washwater booster pump drive motor cooling fins and the areas through which air is drawn into the fan guards.
- e. Check and clean the areas between the hydraulic unit pump drive motor cooling fins and the areas through which air is drawn into the fan guards.

- f. Cycle washwater booster pump solenoid valve on and off by disconnecting and reconnecting power. This will help ensure proper opening and closing.

4. Every 6 Months:

- a. Change the oil in the hydraulic system every 1,500 hours or 6 months, whichever comes first, with one of the oils indicated above for the hydraulic system. **Also, change hydraulic oil anytime temperature of fluid is above 200°F.** As cleanness of oil circuit is a basic requirement for a trouble-free operation, care should be taken that the hydraulic oil is filtered carefully. Therefore the oil should be filled exclusively through the filler-hole.

Prior to filling the oil container make sure that it is free of dirt by using an appropriate inspection lamp. It is not enough to drain the used oil only.

After hydraulic unit has been filled with clean oil, replace cap, start the hydraulic unit and allow belts to tension. Check fluid level in sight glass and add oil as required.

Oil should be changed at operating temperature and during summer. Whenever operating conditions necessitate an oil change during winter, oil can be warmed carefully up to 50°C (120°F) so as to make it less viscous. Ordinary immersion heaters, on account of their high thermal density per unit area are not recommended for this purpose.

Once a type of oil has been selected, no changes of brand should be made. If, however, for any reason, a change of oil type cannot be avoided, at first the system must be flushed thoroughly with oil of the new type.

- b. Replace the return filter for the hydraulic unit when changing the hydraulic fluid.
- c. Purge and refill the dodge roller support bearings (60 mm and 90 mm) with one of the following greases:

Mobil	Mobilith SHC 460
Chevron	Ultra-Duty Grade 1 Grease

Inject 2 oz. minimum for 60 mm bearings and 7 oz. minimum for 90 mm bearings. Grease should be seen exiting around the seal. Proper lubrication occurs when new lubricant completely displaces old lubricant. Lubrication should be applied while manually rotating

roller body. Drive roll bearings should be lubricated while operating machine at minimum speed. There are 2 bearings per cylinder.

Note: Use only the lubricants listed above for the bearings. Failure to lubricate the bearings invalidates the bearing warranty.

- d. Re-grease the rack and pinion of the BFPs with one of the following greases:

Mobil	Mobilith SHC 460
Texaco	Multifak EP
Shell	Alvania EP
Chevron	Dura-Lith EP2

Inject 3 to 5 oz. of grease per bottom head grease fitting (2 per cylinder).

- e. Grease the bearings of washwater pump with one of the following:

Chevron	Dura-Lith EP NLGI 2
Alternate	Lithium soap base, NLGI Grade 2, with safe operating temperature up to 250°F

- f. Clean the washwater booster pump solenoid valve. A periodic cleaning of the solenoid valve is desirable to assure proper operation. If valve operation is sluggish (even though voltage to the coil is correct), or if you detect excessive noise or leakage, the valve should be disassembled and cleaned. The valve strainer should be cleaned at the same time.

While carrying out periodic cleaning carefully inspect all internal valve parts for wear or damage. Replace parts as necessary. **Always turn off water supply to the valve by using the bypass lines, turn off electrical power, and depressurize valve before disassembling it for cleaning or repairs. It is not necessary to remove the water supply pipeline to disassemble the valve.**

- g. Inspect polymer mixer/injection ring assembly and clean as required.

5. Annually:

- a. Replace the suction filter for the hydraulic unit when replacing the hydraulic fluid. Inspect tank interior for corrosion while replacing filter.

- b. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil

Alvania #2

6. Every 2 Years:

- a. Every 2 years or after 10,000 hours of operation, whichever comes first, drain and refill the belt drive reducer with one of the oils indicated in the Daily frequency section for the belt drive reducer.
- b. Every 2 years or after 10,000 hours of operation, whichever comes first, repack bearings on the belt drive reducer or replace if required. Use one of the following greases:

Chevron Oil

Dura-Lith Beacon 3

Mobil Oil Co.

Mobilux EP2

Shell Oil

Alvania Grease R3

Texaco Co.

Multifak EP2

7. Prior to Every Belt Change:

- a. Re-grease the adjusting screw for the setting mechanism of the vertical dewatering section of the belt filter presses.

5.8.4 Odor Reduction Station

Odor Reduction Station Exhaust Fans

1. Monthly:

- a. Check fan for excessive vibration or noise. Do not operate fan if excessive noise or vibration is present. Shut down immediately.
- b. Inspect fan two weeks after start-up and then check periodically once a month until experience indicates that a longer or shorter period of maintenance is necessary.
- c. Check V-belts for proper tension, alignment, or excessive wear. Check sheave's grooves for excessive wear, rough spots, and foreign matter. Belt should not squeal or slip when the fan is started.
- d. Check tightness of all fasteners, including screw on bearing locking collar, and taper lock bushing on shaft.
- e. Check fan bearings for adequate lubrication, wear, tightness, and overheating. If bearings are in need of lubrication, re-grease with one of the following lithium based greases, No. 2 NLGI:

BP Oil

EP-2

ARCO

MIP #2

Gulf

Crown #2

Mobil	Multilith #2
Texac	MP #2
Chevon	SRI #2
Shell	Alvania #2

- f. Check condensate in housing to be sure it is not clogged.
- g. Inspect housing for foreign material build-up and visual sign of damage.
- h. Check impeller and blades for the following:
 - Build-up of foreign matter
 - Signs of visual damage or abrasion
 - Hairline or star shaped cracks
 - De-lamination
- i. Check fan inlet ductwork for foreign matter.
- j. Check gaskets and shaft seals for damage, cracks, and compressibility. Replace as necessary.
- k. Check and clean the areas between the fan motor cooling fins and the area through which air is drawn into the fan guard.

2. Every 6 Months:

- a. Re-grease motor bearings with one of the following:

Chevron	SRI #2
Exxon	Unirex N2
Shell	Dolium R
Texac	Premium RB

- b. Exercise dampers by rotating to open and close positions while the fan system is running.

RETURN DAMPER TO THE BALANCED POSITION.

3. Annually:

- a. Inspect the gearing of the damper actuators which have a chainwheel operator. Re-grease gearings with one of the following:

Amaco	Amdex No. 1 EP
Exxon	Nebula EP-1

Odor Reduction Station Scrubber Nos. 1 and 2

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
2. Every 3 Months:
 - a. Visually observe the scrubber and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the shell of each scrubber, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - c. Visually check the overflow line for any restrictions.
3. Every 6 Months:
 - a. Determine the increase in pressure drop across the packing section of the scrubber and the mist eliminator since the last cleaning.
 - b. Visually inspect both the packing section and the mist eliminator for signs of fouling or plugging. If cleaning is necessary follow cleaning procedures per the Manufacturer's O&M Manual.
 - c. Clean outside with soap and water to help maintain the original appearance of the scrubber.
4. Every 3 Years:
 - a. Visually inspect the inside of the scrubber.
The inspection program should follow U.S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update, and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the scrubber should be observed.

Odor Reduction Station pH and ORP Controllers

1. Weekly:
 - a. Calibrate the pH and ORP meter according to the Manufacturer's O&M Manuals. Initially perform this task weekly, if meter does not drift significantly a less frequent time interval may be appropriate.
 - b. Clean the pH and ORP sensor using a soap solution according to the Manufacturer's O&M Manual. When scaling occurs and soap solution does not adequately clean the pH or ORP sensor, clean sensor with a dilute acid procedure outlined in the Manufacturer's O&M Manual.

Odor Reduction Station Recirculation Pumps

1. Daily:
 - a. Check oil level in the oil lubricated bearings using installed sight glass and replenish as necessary with one of the following:

Shell	Alvania #2
Gulf	Crown #2
Standard Oil	Amilith #2
2. Weekly:
 - a. Exercise all manual isolation valves.
3. Monthly:
 - a. Check and clean the areas between the recirculation pump drive motor cooling fins and the area through which air is drawn into the fan guard.
 - b. Check mechanical seals of the recirculation pumps for leakage once per month or after 150 hours of operation, whichever comes first.
4. Every 3 Months:
 - a. Inspect the electric motor. Drain accumulated moisture by removing plug in the bottom center of the motor housing.
5. Every 6 Months:
 - a. Grease motor bearings with one of the bearing greases listed below:

Chevron	SR1 NLGI #2
Exxon	Unirex N2
Shell	Dolium R
Texaco	Premium RB

Motors can be re-greased by stopping the motor, removing drain plug, and using a hand operated grease gun until a small amount of new grease is forced out of the drain. Replace inlet plugs and run the motor for 1/2 hour before replacing drain plug.

6. Annually:
 - a. Check motor to pump alignment annually and after any pump/seal maintenance according to procedures in Manufacturer's O&M Manual.

- b. Replace bearing frame oil with one of the oils indicated above. See Manufacturer's O&M Manual for complete instructions. Approximate oil capacity is 2.5 pints. Do not fill oil through breather connection as overfilling is possible, resulting in oil leakage and excessive temperatures.

Odor Reduction Station H_2SO_4 and NaOH Metering Pumps

1. Weekly:
 - a. Check pumping action of each H_2SO_4 and NaOH metering pump by observing the discharge pressure, about 40 psi, along with grasping the discharge line and feeling the pulsations caused by the pump.
 - b. Exercise all manual isolation valves.

2. Every 3 Months:
 - a. Check oil levels in the gear box for low level and possible contamination. Replenish as necessary with one of the following (Do not mix brands):

PulsaFeeder	PULSAlube #1
Exxon	Nuto Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 deg F is 450-700; SSU @ 210 deg F is 73-78)
Shell	Tellus Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 F is 450-700; SSU @ 210 F is 73-78)

Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSAlube lubricant takes on a yellowish color. Change the oil per the manufacturer's procedures immediately, if this occurs and examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.

- b. Check the inlet and outlet valves for corrosion.
- c. Check the oil seals for leakage.

3. Every 6 Months:
 - a. Re-grease the motor bearing with one of the following:

Chevron	SRI NGLI #2
Shell	Dolium R

4. Annually:
 - a. Drain oil per manufacturer's procedures (first oil change shall be after 6 months) and check oil for possible contamination. Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSAlube lubricant takes on a yellowish color. Examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.
 - b. Change the oil with one of the oils listed above.

Odor Reduction Sodium Hypochlorite Metering Pump

1. Weekly:
 - a. Check pumping action of the NaOCl metering pump by observing discharge pressure, about 40 psi, along with grasping the discharge line and feeling the pulsations of the pump.
2. Every 3 Months:
 - a. Check oil levels in the gear box for low level and possible contamination. Replenish as necessary with one of the following (Do not mix brands):

PulsaFeeder	PULSAlube #1
Exxon	Nuto Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 deg F is 450-700; SSU @ 210 deg F is 73-78)
Shell	Tellus Series (API Gravity 28-30; Viscosity Index 95-160; SSU @ 100 F is 450-700; SSU @ 210 F is 73-78)

Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSAlube lubricant takes on a yellowish color. Change the oil, per the manufacturer's procedures, immediately, if this occurs and examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.

- b. Check the inlet and outlet valves for corrosion.
- c. Check the oil seals for leakage.

3. Every 6 Months:
 - a. Re-grease the motor bearing with one of the following:

Chevron	SRI NGLI #2
Shell	Dolium R
4. Annually:
 - a. Drain oil per manufacturer's procedures (First oil change shall be after 6 months) and check oil for possible contamination. Under sustained conditions of high humidity or if water is present, the oil can become emulsified. The PULSAube lubricant takes on a yellowish color. Examine the make-up valve and other parts for corrosion. A suction pump similar to a grease gun is useful for removing oil from chambers, or it may be drained from the ports at the side of each chamber.
 - b. Change the oil with one of the oils listed above.

Odor Reduction Station H_2SO_4 Storage Tank

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
2. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems. Pay particular attention to areas exposed to the sun.
 - b. Visually observe the roof of each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - c. Visually check the air vent pipe and the tank overflow line for any restrictions.

Odor Reduction $NaOH$ Storage Tank

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.

2. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof off each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - c. Visually check the air vent pipe and the tank overflow line for any restrictions.
3. Every 6 Months:
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
4. Every 3 Years:
 - a. Visually inspect the inside of the tanks.
The inspection program should follow U.S. Army Corps Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update, and O.S.H.A. General industry Standard 1910.146 (1991), or its update. Proper safety requirements due to the contents of the tanks should be observed.

Odor Reduction Station NaOCl Storage Tank

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
2. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof of each tank, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - c. Visually check the air vent pipe and the tank overflow line for any restrictions.
3. Every 6 Months:
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
4. Every 3 Years:
 - a. Visually inspect the inside of the tanks.

The inspection program should follow U.S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update, and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should be observed.

H₂SO₄, NaOH and NaOCl Containment Sump Pumps

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally specified. The float switches may have to be moved back to their original position.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.
 - d. Check the moisture sensor light and thermal sensor light. If either is on, contact the local representative.
3. Every 2 Years:
 - a. Change dielectric oil surrounding motor with one of the following:

Mobil	D.T.E. Oil Light
BP	Enerpar SE 40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

Odor Reduction Station Water Softener System

1. Weekly:
 - a. Check salt level:
 - Remove brine tank lid.
 - Add salt when the salt level is below the water line.
 - Pour in salt to the top of tank.
 - Close lid.
 - b. Inspect the connection of both vessels for leaks.

2. Monthly:
 - a. Check the duplex water softener for proper operation.
 - b. Calibrate the calcium ion selective meter according to the Manufacturer's O&M Manual.
3. Annually:
 - a. Clean brine tank:
 - Disconnect brine line
 - Remove salt.
 - Drain water.
 - Rinse with hose.
 - Clean with brush and mild soap.
 - Rinse with hose
 - Reconnect brine line.
 - Fill 1/2 way with water.
 - Fill with salt.
 - Return to service.

Sludge Dewatering Building Air Supply Fans (SF2, SF3)

1. Weekly:
 - a. Check General operation including noise and vibration. Excessive fan vibration can be caused by many things. ALL POSSIBLE SOURCES OF THE EXCESSIVE VIBRATION MUST BE CHECKED OUT AND CORRECTIVE ACTION TAKEN IMMEDIATELY TO CORRECT THE PROBLEM. See the fan manufacturer trouble-shooting chart for possible causes of excessive fan vibration.
 - b. Inspect the fan impeller for any buildup of foreign material or wear from abrasion. Carefully clean the impeller of any foreign material.
 - c. Check V-belt for proper alignment, tension, and excessive wear. NEVER SERVICE OR ADJUST ROTATING EQUIPMENT WHILE IT IS IN OPERATION. LOCK OUT THE POWER SOURCE BEFORE PERFORMING MAINTENANCE.

V-belts on belt drive fans are oil, heat, and static resistant type and oversized for continuous duty. With proper installation and maintenance years of operating efficiency can be added to the life span of the V-belt drive.

V-belt drives should be completely guarded.

A noisy V-belt indicates the need for attention. However, it is normal for belts to squeal slightly at startup. V-belt noise can be caused by the slapping of the belts against the drive guard or other obstruction. Check for an improperly installed guard, loose belts, buildup of foreign material on the sheave grooves, or excessive vibration. The cause of excessive vibration should be determined and corrected.

Check belt tension. Ideal tension is the tension at which the belt will not slip under peak load conditions. Over-tensioning shortens belt and bearing life. Keep belts free from foreign material which may cause slipping. The use of belt dressing is not recommended. See manufacturers for recommended tensioning.

Inspect sheaves. Keep all sheaves grooves smooth and uniform. Burrs and rough spots along the sheave rim can damage belts. Dust, oil, and other foreign matter can lead to pitting and rust, and should be avoided as much as possible. Badly worn grooves or a shiny groove bottom indicates that either the sheave, the belt, or both are badly worn. Replace either or both belts and worn sheaves.

Check sheave alignment. Sheaves that are not aligned properly cause excessive belt wear and sheave wear.

2. Every 2 Months:

All belt drive fan bearings are heavy duty, self-aligning ball or roller type, and are relubricable for continuous service.

- a. Grease motor and fan bearings with a hand held grease gun. **Avoid the use of a pressure greasing system which tends to fill the bearing chamber completely.** Do not over grease. Use only 1 or 2 shots with a hand gun in most cases. Maximum hand gun rating 40 P.S.I. Rotate bearings during lubrication where good safety practice permits. Use one of the following greases:

Texaco	Premium PR#2 or Regal AFB#2
Union 76	Unoba EP#2 (275 deg F)
Mobil Oil	Mobilux EP#2
Shell Oil	Shell Alvania EP#2

Truck Loading Building Air Supply Fans (SF4 and SF5)

1. Weekly:

- a. Check General operation including noise and vibration. Excessive fan vibration can be caused by many things. **ALL POSSIBLE SOURCES OF THE EXCESSIVE VIBRATION MUST BE**

CHECKED OUT AND CORRECTIVE ACTION TAKEN IMMEDIATELY TO CORRECT THE PROBLEM. See the fan manufacturer trouble-shooting chart for possible causes of excessive fan vibration.

- b. Inspect the fan impeller for any buildup of foreign material or wear from abrasion. Carefully clean the impeller of any foreign material.
- c. Check V-belt for proper alignment, tension, and excessive wear. NEVER SERVICE OR ADJUST ROTATING EQUIPMENT WHILE IT IS IN OPERATION. LOCK OUT THE POWER SOURCE BEFORE PERFORMING MAINTENANCE.

V-belts on belt drive fans are oil, heat, and static resistant type and oversized for continuous duty. With proper installation and maintenance years of operating efficiency can be added to the life span of the V-belt drive.

V-belt drives should be completely guarded.

A noisy V-belt indicates the need for attention. However, it is normal for belts to squeal slightly at startup. V-belt noise can be caused by the slapping of the belts against the drive guard or other obstruction. Check for an improperly installed guard, loose belts, buildup of foreign material on the sheave grooves, or excessive vibration. The cause of excessive vibration should be determined and corrected. Check belt tension. Ideal tension is the tension at which the belt will not slip under peak load conditions. Over-tensioning shortens belt and bearing life. Keep belts free from foreign material which may cause slipping. The use of belt dressing is not recommended. See manufacturers for recommended tensioning.

Inspect sheaves. Keep all sheaves grooves smooth and uniform. Burrs and rough spots along the sheave rim can damage belts. Dust, oil, and other foreign matter can lead to pitting and rust, and should be avoided as much as possible. Badly worn grooves or a shiny groove bottom indicates that either the sheave, the belt, or both are badly worn. Replace either or both belts and worn sheaves.

Check sheave alignment. Sheaves that are not aligned properly cause excessive belt wear and sheave wear.

2. Every 2 Months:

All belt drive fan bearings are heavy duty, self-aligning ball or roller type, and are re-lubricable for continuous service.

- a. Grease motor and fan bearings with a hand held grease gun. **Avoid the use of a pressure greasing system which tends to fill the bearing chamber completely.** Do not over grease. Use only 1 or 2 shots with a hand gun in most cases. Maximum hand gun rating 40 P.S.I. Rotate bearings during lubrication where good safety practice permits. Use one of the following greases:

Texaco	Premium PR#2 or Regal AFB#2
Union 76	Unoba EP#2 (275 deg F)
Mobil Oil	Mobilux EP#2
Shell Oil	Shell Alvania EP#2

Sludge Dewatering Building Exhaust Fans (EF4, EF5, EF6, EF7)

1. Weekly:
 - a. Check General operation including noise and vibration. Excessive fan vibration can be caused by many things. ALL POSSIBLE SOURCES OF THE EXCESSIVE VIBRATION MUST BE CHECKED OUT AND CORRECTIVE ACTION TAKEN IMMEDIATELY TO CORRECT THE PROBLEM. See the fan manufacturer troubleshooting chart for possible causes of excessive fan vibration.
 - b. Inspect the fan impeller for any buildup of foreign material or wear from abrasion. Carefully clean the impeller of any foreign material. NEVER SERVICE OR ADJUST ROTATING EQUIPMENT WHILE IT IS IN OPERATION. LOCK OUT THE POWER SOURCE BEFORE PERFORMING MAINTENANCE.
2. Every 2 Months:
 - a. Grease motor bearings with a hand held grease gun. **Avoid the use of a pressure greasing system which tends to fill the bearing chamber completely.** Do not over grease. Use only 1 or 2 shots with a hand gun in most cases. Maximum hand gun rating 40 P.S.I. Rotate bearings during lubrication where good safety practice permits. Use one of the following greases:

Texaco	Premium PR#2 or Regal AFB#2
Union 76	Unoba EP#2 (275 deg. F)
Mobil Oil	Mobilux EP#2
Shell Oil	Shell Alvania EP#2

5.9 SLUDGE CONVEYANCE AND LIME STABILIZATION FACILITIES

Refer to the general preventative maintenance requirements presented in Section 5.0. This section should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately.

5.9.1 Dewatered Sludge Conveyance System

Belt Filter Press Conveyors Nos. 1A, 1B, 2A, 2B

1. Daily:

- a. Check belt travel and tension.
- b. Check all troughing, return, and training idlers to make sure all idlers are turning and center of belt is running on the centers of idlers. Record and report, if any idlers are stalling.
- c. Visually observe the training idler pivoting.
- d. Check that belt cleaners are properly adjusted and functional.
- e. Check that rubber skirts and skirt plates are adjusted to prevent spillage.

WARNING: All cages, safety guards, taglines must be fully installed and operational prior to operation and any maintenance activities.

2. Weekly:

- a. Check that chains and sprockets are mated.
- b. Check that shafts are set parallel and level in rigid supporting bearings.
- c. Visually observe the belt for breaks or cuts or for indications that the belt edge is rubbing, and any other unusual problems.
- d. Check loading areas to ensure that sludge is evenly loaded on the center of belt.
- e. Clean up any spills or build-up of material on the conveyor frames. Washdown the belt.
- f. Check gear reducer oil level with driver stopped. Replenish as necessary with one of the following:

Exxon
Shell
Texaco

Teresstic 229
Turbo T220
Regal R&O 220

- g. Check the drive chain oil level and replenish as necessary using one of the following oils:

Shell	SAE 30
Mobil	SAE 30
Chevron	SAE 30

- h. Visually observe the FRP enclosures and all ductwork and piping for cracking, any signs of liquid or gas leaks, and any other unusual problems.

3. Every 3 Months:

- a. Change the gear reducer oil with one of the oils indicated above in Item 2.f. Initial oil change should be accomplished after the first 150 hours of operation. Thereafter, the oil should be changed quarterly.
- b. Change the drive chain oil with one of the oils indicated above in Item 2.g.

4. Every 6 Months:

- a. Clean outside with soap and water to help maintain the original appearance of the FRP enclosures. An application of car wax after cleaning helps to preserve the clean appearance.

5. Every 4000 Hours of Operation:

- a. Re-grease pulley and take-up frame bearings with one of the following greases:

Mobil	Mobilith AW2
Shell	Alvania EP2
Texaco	RB-2

Inspect bushings and cap screens for proper seating.

6. Every 6000 Hours of Operation:

- a. Inspect troughing, impact, return, and training idlers. The idlers are factory lubricated with one of the following:

Mobil	Mobilux EP-2
Shell	Alvania EP-2
Texaco	RB-2

The idlers are factory sealed and, in most cases, re-lubrication is not required.

5.9.2 Lime Storage Facilities

Lime Storage Silos

1. Weekly:
 - a. Visually observe the silo and all piping and connections for cracking, any signs of leaks, and any other unusual problems.
 - b. Visually observe the roof of each silo, and all pipes, duct, valves and manways for any signs of damage or improper installation.
 - c. Visually observe silo's equipment area for any signs of leaks, damage, or improper installation.
2. Annually:
 - a. Clean outside with soap and water to help maintain the original appearance of the silos.
3. Every 3 Years:
 - a. Visually inspect the interior of the silos.
The inspection program should follow U. S. Army Corps of Engineers, Safety and Health Requirements, Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standards 1910.146 (1991) or its update. Proper safety requirements due to the contents of the silos should be observed.

Silo Dust Collector Fan and Shaker

1. Monthly:
 - a. Check general operation including noise and vibration. Excessive fan vibration can be caused by many reasons. ALL POSSIBLE SOURCES OF THE EXCESSIVE VIBRATION MUST BE CHECKED OUT AND CORRECTIVE ACTION TAKEN IMMEDIATELY TO CORRECT THE PROBLEM. See the fan manufacturer's troubleshooting chart for possible causes of excessive fan vibration.

- b. Grease motor and fan bearings with a hand held grease gun. **Avoid the use of a pressure greasing system which tends to fill the bearing chamber completely.** Do not over-grease. Rotate bearings during lubrication where good safety practice permits. Use one of the following greases:

Chevron	SRI No. 2
Texaco	Premium RB
Exxon	Unirex No. 2

2. Every 6 Months:

- a. Inspect the fan impeller for any buildup of foreign material or wear from abrasion. Carefully clean the impeller of any foreign material.
- b. Check the filter fabric, shaker mechanism and all dust seals. Replace any defective parts.

Silo Ventilation Fans

Note: The silo ventilation fans are factory greased and do not require re-greasing.

1. Monthly:

- a. Check general operation including noise and vibration. Excessive fan vibration can be caused by many reasons. **ALL POSSIBLE SOURCES OF THE EXCESSIVE VIBRATION MUST BE CHECKED OUT AND CORRECTIVE ACTION TAKEN IMMEDIATELY TO CORRECT THE PROBLEM.** See the fan manufacturer trouble shooting chart for possible causes of excessive fan vibration.
- b. Inspect the fan impeller for any buildup of foreign material or wear from abrasion. Carefully clean the impeller of any foreign material.
- c. Check V-belt for proper alignment, tension, and excessive wear. **NEVER SERVICE OR ADJUST ROTATING EQUIPMENT WHILE IT IS IN OPERATION. LOCK OUT THE POWER SOURCE BEFORE PERFORMING MAINTENANCE.**
- d. Inspect and clean or replace the filters located in the filter box.

3. Every 6 Months:

- a. Inspect the fan impeller for any buildup of foreign material or wear from abrasion. Carefully clean the impeller of any foreign material.

Lime Silo Bin Activator

1. Weekly:
 - a. Check clamp tightness.
2. Monthly:
 - a. Visually check flexible sleeve for damage caused by quicklime or mechanical damage to the elastomer.
3. Every 3 Months or 2000 Hours of Operation:
 - a. Retighten all nuts and bolts, especially vibrator mounting bolts.
 - b. Grease motor with the following:

Kluber	Staburags NBU 8 EP
	Klubr Lubrication Co.
	54 Wentworth Ave.
	Londonderry, NH 03053
	(603) 434-7704

5.9.3 Lime Conveyance Facilities

Lime Volumetric Feeder

1. Weekly:
 - a. Visually observe for any signs of damage or improper installation, any signs of leaks, and any other unusual problems.
 - b. Visually check that there is no debris or scale deposition in the feeder. Clean as required.
 - c. Inspect the auger. Note any signs of damage or wear. See that material flows evenly and does not block the discharge point.
 - d. Check gear reducer oil level with driver stopped and replenish as necessary with one of the following:

Exxon	Teresstic 220
Shell	Turbo 220
Texaco	Regal R&O 220

WARNING: All cages, safety guards, taglines, must be fully installed and operational prior to operation and any maintenance activities.

2. Every 3 Months:
 - a. Change the gear reducer oil with one of the oils indicated above in Item 1.d.
 - b. Clean interior of the unit. Washdown all debris and scale deposits.
3. Every 4000 Hours of Operation:
 - a. Re-grease all bearings with one of the following greases:

Mobil	Mobilith AW2
Shell	Alvania EP2
Texaco	RB-2

Lime Transfer Screw Conveyor

1. Weekly:
 - a. Visually observe for any signs of damage or improper installation, any signs of leaks, and any other unusual problems.
 - b. Visually check that there is no debris or scale deposition in the conveyor. Clean as required.
 - c. Inspect screw flights. Note any signs of damage or wear. See that material flows evenly and does not block the discharge point.
 - d. Check gear reducer oil level with driver stopped and replenish as necessary with one of the following:

Exxon	Teresstic 220
Shell	Turbo 220
Texaco	Regal R&O 220
 - e. Check V-belt tension. Adjust as necessary.

WARNING: All cages, safety guards, taglines, must be fully installed and operational prior to operation and any maintenance activities.

2. Every 3 Months:
 - a. Change the gear reducer oil with one of the oils indicated above in Item 1.d.
 - b. Clean interior of the unit. Washdown all debris and scale deposits.

3. Every 4000 Hours of Operation:

a. Re-grease all bearings with one of the following greases:

Mobil	Mobilith AW2
Shell	Alvania EP2
Texaco	RB-2

5.9.4 Sludge/Lime Mixing Facilities

Sludge/Lime Mixer

1. Weekly:

- a. Visually observe for any signs of damage or improper installation, any signs of leaks, and any other unusual problems.
- b. Visually check that there is no debris or scale deposition in the conveyor. Clean interior of the unit, as required. Wash down all debris and scale deposition.
- c. Inspect screw flights and paddles. Retighten paddle bolts as necessary. See that material flows evenly and does not block the discharge point.
- d. Check gear reducer oil level with driver stopped and replenish as necessary with one of the following:

Exxon	Teresstic 220
Shell	Turbo 220
Texaco	Regal R&O 220

- e. Check V-belt tension. Adjust as necessary.

WARNING: All cages, safety guards, taglines, must be fully installed and operational prior to operation and any maintenance activities.

2. Every 3 Months:

- a. Change the gear reducer oil with one of the oils indicated above in Item 1.d.

3. Every 4000 Hours of Operation:

- a. Re-grease all bearings with one of the following greases:

Mobil
Shell
Texaco

Mobilith AW2
Alvania EP2
RB-2

4. Every 6 Months:

- a. Inspect gear case lubrication for the sludge discharge knife gate valve actuator every 6 months or 500 cycles, whichever comes first. The “worm” should be totally immersed in grease. Do **not** grease drive bearings unless they are leaking. Excess grease will damage seals. If grease is lacking or contaminated with dirt, water, or foreign matter, units should be flushed with a commercial degreaser/cleaner such as Exxon Varsol #18 which does not affect seal materials. Re-pack unit allowing for grease thermal expansion with one of the following:

Exxon
Alternative

Nebula EP-0 (calcium based)
NLGI Grade 0 or 1, EP additive,
water and heat resistant, non-
separating, does not create more than
8% swell in Buna N or Viton, not
corrosive to steel, Dropping point >
316°F.

- b. Grease the geared limit switch for the valve actuator with Exxon Beacon 325. In accordance with manufacturer’s recommendation, there is **NO SUBSTITUTE** for the geared limit switch.

5.9.5 Stabilized Sludge Conveyance/Truck Loading System

Truck Loading Conveyors

1. Daily:

- a. Check belt travel and tension.
- b. Check all troughing, return, and training idlers to make sure all idlers are turning and center of belt is running on the centers of idlers. Record and report, if any idlers are stalling.
- c. Visually observe the training idler pivoting.
- d. Check that belt cleaners are properly adjusted and functional.
- e. Check that rubber skirts and skirt plates are adjusted to prevent spillage.

WARNING: All cages, safety guards, taglines must be fully installed and operational prior to operation and any maintenance activities.

2. Weekly:

- a. Check that chains and sprockets are mated.
- b. Check that shafts are set parallel and level in rigid supporting bearings.
- c. Visually observe the belt for breaks or cuts or for indications that the belt edge is rubbing, and any other unusual problems.
- d. Check loading areas to ensure that sludge evenly is loaded on the center of belt.
- e. Clean up any spills or build-up of material on the conveyor frames. Washdown the belt.
- f. Check gear reducer oil level with driver stopped. Replenish as necessary with one of the following:

Exxon	Teresstic 229
Shell	Turbo T220
Texaco	Regal R&O 220

- g. Check the drive chain oil level and replenish as necessary using one of the following oils:

Shell	SAE 30
Mobil	SAE 30
Chevron	SAE 30

- h. Visually observe the FRP enclosures and all ductwork and piping for cracking, any signs of liquid or gas leaks, and any other unusual problems.

3. Every 3 Months:

- a. Change the gear reducer oil with one of the oils indicated above in Item 2.f. Initial oil change should be accomplished after the first 150 hours of operation. Thereafter, the oil should be changed quarterly.
- b. Change the drive chain oil with one of the oils indicated above in Item 2.g.

4. Every 6 Months:
 - a. Clean outside with soap and water to help maintain the original appearance of the FRP enclosures. An application of car wax after cleaning helps to preserve the clean appearance.
5. Every 4000 Hours of Operation:
 - a. Re-grease pulley and take-up frame bearings with one of the following greases:

Mobil	Mobilith AW2
Shell	Alvania EP2
Texaco	RB-2

Inspect bushings and cap screens for proper seating.
6. Every 6000 Hours of Operation:
 - a. Inspect troughing, impact, return, and training idlers. The idlers are factory lubricated with one of the following:

Mobil	Mobilux EP-2
Shell	Alvania EP-2
Texaco	RB-2

The idlers are factory sealed and, in most cases, re-lubrication is not required.

Truck Loading Scales

1. Weekly:
 - a. Check water level in the pit. Keep the water level in the pit from contacting the levers; they will tend to “float” and cause inaccurate readings. Flush and drain the pit. Clean drainage line, as required.
 - b. Check that the space between the deck edge and the pit coping is free of material which could jam the deck and cause inaccurate readings.
2. Monthly:
 - a. Clean the scale pit and ensure no material built-up to prevent dirt and spilled material to contact the levers.

3. Annually:
 - a. The pivots and bearings should be packed with non-hardening grease to prevent rusting. Use Jet Lube AP-1 hi-temperature, multi-purpose grease. The old grease should be removed and the pivots and bearings inspected before re-packing.
 - b. Inspect structural steel and wire-brush and re-paint when needed to prevent excessive rusting with the approved painting system for this application.

5.10 PRIMARY EFFLUENT STRUCTURES

Refer to the general preventative maintenance requirements presented in Section 5.0. This section should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately.

5.10.1 Primary Effluent Bypass Structure

Primary Effluent Bypass Structure Drain Pump

1. Monthly:
 - a. Check oil level in the pedestal oil level sight gauge and replenish as necessary with SAE No. 30 non-detergent oil.
 - b. The pedestal oil level must be maintained at the midpoint of the sight gauge.
 - c. If oil for the bearings is cloudy, dirty, or discolored, the mechanical seal may have failed. Replace the mechanical seal with the oil indicated above.
 - d. Exercise all manual isolation valves.
2. Every 6 Months:
 - a. Check amperage draw to the pump motor and compare to that measured at startup. Make sure that power draw does not exceed allowable amperage to the motor at full load.
3. Annually:
 - a. Inspect the electric motor and re-grease motor bearings. Motors can be re-greased by stopping the motor, removing drain plug and pumping new grease into fill hole. Run motor with drain plug removed to discharge excess grease. Replace drain plug.
 - b. Check for smooth shaft rotation by rotating the pump shaft by hand.
 - c. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil

Alvania #2

Automatic Wastewater Sampler

1. Weekly:
 - a. Check humidity indicator. If the indicator turns pink or white, inspect electronics housing for seal failure and replace the desiccant module.
 - b. Check sample withdrawal quantity with a graduate cylinder.
2. Monthly:
 - a. Clean sample cabinet with a damp sponge and mild detergent.
 - b. Clean intake tubing by pumping water with mild detergent through the tubing.
3. Every 6 Months:
 - a. Check intake tubing for any leaks and or damage. Replace tubing if needed.
 - b. Clean the condenser fins and coils behind the access cover on the back of the sample cabinet.

Stainless Steel Slide Gates

1. Every 3 Months:
 - a. Run gate through one complete cycle.
2. Every 6 Months:
 - a. Grease fittings and manual operators with one of the following:

Mobil	Mobilgrease Special
Chevron	RMP Heavy Duty Grease EPNLGI2
Unocal	Megaplex XD-2
Lubriplate	#630-AA
 - b. Clean and grease operating stems with one of the following:

Lubricate	#630-2
Shell	Alvania EP #2
Mobil	Mobilux EP #2
Valvoline	Val-Lith EP #2
Chevron	Ultra Duty Grease EP #2

3. Annually:
 - a. Remove the lift nut and inspect for wear. If excessive wear is evident the lift nut should be replaced.

Diffusers

1. Annually:
 - a. Clean diffusers annually or when air release is non-uniform. Close valve, disconnect from pipe, and lift aeration header assembly out of channel. Rinse pipe, diffuser diaphragm, and diffuser with clean water. Use a rag to wipe extraneous material from assembly. Inspect cleaned diffusers to determine if any debris has entered the orifice holes, or if any are damaged and need replacing.

5.10.2 Primary Effluent Bypass Metering Structure

Metering Structure Sump Pump

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally specified. The float switches may have to be moved back to their original position.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.
 - d. Check the moisture sensor light and thermal sensor light. If either is on, contact the local representative.
3. Every 2 years:
 - a. Change dielectric oil surrounding motor with one of the following:

Mobil	D.T.E. Oil Light
BP	Enerpar SE40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

Flow Control Valves

1. Monthly:
 - a. Check flange connection for leakage. Tighten bolts accordingly.
 - b. Check top trunion areas for shaft leakage. If leakage is detected, replace valve packing.
 - c. Clean the valves and the actuators.
2. Annually:
 - a. Cycle the valve to verify operation and no interference in line.
 - b. Close valve and check for leakage. If leakage is detected, check actuator stops to verify that disc is fully closed. If leakage persists, inspect the valve's seat and adjust or replace the seat in accordance with the manufacturer's recommendations.
 - c. Check the valve packing's for leakage. Replace packing if necessary.
 - d. Inspect the valve seats for wear and tighten the taper pin nuts.
 - e. Check the valve actuators as follows:
 - 1) Disconnect all electric power to the actuator.
 - 2) Open electrical enclosure. Inspect and tighten all electrical connections.
 - 3) Visually inspect for any electrical or mechanical damage. Replace worn or damaged components.
 - 4) Check lubrication consistency and level. Fill or replace lubricant if required with Red Bentone lubricant.
 - f. Inspect gearing of the valve actuators which have either handwheel or chainwheel operators. Re-grease gearings with the following or equal:

Shell Oil

Alvania #2

5.10.3 Primary Effluent Bypass Junction Structure

Primary Effluent Residual Sample Pump

1. Monthly:
 - a. Check oil level in the pedestal oil level sight gauge and replenish as necessary with SAE No. 30 non-detergent oil.
 - b. The pedestal oil level must be maintained at the midpoint of the sight gauge.
 - c. If oil for the bearings is cloudy, dirty, or discolored, the mechanical seal may have failed. Replace the mechanical seal with the oil indicated above.
 - d. Exercise all manual isolation valves.

2. Every 6 Months:
 - a. Check amperage draw to the pump motor and compare to that measured at startup. Make sure that power draw does not exceed allowable amperage to the motor at full load.
3. Annually:
 - a. Inspect the electric motor and re-grease motor bearings. Motors can be re-greased by stopping the motor, removing drain plug and pumping new grease into fill hole. Run motor with drain plug removed to discharge excess grease. Replace drain plug.
 - b. Check for smooth shaft rotation by rotating the pump shaft by hand.

Primary Chlorination Dilution Water Pump

1. Monthly:
 - a. Check oil level in the pedestal oil level sight gauge and replenish as necessary with SAE No. 30 non-detergent oil.
 - b. The pedestal oil level must be maintained at the midpoint of the sight gauge.
 - c. If oil for the bearings is cloudy, dirty, or discolored, the mechanical seal may have failed. Replace the mechanical seal with the oil indicated above.
 - d. Exercise all manual isolation valves.
2. Every 6 Months:
 - a. Check amperage draw to the pump motor and compare to that measured at startup. Make sure that power draw does not exceed allowable amperage to the motor at full load.
3. Annually:
 - a. Inspect the electric motor. Re-grease motor bearings. Motors can be re-greased by stopping the motor, removing drain plug and pumping new grease into fill hole. Run motor with drain plug removed to discharge excess grease. Replace drain plug.
 - b. Check for smooth shaft rotation by rotating the pump shaft by hand.

Electrical Manhole Sump Pump

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally specified. The float switches may have to be moved back to their original position.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.
 - d. Check the moisture sensor light and thermal sensor light. If either is on, contact the local representative.
3. Every 2 years:
 - a. Change dielectric oil surrounding motor with one of the following:

Mobil	D.T.E. Oil Light
BP	Enerpar SE40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

5.11 FINAL EFFLUENT STRUCTURES

Refer to the general preventative maintenance requirements presented in Section 5.0. This section should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately.

5.11.1 Effluent Blending Structure

Primary Effluent Bisulfite Dilution Water Pump

The Primary Effluent Bisulfite Dilution Water Pump at the Effluent Blending Structure will **not** be used to dechlorinate secondary effluent under normal operations.

Verify pump status with Operations Supervisor and modify routine maintenance as needed per manufacturer's long-term storage instructions.

1. Monthly:
 - a. Check oil level in the pedestal oil level sight gauge and replenish as necessary with SAE No. 30 non-detergent oil.
 - b. The pedestal oil level must be maintained at the mid point of the sight gauge.
 - c. If oil for the bearings is cloudy, dirty, or discolored, the mechanical seal may have failed. Replace the mechanical seal with the oil indicated above.
 - d. Exercise all manual isolation valves.
2. Every 6 Months:
 - a. Check amperage draw to the pump motor and compare to that measured at startup. Make sure that power draw does not exceed allowable amperage to the motor at full load.
3. Annually:
 - a. Inspect the electric motor and regrease motor bearings. Motors can be regreased by stopping the motor, removing drain plug and pumping new grease into fillhole. Run motor with drain plug removed to discharge excess grease. Replace drain plug.
 - b. Check for smooth shaft rotation by rotating the pump shaft by hand.

Chlorine Dilution Water Pumps

1. Monthly:
 - a. Check mechanical seal grease level by assessing grease cup plunger position. Refill as needed using a water resistant nonfibrous grease and zerk gun applicator per manufacturer's instructions.
 - b. Check oil level in the oil reservoir while pump is not operating. If air is visible through the clear oil tube, add SAE 30 non-detergent oil until chamber is full.
 - c. Check bearing oil level through the Bullseye Glass on the bearing pedestal. Oil level should be at the center of the bullseye, refill with SAE 30 non-detergent oil as needed.
 - d. Exercise all manual isolation valves.
2. Every 3 Months (approx. every 500 hours of operation):
 - a. Check that the motor is clean, and interior and exterior is free of dirt, oil, grease, water, etc. Ensure all ventilation openings for motor are clear and free.
 - b. Use a "Megger" to ensure integrity of winding insulation. Record Megger readings and investigate any significant decrease in insulation resistance.
 - c. Check all electrical connections to be sure they are all tight.
Do not touch electrical connections before confirming that power has been disconnected and no electrical charge remains.
3. Annually:
 - a. Inspect the electric motor and motor bearings. Listen and feel for unusual sounds or vibration during operation. Regrease motor bearings as needed.
 - b. Check for smooth shaft rotation by rotating the pump shaft by hand.
 - c. Inspect pump suction check valve under Easy-access elbow cover. Clean and regrease, or replace as needed.
4. Every 2-1/2 to 5 years (approx. every 4,750 to 9,500 hours of operation):
 - a. Regrease motor bearings with one of the following:

Exxon Mobil	Polyrex EM
Texaco	Polystar
Rykon	Premium #2
Pennzoil	Pen 2 Lube
Chevron	SR1

Stainless Steel Slide Gates

1. Every 3 Months:
 - a. Run gate through one complete cycle.
2. Every 6 Months:
 - a. Grease fittings and manual operators with one of the following:

Mobil	Mobilgrease Special
Chevron	RMP Heavy Duty Grease EPNLGI2
Unocal	Megaplex XD-2
Lubriplate	#630-AA
 - b. Clean and grease operating stems with one of the following:

Lubricate	#630-2
Shell	Alvania EP #2
Mobil	Mobilux EP #2
Valvoline	Val-Lith EP #2
Chevron	Ultra Duty Grease EP #2
3. Annually:
 - a. Remove the lift nut and inspect for wear. If excessive wear is evident the lift nut should be replaced.

Electrical Actuator

1. Every 3 Months:
 - a. Check hydraulic oil level. If low, add one of the following:

Chevron	Hydraulic Oil #AW150HYD46
Shell	Tellus 46
Unocal	Unax AW46
2. Every 6 Months:
 - a. Remove, clean and oil the air breathers.
 - b. Tighten and check for damaged hydraulic hose connections. Replace the damaged fittings and hose as needed.
 - c. Clean equipment to prevent overheating.
3. Annually:
 - a. Replace all fluid filter cartridges in use for over 6 months.
 - b. Check quality of hydraulic oil. If contaminated change with one of the oils indicated above.
 - c. Check pump and motor alignment. Correct as required.

- d. Grease the motor with one of the following:

Shell Oil
Chevron

Dolium R
SRI NLGI #2

5.11.2 Effluent Metering Structure

Plant Effluent Residual Sample Pump

- 1. Monthly:
 - a. Check oil level in the pedestal oil level sight gauge and replenish as necessary with SAE No. 30 non-detergent oil.
 - b. The pedestal oil level must be maintained at the mid point of the sight gauge.
 - c. If oil for the bearings is cloudy, dirty, or discolored, the mechanical seal may have failed. Replace the mechanical seal with the oil indicated above.
 - d. Exercise all manual isolation valves.
- 2. Every 6 Months:
 - a. Check amperage draw to the pump motor and compare to that measured at startup. Make sure that power draw does not exceed allowable amperage to the motor at full load.
- 3. Annually:
 - a. Inspect the electric motor and regrease motor bearings. Motors can be regreased by stopping the motor, removing drain plug and pumping new grease into fillhole. Run motor with drain plug removed to discharge excess grease. Replace drain plug.
 - b. Check for smooth shaft rotation by rotating the pump shaft by hand.

Effluent Metering Structure Sump Pump

- 1. Weekly:
 - a. Exercise all manual isolation valves.
- 2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally specified. The float switches may have to be moved back to their original position.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.

- c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.
 - d. Check the moisture sensor light and thermal sensor light. If either is on, contact the local representative.
- 3. Every 2 years:
 - a. Change dielectric oil surrounding motor with one of the following:

Mobil	D.T.E. Oil Light
BP	Enerpar SE40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

Automatic Wastewater Sampler

- 1. Weekly:
 - a. Check humidity indicator. If the indicator turns pink or white, inspect electronics housing for seal failure and replace the desiccant module.
 - b. Check sample withdrawal quantity with a graduate cylinder.
- 2. Monthly:
 - a. Clean sample cabinet with a damp sponge and mild detergent.
 - b. Clean intake tubing by pumping water with mild detergent through the tubing.
- 3. Every 6 Months:
 - a. Check intake tubing for any leaks and or damage. Replace tubing if needed.
 - b. Clean the condenser fins and coils behind the access cover on the back of the sample cabinet.

5.11.3 Canyon Collector Meter Vault

Canyon Collector Meter Vault Sump Pump

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Every 3 Months:
 - a. Check the On/Off high water alarm level. The float switches for the alarm may have moved higher or lower than what was originally specified. The float switches may have to be moved back to their original position.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Turn on the pump and check the amperage. If the amperage is different from what it normally is at, your pump may be clogged.
 - d. Check the moisture sensor light and thermal sensor light. If either is on, contact the local representative.
3. Every 2 years:
 - a. Change dielectric oil surrounding motor with one of the following:

Mobil	D.T.E. Oil Light
BP	Enerpar SE40
Conoco	Pale Paraffin 22
G&G Oil	Circulating 22

Automatic Wastewater Sampler

1. Weekly:
 - a. Check humidity indicator. If the indicator turns pink or white, inspect electronics housing for seal failure and replace the desiccant module.
 - b. Check sample withdrawal quantity with a graduate cylinder.
2. Monthly:
 - a. Clean sample cabinet with a damp sponge and mild detergent.
 - b. Clean intake tubing by pumping water with mild detergent through the tubing.
3. Every 6 Months:
 - a. Check intake tubing for any leaks and or damage. Replace tubing if needed.
 - b. Clean the condenser fins and coils behind the access cover on the back of the sample cabinet.

5.12 STANDBY POWER GENERATION FACILITIES

Refer to the general preventative maintenance requirements presented in Section 5.0. This section should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately.

5.12.1 Standby Generators No. 1 and No. 2

1. Weekly:
 - a. Visually inspect, check, and clean the generator, engine, and other equipment, for any condition of leakage, vibration, noise, temperature, or other deterioration.
 - b. Visually inspect the general condition of the equipment and electrical system to ensure that the system is ready for automatic operation.
 - c. Visually inspect and clean the interior of the outdoor weather housing.
2. Monthly:
 - a. Visually inspect the fuel system flexible lines and connections. Replace as necessary.
 - b. Visually inspect and check the lubrication system oil level with the engine stopped. If necessary, add sufficient oil to raise the level to the proper mark on the dipstick, with an oil that has the following specifications:

SAE Viscosity Grade:	15W-40
API Classification:	CG-4
 - c. Check the engine jacket heater operation.
 - d. Check the drive belt tension. Adjust as required.
 - e. Visually inspect timing belts for splits, cracks and glazing, and replace as required.
 - f. Visually inspect and check the cooling system coolant level when the engine is cold. Add coolant as necessary, **but do not overfill**.
 - g. Visually inspect the cooling system flexible hoses and connectors for signs of deterioration and replace as needed.
 - h. Visually inspect and check the cooling system fan and alternator belts, as indicated in the manufacturer's maintenance manual. Replace as necessary.
 - i. Visually inspect the DC electrical system battery charger operation and charge rate.

- j. Check the DC electrical system battery electrolyte level and charge state.
- k. Visually inspect and clean the DC electrical system. Remove corrosion and clean and dry battery and rack.
- l. Visually inspect, check, test, and clean the AC electrical system circuit breakers and fuses. Replace as necessary.
WARNING: DO NOT BREAK MANUFACTURER'S SEALS OR INTERNALLY INSPECT THESE DEVICES.
- m. Perform a monthly load test on the generator sets operating in parallel. When exercising the generator sets, load should be at least 1400 kW or 35 percent of the combined nameplate rating of 4000 kW. Operate the generators at that load or higher until coolant temperature becomes stable.

If no load is available to put on the engine, start the engine for a period of time that would allow verification of oil pressure. When oil pressure stability is confirmed, shut the engine down.

Perform the following checks on the generators during the monthly load test. Coordinate with the Operational Supervisor as necessary.

- 1) Check and record oil pressure.
- 2) Visually inspect fuel system and drain all water from fuel/water separator.
- 3) Check and record coolant temperature.
- 4) Check the DC electrical system recharge.
- 5) Visually inspect exhaust line for leakage and drain the exhaust line drain condensate trap.
- 6) Check restriction indicator of air cleaner. If maximum allowable air restriction has been reached, replace air cleaner element.

3. Every 3 Months:

- a. Clean and tighten battery terminals.
- b. Visually inspect the exhaust line insulation for fire hazards.
- c. Visually inspect and check the DC electrical system. Clean and tighten battery terminals.
- d. Visually inspect and check the AC electrical system for wire abrasions where subject to motion.

4. Every 6 Months:

- a. Visually inspect the exhaust line flexible connector(s).
- b. Check the DC electrical system. Tighten DC electrical connections.
- c. Check and test the AC electrical system alarm operation.

5. Annually or Every 50 Hours of Operation:
 - a. Replace air cleaner.
6. Annually or Every 150 Hours of Operation:
 - a. Change the lubrication oil with 15W-40 and CG-4 type oil, based on procedures in the manufacturer's maintenance manual.
 - b. Replace the lubrication system filters, when the oil is being replaced, based on procedures in the manufacturer's maintenance manual.
7. Annually or Every 200 Hours of Operation:
 - a. Test the cooling system coolant supplemental coolant additives (SCA) concentration. Additional SCA **must** be added to the coolant when it becomes depleted below a specified amount depending on the concentration of nitrite and other parameters, as required in the manufacturer's maintenance manual.
8. Annually or Every 300 Hours of Operation:
 - a. Change the fuel system primary and secondary filters.
 - b. Lubricate tachometer drive with an all-purpose NLGI No. 2 grease.
9. Annually or every 500 hours of Operation:
 - a. Check and clean crankcase breather assembly. Replace the filter element and gasket.
 - b. Check and record the crankcase pressure.
10. Annually:
 - a. Visually inspect and check the generator bearing condition. Replace as necessary.
 - b. Lubricate the generator bearing at recommended intervals specified in the generator technical manual. Use one of the following greases:

Chevron Equivalent	SRI Anti-friction-type, high quality grease with a lubrication temperature range of -22 to +350 degrees ^F .
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 - c. Visually inspect and clean the generator rotor and stator following procedures in the manufacturer's maintenance manual.

- d. Visually inspect, check, and clean the generator exciter.
- e. Visually inspect, check, and clean the generator voltage regulator.
- f. Obtain scheduled oil sampling (S.O.S) analysis.
- g. Visually inspect and clean the engine ignition components.
- h. Check and test the engine injector pump and injector flow rate, pressure, and spray pattern.
- i. Check and clean the cooling system air ducts and louvers.
- j. Check, adjust, and lubricate all linkage fittings.
- k. Inspect the outside of the radiator core and, if necessary, clean it with a quality grease solvent such as mineral spirits and dry it with compressed air.
- l. Visually inspect the cooling system water pump drain hole for plugging and clean out, if required.
- m. Visually inspect, clean, and test the cooling system louver motors and controls.
- n. Test the exhaust line for excessive back pressure.
- o. Visually inspect the exhaust line hangers and supports.
- p. Check the AC electrical system. Tighten control and power wiring connections.
- q. Visually inspect and clean the AC electrical system transfer switch main contacts.

WARNING: DO NOT BREAK MANUFACTURER'S SEALS OR INTERNALLY INSPECT THESE DEVICES.

- r. Check and test the AC electrical system voltage-sensing device/relay adjustment, as indicated in the manufacturer's maintenance manual.

WARNING: DO NOT BREAK MANUFACTURER'S SEALS OR INTERNALLY INSPECT THESE DEVICES.

- s. Check and test the generator and engine mounting bolt torque.
- t. During the monthly load test perform the additionally activities while the generator set is running:
 - 1) Test the generator by measuring and recording resistance readings of windings with insulation tester (Megger, with SCR assembly or rectifier disconnected).
 - 2) Test the operation of the emergency shutdown.
 - 3) Check air flow from the air box drain tubes and the check valves for clogging. Clean as required.

11. Every 500 hours of Operation:

- a. Inspect and calibrate electronic governor as indicated in the manufacturer's maintenance manual.

12. Every 2 Years or 300 Hours of Operation:
 - a. Visually inspect the generator. Blow dust out of generator. Service more frequently if operated in dusty areas. Clean the generator, as indicated in the manufacturer's maintenance manual.
13. Every 3 Years or 500 Hours of Operation:
 - a. Visually inspect and test the AC electrical system wire-cable for insulation breakdown.
 - b. Check the engine and mounting valve clearance, as indicated in the manufacturer's maintenance manual. Minor adjustments may be made due to wear.
 - c. Drain, clean and flush the cooling system. Replace thermostat. Refill with coolant solution and conditioner.
 - d. Replace rubber hoses and better.
 - e. Replace batteries.
 - f. Perform a complete engine adjustment and tune-up.
 - g. Inspect/check the turbocharger bearing end play and radial clearance on the turbine wheel and shaft.

5.12.2 Diesel Fuel Storage Tanks

1. Weekly:
 - a. Visually inspect storage tanks for small cracks, and any signs of leakage. Fill and repair the small cracks as needed.
 - b. Inspect all decals and signs and replace if not readable.
 - c. Inspect the leak detector tube for any signs of leakage from the primary steel tank into the secondary containment.
 - d. Inspect the lock on the leak detector tube cap for corrosion. Oil the lock in key slot with light weight lube oil, if required. The lock should always be attached to the cap to prevent accidental filling of leak detector with fuel.
 - e. Inspect nipples, spill containment, and manholes for any sign of powder coating, deterioration, and corrosion. Remove the deteriorated and chipped off coating, sand, clean, and paint in accordance with the manufacturer's recommendation.
2. Monthly:
 - a. Confirm with your local fuel supplier the need to utilize additives for seasonal variances or to reduce corrosion of the inner steel tank due to local fuel impurities or intermittent moisture.
 - b. Monitor the storage tank for water at least monthly, or as needed based on experience and weather conditions. Water is heavier than

fuel and will settle to the bottom of the tank. If water is in bottom of tank, remove water with small pump.

CONTROLLING WATER ACCUMULATION IN TANK WILL INCREASE THE USEFUL LIFE OF THE TANK AND ALSO PREVENT BACTERIAL GROWTH.

If microbial growth is suspected due to fuel filter plugging, injection failing, system deposits, or corrosion of tanks and lines, arrange to have the fuel analyzed for microbial growth and contact fuel supplier to eradicate the infestation.

3. Every 3 Months:
 - a. Visually observe the tank and all pipes, valves, manway for any signs of damage or improper installation.
 - b. Visually check atmospheric vent pipe for proper operation and ensure that it is not obstructed or prevented from venting into atmosphere.
4. Annually:
 - a. Check the operation of emergency relief vents of both the primary and secondary tanks by lifting top cap and releasing it. Emergency relief vent cap should operate free from any restrictions.

5.12.3 Diesel Fuel Transfer Pump Stations

Diesel Fuel Transfer Pumps

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Monthly:
 - a. Turn on the pump and check the amperage.
 - b. Run pump to check its operation status. Listen for unusual noises and vibration.
3. Every 6 Months:
 - a. Regrease the motor bearing with one of the following:

Chevron

SRI #2

Diesel Fuel Day Tanks

1. Monthly:
 - a. Check for any leaks or signs of deterioration such as rust. Repair and repaint as needed.
2. Every 3 Months:
 - a. Visually observe the tank and all pipes, valves, for any signs of damage or improper installation.
 - b. Visually check atmospheric vent pipe for any restrictions.
3. Annually:
 - a. Check the operation of emergency relief vents of both the primary and secondary tanks by lifting top cap and releasing it. Emergency relief vent cap should operate free from any restrictions.

Diesel Fuel Overflow Tanks

1. Monthly:
 - a. Check for any leaks or signs of deterioration such as rust. Repair and repaint as needed.
2. Every 3 Months:
 - a. Visually observe the tank and all pipes, valves, for any signs of damage or improper installation.
 - b. Visually check vent pipe for any restrictions.
3. Annually:
 - a. Visually inspect the inside of the tanks. The inspection program would follow O.S.H.A. General Industry Standard. Proper safety requirements due to the contents of the tank should be observed.

Diesel Fuel Overflow Pumps

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Monthly:
 - a. Turn on the pump and check the amperage.

- b. Run pump to check its operation status. Listen for unusual noises and vibration.
- 3. Every 6 Months:
 - a. Regrease the motor bearing with one of the following:

ChevronSRI #2

5.13 COLLECTION AND CONVEYANCE FACILITIES

Refer to the general preventative maintenance requirements described in Section 5.0. The following sections should be used in conjunction with the manufacturer's Operation and Maintenance Manuals that are bound separately.

5.13.1 Diversion Structures

The concrete diversion structures have no mechanical equipment associated with their operation. There are no automated controls or telemetry associated with them. Periodic maintenance of the side weirs, the underdrain area, and the diversion box is required to ensure that flows are not blocked.

At the time of the development of this manual, no history of required maintenance frequency exists. Moreover, maintenance frequencies are likely to change with the yearly seasons. More frequent maintenance should be conducted at facility start up, with frequency adjusted as appropriate thereafter.

Goat Canyon Diversion Structure

1. Monthly (and After Each Rain Event):
 - a. Inspect the flood weir. Remove excess sediment and debris over the underdrain gravel to facilitate proper drainage.
 - b. Inspect the side inlet weir. If debris or sediment blocks the side weir grating, remove as needed.
 - c. Inspect Diversion Box Chamber No. 1. If the flange of the 90-degree elbow is buried in sediment, clean as necessary.
CAUTION: The inspection and cleaning program of the diversion chambers should follow U. S. Army Corps of Engineers, Safety and Health Requirements, Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the chambers should be observed.
 - d. Inspect Diversion Box Chamber No. 2, clean as necessary.
 - e. Inspect the inlet and outlet of the DIP culvert under the road, north of the diversion structure. If large debris or excess sediment blocks the flow, clean as necessary.

Smuggler's Gulch Diversion Structure and Stewart's Drain Diversion Structure

1. Monthly (and After Each Rain Event):
 - a. Inspect the flood weir. Remove excess sediment and debris over the underdrain gravel to facilitate proper drainage.
 - b. Inspect the side inlet weir. If debris or sediment blocks the side weir grating, remove as needed.
 - c. Inspect Diversion Box Chamber No.1. If the flange of the 90-degree elbow is buried in sediment, clean as necessary.
CAUTION: The inspection and cleaning program of the diversion chambers should follow U. S. Army Corps of Engineers, Safety and Health Requirements, Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the chambers should be observed.
 - d. Inspect Diversion Box Chamber No. 2, clean as necessary.

Canyon Del Sol Diversion Structure, and Silva's Drain Diversion Structure

1. Monthly (and After Each Rain Event):
 - a. Inspect the flood weir. Remove excess sediment and debris over the underdrain gravel to facilitate proper drainage.
 - b. Inspect the side inlet weir. If debris or sediment blocks the side weir grating, remove as needed.
 - c. Inspect Diversion Box Chamber No.1. If the flange of the 90-degree elbow is buried in sediment, clean as necessary.
CAUTION: The inspection and cleaning program of the diversion chambers should follow U. S. Army Corps of Engineers, Safety and Health Requirements, Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the chambers should be observed.
 - d. Inspect Diversion Box Chamber No. 2, clean as necessary.
 - e. Inspect the vortex valve in Chamber No. 2. If debris or sediment blocks the vortex valve, clean as necessary.

5.13.2 Conveyance Pipelines

The conveyance pipelines have no equipment associated with their operation. There are no automated controls or telemetry. Periodic maintenance at the pipe cleanouts is required to ensure that flows are not blocked.

1. Every 6 Months:
 - a. Inspect each cleanout in the conveyance piping from Goat Canyon Diversion Structure to the Goat Canyon Pump Station. Clean out as necessary.
 - b. Inspect each cleanout in the conveyance piping from Smuggler's Gulch Diversion Structure to the Hollister Street Pump Station. Clean out as necessary.

5.13.3 Goat Canyon Pump Station

5.13.3.1 Isolation Valve, Wetwell, and Pumps

Isolation Valve

1. Every 6 Months:
 - a. Inspect gear case lubrication for the valve actuator every 6 months or 500 cycles, whichever comes first. The "worm" should be totally immersed in grease. Do **not** grease drive bearings unless they are leaking. Excess grease will damage seals. If grease is lacking or contaminated with dirt, water, or foreign matter, units should be flushed with a commercial degreaser/cleaner such as Exxon Varsol #18 which does not affect seal materials. Repack unit allowing for grease thermal expansion with one of the following:

Exxon: Nebula EP-0 (calcium based)

Alternative: NLGI Grade 0 or 1, EP additive, water and heat resistant, non-separating, does not create more than 8% swell in Buna N or Viton, not corrosive to steel, Dropping point > 316°F.
 - b. Grease the geared limit switch for the valve actuator with Exxon Beacon 325. In accordance with manufacturer's recommendation, there is **NO SUBSTITUTE** for the grease for the geared limit switch.

Sewage Lift Pumps

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Monthly:
 - a. Check pressure, voltage, current, vibration, and other specifications. Unusual readings may indicate a problem requiring immediate

service. Contact your local manufacturer representative as soon as possible.

- b. Check current and ammeter fluctuation. If ammeter fluctuation is great, even though within the limits of pump rating, foreign matter may be clogging the pump. If the quantity of liquid discharged falls suddenly, foreign matter may be blocking the suction inlet.
- c. Check insulation resistance. Operation is safe as long as insulation resistance is more than 1.5 mega ohm. If resistance starts to fall rapidly even with an initial indication of over 1.5 mega ohm, this may be an indication of trouble, and repair work is required.

3. Annually:

- a. Lift out (see Item 3.b. below) and visually inspect the pump (see Item 3.c. below). If a mechanical seal must be replaced or an overhaul is considered necessary as a result of the inspection, contact nearest dealer or manufacturer directly.

- b. Follow the steps below for lifting pump:

WARNING: BEFORE PULLING THE PUMP, DISCONNECT ALL CABLES AND ENSURE THAT THE PUMP IS ISOLATED FROM THE POWER SUPPLY.

WARNING: ALWAYS LIFT THE PUMP BY THE LIFTING LUGS, NEVER BY THE MOTOR CABLE.

WARNING: WHEN LIFTING THE PUMP, USE APPROPRIATE CRANE (OR HOIST) AND LIFT SYSTEM. CHECK POSITION AND TIGHTNESS OF LIFT SYSTEM SO THAT WEIGHT OF THE PUMP IS NOT UNBALANCED. FAILURE TO OBSERVE THIS PRECAUTION CAN RESULT IN SERIOUS ACCIDENTS.

- 1) Open the access hatch. Hook the lifting chain on the hoist or motor-driven chain block.
 - 2) Lift the whole pump body slowly. It is not necessary to empty the pump wetwell or remove any bolts.
 - 3) If the guide rail is deposited with dirt such that the pump cannot slide up along it smoothly, do not lift using force. Clear the rail of dirt with a hose, stick, etc.
- c. Follow the steps below for inspection procedures:
 - 1) Check appearance. Check the impeller, cables, bolts and nuts, and external surface conditions for abnormal conditions.
CAUTION: THE SEAL CHAMBER MAY BE UNDER PRESSURE. HOLD A RAG OVER THE OIL PLUG TO PREVENT SPLATTER.
 - 2) Check mechanical seal (upper). Lift the pump out of the wetwell (by lifting procedures described in Item 3.b. above), and stand it on the floor in a vertical position. Unplug the “leak check” in the intermediate casing of the pump.

If neither oil nor water leaks are visible from the “leak check,” the mechanical seal (upper) is in satisfactory condition. If a very small quantity of oil leaks out, there is no practical problem.

If water or oil containing water, in excess of 0.8 liter (after one year of use) leaks out, the mechanical seal must be replaced.

If significant water is emitted, the mechanical seal or other components may be damaged, and an overhaul is necessary. When inspection is completed, coat the plug threads with Teflon tape or liquid packing (Three Bond #1102, or equivalent) and install.

- 3) Check mechanical seal (lower). Unplug the “oil port” and “air vent” and drain all internal oil.

If the drained oil is muddy or milky-white, it contains water. The mechanical seal (lower) is in satisfactory condition as long as the oil does not contain much water. Otherwise, it must be replaced.

After the oil has been inspected, pour fresh oil through the “oil port,” with the pump in a vertical position until oil overflows from the air vent plug. Replenish as necessary with one of the following or equivalent:

Standard	ISO VG32
Shell	Turbo Oil T32
Mobil	Mobil DTE Oil light
Esso	Esso Tresso 32
Exxon	Terresstic 32
Gulf	Harmony 32, Crest 32
Caltex	Regal Oil R&O 32

After the sealing chamber is filled to the appropriate level, wrap the oil port plug and the air vent plug securely with liquid packing (Three bond #1102 or equivalent) and install plugs.

Check for leaks. If the mechanical seal needs repair, contact the manufacturer’s local representative.

- 4) Re-grease the pump bearings with one of the following:

Lower Bearing - Grease

Standard	NLGI grade 3
Esso	Unirex N3
Mobil	Mobilith AW3

Upper Bearing - Grease

Mobil

Mobil SHC 32

- 5) Check rotor.

WARNING: CHECK THAT THE POWER IS LOCKED OFF AND DISCONNECTED BEFORE WORKING ON PUMP.

Turn the impeller manually through the pump discharge. If it turns smoothly, the rotating components should be in satisfactory condition. If the impeller resists or feels locked, the pump requires overhaul.

- d. Follow the steps below for reinstallation procedures:
- 1) After the pump has been thoroughly inspected, reinstall it by reversing the lifting procedure (see Item 3.b. above). If dirt is caught in the elbow, lift the pump slightly and operate the pump for two or three seconds to blow off the dirt.
- e. Inspect gearing of the valve actuators. Re-grease gearing with the following or equal:

Shell

Alvania #2

4. Every 2 Years:
- a. Return the pump to the manufacturer for overhaul for general inspection.

Sump Pumps

1. Weekly:
- a. Exercise all manual isolation valves.
2. Monthly:
- a. Check voltage, current, vibration, and other specifications. Unusual readings may indicate a problem requiring immediate service. Contact your local manufacturer representative as soon as possible.
- b. Check current and ammeter fluctuation. If ammeter fluctuation is great, even though within the limits of pump rating, foreign matter may be clogging the pump. If the quantity of liquid discharged falls suddenly, foreign matter may be blocking the suction inlet.
- c. Measure the insulation resistance. The value should be more than 1 mega ohm. If resistance starts to fall rapidly even with an initial indication of over 1 mega ohm, this may be an indication of trouble and repair work is required.

3. Every 3 Months:
 - a. Check the water level switches. The float switches may have moved higher or lower than what was originally specified. The float switches may have to be re-adjusted.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Check the moisture sensor light and thermal sensor light. If either is on, contact the manufacturer's local representative.
4. Every 6 Months:
 - a. Inspect the mechanical seal. If you notice water mixed with the oil or cloudy texture of the oil, these may be indications of a defective mechanical seal requiring replacement.
5. Annually:
 - a. Replace the mechanical seal whenever the oil in the mechanical seal chamber is clouded.
 - b. Change the oil in the mechanical seal chamber, and replenish as necessary with one of the following:

Shell	Turbo Oil T32
Mobil	Mobil DTE Oil light
Esso	Esso Gresso 32
Exxon	Teresstic 32
Gulf	Harmony 32, Crest 32
 - c. When replacing the oil, lay the pump on its side, with filler plug on top. Be sure to dispose of oil residue properly.
 - d. Replace the oil filler plug gasket whenever oil is replaced or inspected.
 - e. Conduct an overhaul of the pump.
 - f. Replace the O-ring whenever the pump is overhauled.
 - f. Inspect gearing of the valve actuators. Re-grease gearing with the following or equal:

Shell	Alvania #2
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5.13.3.2 Surge Arresters

CAUTION: DO NOT PROCEED WITH ANY MAINTENANCE ON THE LIQUID LEVEL GAGE VALVES UNLESS THE LEVEL GAGE HAS BEEN RELIEVED OF ALL PRESSURE OR VACUUM HAS BEEN ALLOWED TO REACH AMBIENT TEMPERATURE, AND HAS BEEN DRAINED OR PURGED OF ALL FLUIDS.

1. Weekly:
 - a. Inspect surge arresters for correct liquid level.
 - b. Exercise all manual isolation valves.
2. Monthly:
 - a. Inspect all threaded and bolted connections to the vessels to ensure they are secure.
 - b. Check the gage valves for signs of leakage around stem area. Stem packing leakage can often be stopped by tightening the stem packing nut. If leak persists, replace the stem packing.
 - c. Check the gage valves for signs of internal stem leak. Replace stem or renew seat surface as needed.
 - d. Check the gage valves for signs of leakage around stuffing box connection. Replace glass packing as needed. In the event of improper packing compression, leakage can be stopped by tightening gage coupling nut.
 - e. Check the gage valves for signs of internal or external corrosion. Conduct investigation as to the cause of the problem as appropriate.

5.13.3.3 Odor Reduction Station

Odor Reduction Blower

WARNING: DO NOT ATTEMPT ANY MAINTENANCE ON A BLOWER UNLESS THE ELECTRICAL SUPPLY HAS BEEN COMPLETELY DISCONNECTED AND LOCKED. IN MANY CASES, A BLOWER CAN WINDMILL DESPITE REMOVAL OF ALL ELECTRICAL POWER. THE ROTATING ASSEMBLY SHOULD BE BLOCKED SECURELY BEFORE ATTEMPTING MAINTENANCE OF ANY KIND.

1. Monthly:
 - a. Check blower for excessive vibration or noise. Do not operate blower if excessive noise or vibration is present. Shut down immediately.

- b. Inspect blower two weeks after start-up and then check periodically once a month until experience indicates that a longer or shorter period of maintenance is necessary.
- c. Check V-belts for proper tension, alignment, or excessive wear. Check sheave's grooves for excessive wear, rough spots, and foreign matter. Belt should not squeal or slip when the blower is started.
- d. Check tightness of all fasteners, including screw on bearing locking collar, and taper lock bushing on shaft.
- e. Check blower bearings for adequate lubrication, wear, tightness, and overheating. If bearings are in need of lubrication, re-grease with one of the following lithium-based greases conforming to NLGI Grade 2
Do not over lubricate.

Standard Oil	Amolith #2
Gulf Oil	Gulf Crown #2
Mobil	Mobilith 22
Texaco	Premium RB
Shell	Alvania #2

- f. Check condensate in housing to be sure it is not clogged.
- g. Inspect housing for foreign material build-up and visual sign of damage.
- h. Check impeller and blades for the following:
 - Build-up of foreign matter
 - Signs of visual damage or abrasion
 - Hairline or star shaped cracks
 - De-lamination
- i. Check blower inlet ductwork for foreign matter.
- j. Check gaskets and shaft seals for damage, cracks, and compressibility. Replace as necessary.
- k. Check and clean the areas between the blower motor cooling fins and the area through which air is drawn into the blower guard.
- l. Clean and re-balance the wheel, or replace as necessary.

2. Every 6 Months:

- a. Exercise damper by rotating to open and close positions while the blower is running.

RETURN DAMPER TO THE BALANCED POSITION.

Odor Reduction Scrubber

1. Weekly:

- a. Exercise all manual isolation valves.
- b. Check for any leaks and repair as needed.

- c. Visually observe the scrubber and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - d. Visually observe the shell of each scrubber, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - e. Visually check the overflow line for any restrictions.
- 2. Every 6 Months:
 - a. Determine the increase in pressure drop across the packing section of the scrubber since the last cleaning.
 - b. Visually inspect both the packing section and the mist eliminator for signs of fouling or plugging. If cleaning is necessary, follow acid wash procedures per the Manufacturer's O&M Manual.
 - c. Clean outside with soap and water to help maintain the original appearance of the scrubber.
- 3. Every 3 Years:
 - a. Visually inspect the inside of the scrubber.
The inspection program should follow U.S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the scrubber should be observed.

Odor Reduction pH and ORP Controllers

- 1. Weekly:
 - a. Calibrate the pH and ORP meter according to the Manufacturer's O&M Manuals. Initially perform this task weekly. If meter does not drift significantly a less frequent time interval may be appropriate.
 - b. Clean the pH and ORP sensor using a soap solution according to the Manufacturer's O&M Manual. When scaling occurs and soap solution does not adequately clean the pH or ORP sensor, clean sensor with a dilute acid procedure outlined in the Manufacturer's O&M Manual.
 - c. If calibration cannot be accomplished after cleaning the sensor, replace the sensor's standard cell buffer and salt bridge according to the procedure outlined in the Manufacturers O&M Manual.

Odor Reduction Recirculation Pumps

- 1. Weekly:
 - a. Exercise all manual isolation valves.

2. Monthly:
 - a. Check and clean the areas between the recirculation pump drive motor cooling fins and the area through which air is drawn into the blower guard.
 - b. Check mechanical seals of the recirculation pumps for leakage once per month or after 150 hours of operation, whichever comes first.

Odor Reduction Chemical Metering Pumps

1. Weekly:
 - a. Check pumping action of the NaOH and NaOCl metering pumps by observing the discharge line and feeling the pulsations caused by the pumps.
 - b. Exercise all manual isolation valves.

Odor Reduction Chemical Storage Tanks

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
2. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof of each tank, and all pipes, ducts, and valves for any signs of damage or improper installation.
 - c. Visually check the air vent pipe for any restrictions.
3. Every 6 Months:
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
4. Every 3 Years:
 - a. Visually inspect the inside of the tanks.
The inspection program should follow U.S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should be observed.

Odor Reduction Make-Up Water Conditioning System

1. Weekly:
 - a. Check salt level:
 - Remove brine tank lid.
 - Add salt when the salt level is below the water line.
 - Pour in salt to the top of tank.
 - Close lid.
 - b. Inspect the connection of the vessels for leaks.
2. Monthly:
 - a. Check hardness of treated water. If hardness exceeds 50 ppm (as CaCO_3), increase frequency of regeneration.
3. Annually
 - a. Inspect and clean brine tank.
 - Disconnect brine line
 - Remove salt.
 - Drain water.
 - Rinse with hose.
 - Clean with brush and mild soap.
 - Rinse with hose
 - Reconnect brine line.
 - Fill ½ way with water.
 - Fill with salt.
 - Return to service
 - b. Clean injector screen and injector.
 - Unplug electric cord
 - Shut off water supply or put bypass valves into bypass position.
 - Relieve tank pressure by opening valve
 - Unscrew cap using screw driver
 - Remove cap and screen
 - Clean screen using fine brush
 - Flush screen until clean
 - Lubricate O-ring with silicone lubricant and reassemble
 - Clean and flush injector
 - Open water supply valve or return bypass valve(s) to service position
 - Plug electric cord into outlet
 - Reset timer

5.13.3.4 Standby Generator

1. Weekly:

- a. Visually inspect, check, and clean the generator, engine, and other equipment, for any condition of leakage, vibration, noise, temperature, or other deterioration.
- b. Visually inspect the general condition of the equipment and electrical system to ensure that the system is ready for automatic operation.
- c. Visually inspect and clean the interior of the equipment room or outdoor weather housing.

2. Monthly:

- a. Visually inspect and check the fuel system base tank level and level switch.
- b. Visually inspect the fuel system flexible lines and connections. Replace as necessary.
- c. Monitor the base tank for water at least monthly, or as needed based on experience. Water is heavier than fuel and will settle to the bottom of the tank. If water is in bottom of tank, remove water with small pump.

CONTROLLING WATER ACCUMULATION IN TANK WILL INCREASE THE USEFUL LIFE OF THE TANK AND ALSO PREVENT BACTERIAL GROWTH.

If microbial growth is suspected due to fuel filter plugging, injection failing, system deposits, or corrosion of tanks and lines, arrange to have the fuel analyzed for microbial growth and contact fuel supplier to eradicate the infestation. Replace or filter the entire supply of diesel fuel oil as needed.

- d. Visually inspect and check the lubrication system oil level with the engine stopped. If necessary, add sufficient oil to raise the level to the proper mark on the dipstick, with oil that has the following specifications:

SAE Viscosity Grade:	15W-40
API Classification:	CG-4

- e. Check the engine jacket heater operation.
- f. Check the drive belt tension. Adjust as required.
- g. Visually inspect timing belts for splits, cracks and glazing, and replace as required.
- h. Visually inspect and check the cooling system coolant level when the engine is cold. Add coolant (50% ethylene glycol solution) as necessary, **but do not overfill**.
- i. Visually inspect the cooling system flexible hoses and connectors for signs of deterioration and replace as needed.

- j. Visually inspect and check the cooling system fan and alternator belts, as indicated in the manufacturer's maintenance manual. Replace as necessary.
- k. Visually inspect the DC electrical system battery charger operation and charge rate.
- l. Check the DC electrical system battery electrolyte level and charge state.
- m. Visually inspect and clean the DC electrical system. Remove corrosion and clean and dry battery and rack.
- n. Visually inspect, check, test, and clean the AC electrical system circuit breakers and fuses. Replace as necessary.

WARNING: DO NOT BREAK MANUFACTURER'S SEALS OR INTERNALLY INSPECT THESE DEVICES.

- o. Perform a load test on the generator set. When exercising the generator set, load should be at least 122 kW or 35 percent of the nameplate rating of 350 kW. Operate the generator at that load or higher until coolant temperature becomes stable.
If no load is available to put on the engine, start the engine for a period of time that would allow verification of oil pressure. When only pressure stability is confirmed, shut the engine down.
Perform the following checks on the generator during the monthly load test. Coordination with the Operational Supervisor as necessary.
 - 1) Check and record oil pressure.
 - 2) Visually inspect fuel system and drain all water from fuel/water separator.
 - 3) Check and record coolant temperature.
 - 4) Check the DC electrical system recharge.
 - 5) Visually inspect exhaust line for leakage and drain the exhaust line drain condensate trap.
 - 6) Check restriction indicator of air cleaner. If maximum allowable air restriction has been reached, replace air cleaner element.

3. Every 3 Months:

- a. Clean and tighten battery terminals.
- b. Visually inspect the exhaust line insulation for fire hazards.
- c. Visually inspect and check the DC electrical system. Clean and tighten battery terminals.
- d. Visually inspect and check the AC electrical system for wire abrasions where subject to motion.

4. Every 6 Months:

- a. Visually inspect the exhaust line flexible connector(s).
- b. Check the DC electrical system. Tighten DC electrical connections.
- c. Check and test the AC electrical system alarm operation.

5. Annually or Every 150 Hours of Operation:
 - a. Change the lubrication oil with 15W-40 and CG-4 type oil, based on procedures in the manufacturer's maintenance manual.
 - b. Replace the lubrication system filters, when the oil is being replaced, based on procedures in the manufacturer's maintenance manual.
6. Annually or Every 200 Hours of Operation:
 - a. Test the cooling system coolant supplemental coolant additives (SCA) concentration. Additional SCA **must** be added to the coolant when it becomes depleted below a specified amount depending on the concentration of nitrite and other parameters, as required in the manufacturer's maintenance manual.
7. Annually or Every 300 Hours of Operation:
 - a. Change the fuel system primary and secondary filters.
 - b. Lubricate tachometer drive with all-purpose NLGI No. 2 grease.
8. Annually or every 500 hours of Operation:
 - a. Check and clean crankcase breather assembly. Replace the filter element and gasket.
 - b. Check and record the crankcase pressure.
9. Annually:
 - a. Visually inspect and check the generator bearing condition. Replace as necessary.
 - b. Lubricate the generator bearing at recommended intervals specified in the generator technical manual. Use one of the following greases:

Chevron Equivalent	SRI Anti-friction-type, high quality grease with a lubrication temperature range of -22 to +350 degrees F.
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 - c. Visually inspect and clean the generator rotor and stator following procedures in the manufacturer's maintenance manual.
 - d. Visually inspect, check, and clean the generator exciter.
 - e. Visually inspect, check, and clean the generator voltage regulator.
 - f. Check the fuel system tank vents and return lines for obstructions.
 - g. Check the operation of emergency relief vents of both the primary and secondary tanks by lifting top cap and releasing it. Emergency relief vent cap should operate free from any restrictions.
 - h. Visually inspect and clean the engine ignition components.
 - i. Check and test the engine injector pump and injector flow rate, pressure, and spray pattern.

- j. Check and clean the cooling system air ducts and louvers.
- k. Drain the cooling system coolant, clean and flush the inside of the radiator, and replace with new coolant as specified in the manufacturer's maintenance manual.
- l. Inspect the outside of the radiator core and, if necessary, clean it with a quality grease solvent such as mineral spirits and dry it with compressed air.
- m. Replace air cleaner elements.
- n. Visually inspect the cooling system water pump drain hole for plugging and cleaned out, if required.
- o. Visually inspect, clean, and test the cooling system louver motors and controls.
- p. Test the exhaust line for excessive back pressure.
- q. Visually inspect the exhaust line hangers and supports.
- r. Check the AC electrical system. Tighten control and power wiring connections.
- s. Visually inspect and clean the AC electrical system transfer switch main contacts.

WARNING: DO NOT BREAK MANUFACTURER'S SEALS OR INTERNALLY INSPECT THESE DEVICES.

- t. Check and test the AC electrical system voltage-sensing device/relay adjustment, as indicated in the manufacturer's maintenance manual.
WARNING: DO NOT BREAK MANUFACTURER'S SEALS OR INTERNALLY INSPECT THESE DEVICES.
- u. Check and test the generator and engine mounting bolt torque annually or after 1000 hours of operation whichever come first.
- v. Once a year, during the monthly load test, perform the additionally activities while the generator set is running:
 - 1) Test the generator by measuring and recording resistance readings of windings with insulation tester (Megger, with SCR assembly or rectifier disconnected).
 - 2) Test the operation of the emergency shutdown. If the valve fails to shut down in the engine, it **must** be readjusted to provide positive shutdown.
 - 3) Check air flow from the air box drain tubes and the check valves for clogging. Clean as required.

10. Every 500 hours of Operation:

- a. Inspect and calibrate electronic governor as indicated in the manufacturer's maintenance manual.

11. Every 2 Years or 300 Hours of Operation:

- a. Visually inspect the generator. Blow dust out of generator. Service more frequently if operated in dusty areas. Clean the generator, as indicated in the manufacturer's maintenance manual.

12. Every 3 Years or 500 Hours of Operation:
 - a. Visually inspect and test the AC electrical system wire-cable for insulation breakdown.
 - b. Check the engine and mounting valve clearance, as indicated in the manufacturer's maintenance manual. Minor adjustments may be made due to wear.
13. Every 3000 Hours of Operation:
 - a. Replace flexible fuel line hoses and connections.
 - b. Remove blower bypass valve and clean in solvent. Repair or replace as needed.
14. Every 6000 Hours of Operation:
 - a. Replace cooling system water pump.
 - b. Remove and check thermostats. Reinstall with new seals. Replace thermostat as needed and during engine overhaul.

5.13.4 Hollister Street Pump Station

5.13.4.1 Isolation Valve, Wetwell, and Pumps

Isolation Valve

1. Every 6 Months:
 - a. Inspect gear case lubrication for the valve actuator every 6 months or 500 cycles, whichever comes first. The "worm" should be totally immersed in grease. Do **not** grease drive bearings unless they are leaking. Excess grease will damage seals. If grease is lacking or contaminated with dirt, water, or foreign matter, units should be flushed with a commercial degreaser/cleaner such as Exxon Varsol #18 which does not affect seal materials. Re-pack unit allowing for grease thermal expansion with one of the following:

Exxon	Nebula EP-0 (calcium based)
Alternative	NLGI Grade 0 or 1, EP additive, water and heat resistant, non-separating, does not create more than 8% swell in Buna N or Viton, not corrosive to steel, Dropping point > 316°F.
 - b. Grease the geared limit switch for the valve actuator with Exxon Beacon 325. In accordance with manufacturer's recommendation, there is **NO SUBSTITUTE** for the grease for the geared limit switch.

Sewage Lift Pumps

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Monthly:
 - a. Check pressure, voltage, current, vibration, and other specifications. Unusual readings may indicate a problem requiring immediate service. Contact your local manufacturer representative as soon as possible.
 - b. Check current and ammeter fluctuation. If ammeter fluctuation is great, even though within the limits of pump rating, foreign matter may be clogging the pump. If the quantity of liquid discharged falls suddenly, foreign matter may be blocking the suction inlet.
 - c. Check insulation resistance. Operation is safe as long as insulation resistance is more than 1.5 mega ohm. If resistance starts to fall rapidly even with an initial indication of over 1.5 mega ohm, this may be an indication of trouble, and repair work is required.
3. Annually:
 - a. Lift out (see Item 3.b. below) and visually inspect the pump (see Item 3.c. below). If a mechanical seal must be replaced or an overhaul is considered necessary as a result of the inspection, contact nearest dealer or manufacturer directly.
 - b. Follow the steps below for lifting pump:

WARNING: BEFORE PULLING THE PUMP, DISCONNECT ALL CABLES AND ENSURE THAT THE PUMP IS ISOLATED FROM THE POWER SUPPLY.

WARNING: ALWAYS LIFT THE PUMP BY THE LIFTING LUGS, NEVER BY THE MOTOR CABLE.

WARNING: WHEN LIFTING THE PUMP, USE APPROPRIATE CRANE (OR HOIST) AND LIFT SYSTEM. CHECK POSITION AND TIGHTNESS OF LIFT SYSTEM SO THAT WEIGHT OF THE PUMP IS NOT UNBALANCED. FAILURE TO OBSERVE THIS PRECAUTION CAN RESULT IN SERIOUS ACCIDENTS.

 - 1) Open the access hatch. Hook the lifting chain on the hoist or motor-driven chain block.
 - 2) Lift the whole pump body slowly. It is not necessary to empty the pump wetwell or remove any bolts.
 - 3) If the guide rail is deposited with dirt such that the pump cannot by slide up along it smoothly, do not lift using force. Clear the rail of dirt with a hose, stick, etc.
 - c. Follow the steps below for inspection procedures:
 - 1) Check appearance. Check the impeller, cables, bolts and nuts, and external surface conditions for abnormal conditions.

CAUTION: THE SEAL CHAMBER MAY BE UNDER PRESSURE. HOLD A RAG OVER THE OIL PLUG TO PREVENT SPLATTER.

- 2) Check mechanical seal (upper). Lift the pump out of the wetwell (by lifting procedures described in Item 3.b. above), and stand it on the floor in a vertical position. Unplug the “leak check” in the intermediate casing of the pump.
If neither oil nor water leaks are visible from the “leak check,” the mechanical seal (upper) is in satisfactory condition. If a very small quantity of oil leaks out, there is no practical problem.
If water or oil containing water, in excess of 0.8 liter (after one year of use) leaks out, the mechanical seal must be replaced.
If significant water is emitted, the mechanical seal or other components may be damaged, and an overhaul is necessary. When inspection is completed, coat the plug threads with Teflon tape or liquid packing (Three Bond #1102, or equivalent) and install.
- 3) Check mechanical seal (lower). Unplug the “oil port” and “air vent” and drain all internal oil.
If the drained oil is muddy or milky-white, it contains water. The mechanical seal (lower) is in satisfactory condition as long as the oil does not contain much water. Otherwise, it must be replaced.
After the oil has been inspected, pour fresh oil through the “oil port,” with the pump in a vertical position until oil overflows from the air vent plug. Replenish as necessary with one of the following or equivalent:

Standard	ISO VG32
Shell	Turbo Oil T32
Mobil	Mobil DTE Oil light
Esso	Esso Tresso 32
Exxon	Terresstic 32
Gulf	Harmony 32, Crest 32
Caltex	Regal Oil R&O 32

After the sealing chamber is filled to the appropriate level, wrap the oil port plug and the air vent plug securely with liquid packing (Three bond #1102 or equivalent) and install plugs.

Check for leaks. If the mechanical seal needs repair, contact the manufacturer’s local representative.

- 4) Re-grease the pump bearings with one of the following:

Lower Bearing - Grease

Standard	NLGI grade 3
Esso	Unirex N3
Mobil	Mobilith AW3

Upper Bearing - Grease

Mobil	Mobil SHC 32
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- 5) Check rotor.

WARNING: CHECK THAT THE POWER IS LOCKED OFF AND DISCONNECTED BEFORE WORKING ON PUMP.

Turn the impeller manually through the pump discharge. If it turns smoothly, the rotating components should be in satisfactory condition. If the impeller resists or feels locked, the pump requires overhaul.

- d. Follow the steps below for reinstallation procedures:
 - 1) After the pump has been thoroughly inspected, reinstall it by reversing the lifting procedure (see Item 3.b. above). If dirt is caught in the elbow, lift the pump slightly and operate the pump for two or three seconds to blow off the dirt.
- e. Inspect gearing of the valve actuators. Re-grease gearing with the following or equal:

Shell	Alvania #2
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4. Every 2 Years:
 - a. Return the pump to the manufacturer for overhaul for general inspection.

Sump Pumps

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Monthly:
 - a. Check voltage, current, vibration, frequency, and other specifications. Unusual readings may indicate a problem requiring immediate service. Contact your local manufacturer representative as soon as possible.
 - b. Check current and ammeter fluctuation. If ammeter fluctuation is great, even though within the limits of pump rating, foreign matter may be clogging the pump. If the quantity of liquid discharged falls suddenly, foreign matter may be blocking the suction inlet.

- c. Measure the insulation resistance. The value should be more than 1 mega ohm. If resistance starts to fall rapidly even with an initial indication of over 1 mega ohm, this may be an indication of trouble and repair work is required.
3. Every 3 Months:
 - a. Check the water level switches. The float switches may have moved higher or lower than what was originally specified. The float switches may have to be re-adjusted.
 - b. Clean the sump pit, as excess trash, large solids, etc., may clog or affect the performance of the pump.
 - c. Check the moisture sensor light and thermal sensor light. If either is on, contact the manufacturer's local representative.
4. Every 6 Months:
 - a. Inspect the mechanical seal. If you notice water mixed with the oil or cloudy texture of the oil, these may be indications of a defective mechanical seal requiring replacement.
5. Annually:
 - a. Replace the mechanical seal whenever the oil in the mechanical seal chamber is clouded.
 - b. Change the oil in the mechanical seal chamber, and replenish as necessary with one of the following:

Shell	Turbo Oil T32
Mobil	Mobil DTE Oil light
Esso	Esso Gresso 32
Exxon	Teresstic 32
Gulf	Harmony 32, Crest 32

When replacing the oil, lay the pump on its side, with filler plug on top. Be sure to dispose of oil residue properly.

 - c. Replace the oil filler plug gasket whenever oil is replaced or inspected.
 - d. Conduct an overhaul of the pump.
 - e. Replace the O-ring whenever the pump is overhauled.
 - f. Inspect gearing of the valve actuators. Re-grease gearing with the following or equal:

Shell	Alvania #2
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5.13.4.2 Surge Control System

Surge Arrestors

CAUTION: DO NOT PROCEED WITH ANY MAINTENANCE ON THE LIQUID LEVEL GAGE VALVES UNLESS THE LEVEL GAGE HAS BEEN RELIEVED OF ALL PRESSURE OR VACUUM HAS BEEN ALLOWED TO REACH AMBIENT TEMPERATURE, AND HAS BEEN DRAINED OR PURGED OF ALL FLUIDS.

1. Weekly:
 - a. Inspect surge arresters for correct liquid level.
 - b. Exercise all manual isolation valves.
2. Monthly:
 - a. Inspect all threaded and bolted connections to the vessels to ensure they are secure.
 - b. Check the gage valves for signs of leakage around stem area. Stem packing leakage can often be stopped by tightening the stem packing nut. If leak persists, replace the stem packing.
 - c. Check the gage valves for signs of internal stem leak. Replace stem or renew seat surface as needed.
 - d. Check the gage valves for signs of leakage around stuffing box connection. Replace glass packing as needed. In the event of improper packing compression, leakage can be stopped by tightening gage coupling nut.
 - e. Check the gage valves for signs of internal or external corrosion. Conduct investigation as to the cause of the problem as appropriate.

Surge Control Air Compressor

1. Daily:
 - a. Check compressor frame lubricant level. Replenish as necessary with one of the following oils:

Shell	Tellus #69, SAE 40
Mobil	Mobil DTE, extra heavy, SAE 30/35
Texaco	Regal Oil F (R&O), SAE 30
Chevron	Industrial #86X, SAE 30
Ingersoll-Rand	Select 30, Diester Base
 - b. Drain the condensate through the manual drain valve on the receiver.
 - c. Check for unusual noise and vibration.

2. Weekly:
 - a. Inspect and clean the compressor air inlet filter.
 - b. Clean the exterior of the compressor intercooler.
 - c. Manually check the compressor relief valves.
 - d. Clean the compressor cylinder cooling fins.
 - e. Clean the motor.
 - f. Manually check the receiver relief valves.
3. Monthly:
 - a. Check and tighten screws and bolts.
 - b. Inspect for air leaks.
 - c. Check pressure, output, voltage, current, vibration, frequency, and other specifications. Unusual readings may indicate a problem requiring immediate service. Contact your local manufacturer representative as soon as possible.
 - d. Check the V-belts for tightness. Drive belts must be kept tight enough to prevent slipping. Adjust as necessary.
 - e. Check relief valves. If defective or a leak is apparent, replace as necessary.
4. Every 3 Months:
 - a. Inspect and clean compressor valves.
5. Every 6 Months:
 - a. Re-grease motor bearings with one of the following:

Chevron	SRI #2
Shell	Dolium R
6. Annually:
 - a. Inspect compressor lubricant for contamination, and replenish as necessary with one of the oils indicated above in Item 1.a:

5.13.4.3 Odor Reduction Station

Odor Reduction Blower

WARNING: DO NOT ATTEMPT ANY MAINTENANCE ON A BLOWER UNLESS THE ELECTRICAL SUPPLY HAS BEEN COMPLETELY DISCONNECTED AND LOCKED. IN MANY CASES, A BLOWER CAN WINDMILL DESPITE REMOVAL OF ALL ELECTRICAL POWER. THE ROTATING ASSEMBLY SHOULD BE BLOCKED SECURELY BEFORE ATTEMPTING MAINTENANCE OF ANY KIND.

1. Monthly:

- a. Check blower for excessive vibration or noise. Do not operate blower if excessive noise or vibration is present. Shut down immediately.
- b. Inspect blower two weeks after start-up and then check periodically once a month until experience indicates that a longer or shorter period of maintenance is necessary.
- c. Check V-belts for proper tension, alignment, or excessive wear. Check sheave's grooves for excessive wear, rough spots, and foreign matter. Belt should not squeal or slip when the blower is started.
- d. Check tightness of all fasteners, including screw on bearing locking collar, and taper lock bushing on shaft.
- e. Check blower bearings for adequate lubrication, wear, tightness, and overheating. If bearings are in need of lubrication, re-grease with one of the following lithium-based greases conforming to NLGI Grade 2
Do not over lubricate.

Standard Oil	Amolith #2
Gulf Oil	Gulf Crown #2
Mobil	Mobilith 22
Texaco	Premium RB
Shell	Alvania #2

- f. Check condensate in housing to be sure it is not clogged.
- g. Inspect housing for foreign material build-up and visual sign of damage.
- h. Check impeller and blades for the following:
 - Build-up of foreign matter
 - Signs of visual damage or abrasion
 - Hairline or star shaped cracks
 - De-lamination
- i. Check blower inlet ductwork for foreign matter.
- j. Check gaskets and shaft seals for damage, cracks, and compressibility. Replace as necessary.
- k. Check and clean the areas between the blower motor cooling fins and the area through which air is drawn into the blower guard.
- l. Clean and re-balance the wheel, or replace as necessary.

2. Every 6 Months:

- a. Exercise damper by rotating to open and close positions while the blower is running.
RETURN DAMPER TO THE BALANCED POSITION.

Odor Reduction Scrubber

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
 - c. Visually observe the scrubber and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - d. Visually observe the shell of each scrubber, and all pipes, ducts, valves, and manholes for any signs of damage or improper installation.
 - e. Visually check the overflow line for any restrictions.
3. Every 6 Months:
 - a. Determine the increase in pressure drop across the packing section of the scrubber since the last cleaning.
 - b. Visually inspect both the packing section and the mist eliminator for signs of fouling or plugging. If cleaning is necessary, follow acid wash procedures per the Manufacturer's O&M Manual.
 - c. Clean outside with soap and water to help maintain the original appearance of the scrubber.
4. Every 3 Years:
 - a. Visually inspect the inside of the scrubber.
The inspection program should follow U.S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General Industry Standard 1910.146 (1991) or its update. Proper safety requirements due to the contents of the scrubber should be observed.

Odor Reduction pH and ORP Controllers

1. Weekly:
 - a. Calibrate the pH and ORP meter according to the Manufacturer's O&M Manuals. Initially perform this task weekly. If meter does not drift significantly a less frequent time interval may be appropriate.
 - b. Clean the pH and ORP sensor using a soap solution according to the Manufacturer's O&M Manual. When scaling occurs and soap solution does not adequately clean the pH or ORP sensor, clean sensor with a dilute acid procedure outlined in the Manufacturer's O&M Manual.
 - c. If calibration cannot be accomplished after cleaning the sensor, replace the sensor's standard cell buffer and salt bridge according to the procedure outlined in the Manufacturers O&M Manual.

Odor Reduction Recirculation Pumps

1. Weekly:
 - a. Exercise all manual isolation valves.
2. Monthly:
 - a. Check and clean the areas between the recirculation pump drive motor cooling fins and the area through which air is drawn into the blower guard.
 - b. Check mechanical seals of the recirculation pumps for leakage once per month or after 150 hours of operation, whichever comes first.

Odor Reduction Chemical Metering Pumps

1. Weekly:
 - a. Check pumping action of the NaOH and NaOCl metering pumps by observing the discharge pressure, about 40 psi, along with grasping the discharge line and feeling the pulsations caused by the pumps.
 - b. Exercise all manual isolation valves.

Odor Reduction Chemical Storage Tanks

1. Weekly:
 - a. Exercise all manual isolation valves.
 - b. Check for any leaks and repair as needed.
2. Every 3 Months:
 - a. Visually observe the tank and all piping and connections for cracking, any signs of liquid or gas leaks, and any other unusual problems.
 - b. Visually observe the roof of each tank, and all pipes, ducts, and valves for any signs of damage or improper installation.
 - c. Visually check the air vent pipe for any restrictions.
3. Every 6 Months:
 - a. Clean outside with soap and water to help maintain the original appearance of the tanks. An application of car wax after cleaning helps to preserve the clean appearance.
4. Every 3 Years:
 - a. Visually inspect the inside of the tanks.
The inspection program should follow U. S. Army Corps of Engineers, Safety and Health Requirements Manual EM 385-1-1 (1996) or its update and O.S.H.A. General industry Standard

1910.146 (1991) or its update. Proper safety requirements due to the contents of the tanks should be observed.

Odor Reduction Make-Up Water Air Gap System (Water Seal Unit)

1. Weekly:
 - a. Check operation of float valve.
2. Monthly:
 - a. Check and clean the areas between the pump drive motor cooling fins and the area through which air is drawn into the blower guard.
 - b. Check mechanical seals of the pump for leakage once per month or after 150 hours of operation, whichever comes first.

5.13.4.4 Standby Generator

1. Weekly:
 - a. Visually inspect, check, and clean the generator, engine, and other equipment, for any condition of leakage, vibration, noise, temperature, or other deterioration.
 - b. Visually inspect the general condition of the equipment and electrical system to ensure that the system is ready for automatic operation.
 - c. Visually inspect and clean the interior of the equipment room or outdoor weather housing.
2. Monthly:
 - a. Visually inspect and check the fuel system base tank level and level switch.
 - b. Visually inspect the fuel system flexible lines and connections. Replace as necessary.
 - c. Monitor the base tank for water at least monthly, or as needed based on experience. Water is heavier than fuel and will settle to the bottom of the tank. If water is in bottom of tank, remove water with small pump.

CONTROLLING WATER ACCUMULATION IN TANK WILL INCREASE THE USEFUL LIFE OF THE TANK AND ALSO PREVENT BACTERIAL GROWTH.

If microbial growth is suspected due to fuel filter plugging, injection failing, system deposits, or corrosion of tanks and lines, arrange to have the fuel analyzed for microbial growth and contact fuel supplier to eradicate the infestation. Replace or filter the entire supply of diesel fuel oil as needed.

- d. Visually inspect and check the lubrication system oil level with the engine stopped. If necessary, add sufficient oil to raise the level to

the proper mark on the dipstick, with an oil that has the following specifications:

SAE Viscosity Grade: 15W-40
API Classification: CG-4

- e. Check the engine jacket heater operation.
- f. Check the drive belt tension. Adjust as required.
- g. Visually inspect timing belts for splits, cracks and glazing, and replace as required.
- h. Visually inspect and check the cooling system coolant level when the engine is cold. Add coolant (50% ethylene glycol solution) as necessary, **but do not overfill**.
- i. Visually inspect the cooling system flexible hoses and connectors for signs of deterioration and replace as needed.
- j. Visually inspect and check the cooling system fan and alternator belts, as indicated in the manufacturer's maintenance manual. Replace as necessary.
- k. Visually inspect the DC electrical system battery charger operation and charge rate.
- l. Check the DC electrical system battery electrolyte level and charge state.
- m. Visually inspect and clean the DC electrical system. Remove corrosion and clean and dry battery and rack.
- n. Visually inspect, check, test, and clean the AC electrical system circuit breakers and fuses. Replace as necessary.

WARNING: DO NOT BREAK MANUFACTURER'S SEALS OR INTERNALLY INSPECT THESE DEVICES.

- o. Perform a load test on the generator set. When exercising the generator set, load should be at least 210 kW or 35 percent of the nameplate rating of 600 kW. Operate the generator at that load or higher until coolant temperature becomes stable.
If no load is available to put on the engine, start the engine for a period of time that would allow verification of oil pressure. When only pressure stability is confirmed, shut the engine down.
Perform the following checks on the generator during the monthly load test. Coordination with the Operational Supervisor as necessary.
 - 1) Check and record oil pressure.
 - 2) Visually inspect fuel system and drain all water from fuel/water separator.
 - 3) Check and record coolant temperature.
 - 4) Check the DC electrical system recharge.
 - 5) Visually inspect exhaust line for leakage and drain the exhaust line drain condensate trap.
 - 6) Check restriction indicator of air cleaner. If maximum allowable air restriction has been reached, replace air cleaner element.

3. Every 3 Months:
 - a. Clean and tighten battery terminals.
 - b. Visually inspect the exhaust line insulation for fire hazards.
 - c. Visually inspect and check the DC electrical system. Clean and tighten battery terminals.
 - d. Visually inspect and check the AC electrical system for wire abrasions where subject to motion.
4. Every 6 Months:
 - a. Visually inspect the exhaust line flexible connector(s).
 - b. Check the DC electrical system. Tighten DC electrical connections.
 - c. Check and test the AC electrical system alarm operation.
5. Annually or Every 150 Hours of Operation:
 - a. Change the lubrication oil with 15W-40 and CG-4 type oil, based on procedures in the manufacturer's maintenance manual.
 - b. Replace the lubrication system filters, when the oil is being replaced, based on procedures in the manufacturer's maintenance manual.
6. Annually or Every 200 Hours of Operation:
 - a. Test the cooling system coolant supplemental coolant additives (SCA) concentration. Additional SCA **must** be added to the coolant when it becomes depleted below a specified amount depending on the concentration of nitrite and other parameters, as required in the manufacturer's maintenance manual.
7. Annually or Every 300 Hours of Operation:
 - a. Change the fuel system primary and secondary filters.
 - b. Lubricate tachometer drive with all-purpose NLGI No. 2 grease.
8. Annually or every 500 hours of Operation:
 - a. Check and clean crankcase breather assembly. Replace the filter element and gasket.
 - b. Check and record the crankcase pressure.
9. Annually:
 - a. Visually inspect and check the generator bearing condition. Replace as necessary.
 - b. Lubricate the generator bearing at recommended intervals specified in the generator technical manual. Use one of the following greases:

Chevron

SRI

Equivalent

Anti-friction-type, high quality grease with a lubrication temperature range of -22 to +350 degrees F.

- c. Visually inspect and clean the generator rotor and stator following procedures in the manufacturer's maintenance manual.
- d. Visually inspect, check, and clean the generator exciter.
- e. Visually inspect, check, and clean the generator voltage regulator.
- f. Check the fuel system tank vents and return lines for obstructions.
- g. Check the operation of emergency relief vents of both the primary and secondary tanks by lifting top cap and releasing it. Emergency relief vent cap should operate free from any restrictions.
- h. Visually inspect and clean the engine ignition components.
- i. Check and test the engine injector pump and injector flow rate, pressure, and spray pattern.
- j. Check and clean the cooling system air ducts and louvers.
- k. Drain the cooling system coolant, clean and flush the inside of the radiator, and replace with new coolant as specified in the manufacturer's maintenance manual.
- l. Inspect the outside of the radiator core and, if necessary, clean it with a quality grease solvent such as mineral spirits and dry it with compressed air.
- m. Replace air cleaner elements.
- n. Visually inspect the cooling system water pump drain hole for plugging and cleaned out, if required.
- o. Visually inspect, clean, and test the cooling system louver motors and controls.
- p. Test the exhaust line for excessive back pressure.
- q. Visually inspect the exhaust line hangers and supports.
- r. Check the AC electrical system. Tighten control and power wiring connections.
- s. Visually inspect and clean the AC electrical system transfer switch main contacts.
WARNING: DO NOT BREAK MANUFACTURER'S SEALS OR INTERNALLY INSPECT THESE DEVICES.
- t. Check and test the AC electrical system voltage-sensing device/relay adjustment, as indicated in the manufacturer's maintenance manual.
WARNING: DO NOT BREAK MANUFACTURER'S SEALS OR INTERNALLY INSPECT THESE DEVICES.
- u. Check and test the generator and engine mounting bolt torque annually or after 1000 hours of operation whichever come first.
- v. Once a year during the monthly load test, perform the additionally activities while the generator set is running:
 - 1) Test the generator by measuring and recording resistance readings of windings with insulation tester (Megger, with SCR assembly or rectifier disconnected).

- 2) Test the operation of the emergency shutdown. If the valve fails to shut down in the engine, it **must** be readjusted to provide positive shutdown.
 - 3) Check air flow from the air box drain tubes and the check valves for clogging. Clean as required.
10. Every 500 hours of Operation:
 - a. Inspect and calibrate electronic governor as indicated in the manufacturer's maintenance manual.
11. Every 2 Years or 300 Hours of Operation:
 - a. Visually inspect the generator. Blow dust out of generator. Service more frequently if operated in dusty areas. Clean the generator, as indicated in the manufacturer's maintenance manual.
12. Every 3 Years or 500 Hours of Operation:
 - a. Visually inspect and test the AC electrical system wire-cable for insulation breakdown.
 - b. Check the engine and mounting valve clearance, as indicated in the manufacturer's maintenance manual. Minor adjustments may be made due to wear.
13. Every 3000 Hours of Operation:
 - a. Replace flexible fuel line hoses and connections.
 - b. Remove blower bypass valve and clean in solvent. Repair or replace as needed.
14. Every 6000 Hours of Operation:
 - a. Replace cooling system water pump.
 - b. Remove and check thermostats. Reinstall with new seals. Replace thermostat as needed and during engine overhaul.

Chapter 6

DETAILED EQUIPMENT SCHEDULE

NOTICE AND CAUTIONS TO USERS OF THIS O&M MANUAL

This O&M Manual provides a general overview only of the South Bay International Wastewater Treatment Plant (SBIWTP).

This O&M Manual relies on information obtained from the various equipment manufactures and the Construction Contractors that were involved in construction of the SBIWTP. The information obtained from equipment manufacturers and construction Contractors was reviewed by Malcolm Pirnie only for general compliance with the submittal requirements specified in construction Contract Documents.

All USERS of this O&M Manual shall be required to consult the detailed O&M Manuals provided by the equipment manufactures and Construction Contractors and to understand and follow the directions given therein for safe operation and maintenance of all equipment and systems prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all safety manuals published and provided by their employer(s) and to understand and follow all directions given therein, including but not limited to *Personnel Protective Equipment (PPE), Electrical Lock-Out Procedures, Fall Prevention Procedures and Confined Space Entry Procedures* prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all “record” drawings and to understand how equipment and systems are intended to be operated and controlled prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to understand and acknowledge that the SBIWTP contains chemicals and equipment that if not operated and/or maintained in a responsible and safe manner can result in serious injury or death.

CHAPTER 6

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6.1 HEADWORKS

6.1.1 Screenings Equipment

1. Influent Sluice Gate
(Located at JB No. 1)

Number: 1
Manufacturer: Hydro Gate Corp.
6101 Dexter Street
Commerce City, CO 80022
(303) 288-7873
Series: 501
Size: 96-inch x 96-inch
Type: Cast Iron, Heavy Duty
Seating/Unseating Head: 20 ft/20 ft
Supplier: Hydro Gate Corp.
6101 Dexter Street
Commerce City, CO 80022
(303) 288-7873
Local Representative: Misco-Southwest
1538 Brookhollow Dr.,
Suite C
Santa Ana, CA 92705
(714) 979-6001

2. Influent Sluice Gate Actuator

Number: 1
Manufacturer: Limitorque Corp.
5114 Woodall Road
P.O. Box 11318
Lynchburg, VA 24506
(804) 528-4400
Series: L-120
Type: 40
Model: B320-70
Gear Reduction Ratio: 6:1
Load: 25 ft-lbs
Horsepower: 3.2
Service: 3 phase, 60 Hz, 460 v
Enclosure: EXPF
Temperature Rise: Class B Rise in 50°C Ambient
Insulation: Class F
Service Factor: 1.0

Supplier: Hydro Gate Corp.
6101 Dexter Street
Commerce City, CO 80022
(303) 288-7873

Local Representative: Misco-Southwest
1538 Brookhollow Dr.,
Suite C
Santa Ana, CA 92705
(714) 979-6001

3. Screening Channel Slide Gates

Number: 12 (2 per channel)
Manufacturer: Golden Harvest
1353 A5 Peterson Road
Burlington, WA 98233
(800) 338-6238

Model: GH-45, 316 SS
Size: 48-inch x 72-inch
Seating/Unseating Head: 6 ft/0 ft
Supplier: Golden Harvest
1353 A5 Peterson Road
Burlington, WA 98233
(800) 338-6238

Local Representative: Golden Harvest
1353 A5 Peterson Road
Burlington, WA 98233
(800) 338-6238

4. Portable Hydraulic Operators

Number: 2
Manufacturer: Golden Harvest
1353 A5 Peterson Road
Burlington, WA 98233
(800) 338-6238

Model: GH-1050E
Maximum Torque: 80 ft.-lbs.
Operating Torque: 50 ft.-lbs.
Speed: 120 rpm
Supplier: Golden Harvest
1353 A5 Peterson Road
Burlington, WA 98233
(800) 338-6238

Local Representative: Golden Harvest
1353 A5 Peterson Road
Burlington, WA 98233
(800) 338-6238

5. Portable Hydraulic Operator Motors

Number: 2
Manufacturer: Baldor Electric
P.O. Box 2400
Fort Smith, AR 72902
(501) 646-4711
Horsepower: 2 hp
RPM: 1800
Service: 1 ph/ 60 hz/230v
Enclosure: TEFC-XP
Temperature Rise: Class B Rise in 50° C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: Class B
Supplier: Golden Harvest
1353 A5 Peterson Road
Burlington, WA 98233
(800) 338-6238
Local Representative: Chick's Electric
3592 Main Street
San Diego, CA 92113
(619) 232-2162

6. Automatic Influent Wastewater Sampler w/Remote Peristaltic Pump (IWS No. 1)

Number: 1
Manufacturer: Isco, Inc.
4700 Superior Street
Lincoln, NE 68504
(402) 474-2233
Model: 3710 FR - Sampler
3700-Remote Peristaltic Pump
Cabinet: FRP with UV Resistant Polyurethane Resin
Intake Tubing: 3/8-inch ID Vinyl
Sample Bottle Capacity: 4.0 gallons plastic bottle
Pump Vertical Lift: 26 ft maximum

Pump Capacity:	60 ml/sec at 3 ft vertical lift in a 3/8-inch ID intake tube
Service:	1 phase, 60 Hz 230 v
Enclosure:	NEMA 4X
Supplier:	R. C. Hoffman Co. 2272 East Walnut Street Pasadena, CA 91107 (818) 568-9211
Local Representative:	R. C. Hoffman Co. 2272 East Walnut Street Pasadena, CA 91107 (818) 568-9211

7. Automatic Screening Influent Wastewater Sampler
with Remote Peristaltic Pump (IWS No. 3)

Number:	1
Manufacturer:	Isco, Inc. 4700 Superior Street Lincoln, NE 68504 (402) 474-2233
Model:	3710 FR - Sampler 3700-Remote Peristaltic Pump
Cabinet:	FRP with UV Resistant Polyurethane Resin
Intake Tubing:	3/8-inch ID Vinyl
Sample Bottle Capacity:	4.0 gallons plastic bottle
Pump Vertical Lift:	26 ft maximum
Pump Capacity:	60 ml/sec at 3 ft vertical lift in a 3/8-inch ID intake tube
Service:	1 phase, 60 Hz 230 v
Enclosure:	NEMA 4X
Supplier:	R. C. Hoffman Co. 2272 East Walnut Street Pasadena, CA 91107 (818) 568-9211
Local Representative:	R. C. Hoffman Co. 2272 East Walnut Street Pasadena, CA 91107 (818) 568-9211

8. Mechanical Bar Screens

Number: 3
Manufacturer: Fairfield Service Company
240 Boone Avenue
Marion, Ohio 43302
(614) 387-3335
Model: RPFF-S
Type: Mechanically Cleaned Climber Screen
Size: 4 ft. screen width, 5/8-inch clear bar
Capacity: 250 lbs/ft. of rake per cycle at
openings minimum travel speed of 40
fpm
Supplier: Fairfield Service Company
240 Boone Avenue
Marion, Ohio 43302
(614) 387-3335
Local Representative: Pacific Process Equipment
Second Floor
1124 N. Brand Ave. #200
Glendale, CA 91202
(818) 500-9495

9. Mechanical Bar Screen Motors

Number: 3 (One per Screen)
Manufacturer: U.S. Electrical Motors
8100 West Florissant Avenue
P. O. Box 3946
St. Louis, MO 63136
(314) 553-2000
Model: G98728
Horsepower: 5.00
Service: 3 ph, 60 hz, 460 v
Enclosure: EXP PRF
Temperature Rise: Class B Rise in 50° C Ambient
RPM: 1750
NEMA Design: B
Insulation: Class F
Service Factor: 1.15
Supplier: Fairfield Service Company
240 Boone Avenue
Marion, Ohio 43302
(614) 387-3335

Local Representative: U.S. Electrical Motors
19877 Quiroz Ct.
Walnut, CA 91789
(909) 594-5470

10. Screenings Conveyors

Number: 2
Manufacturer: Geirlich-Mitchel, Inc.
227 W. Grand Avenue
El Segundo, CA 90245
(310) 414-0150
Belt Model: Beltwall, 24-inch, 2 Ply, 220, 1/8 X
1/16 OR
Belt Capacity: 220 lb/in of width, 5 tons per hour at a
maximum belt speed of 50 ft. per
minute
Reducer Type: Helical
Supplier: Geirlich-Mitchel, Inc.
227 W. Grand Avenue
El Segundo, CA 90245
(310) 414-0150
Local Representative: Geirlich-Mitchel, Inc.
227 W. Grand Avenue
El Segundo, CA 90245
(310) 414-0150

11. Screenings Conveyor Drive Motors

Number: 2 (One per Conveyor)
Manufacturer: Baldor Electric
P.O. Box 2400
Fort Smith, AR 72902
(501) 646-4711
Model: 06
Horsepower: 1-1/2
Service: 3 ph, 60 Hz, 230/460 volt
Enclosure: XPFC
Temperature Rise: Class B Rise in 50°C Ambient
NEMA Design: B
Insulation: Class F
Service Factor: 1.15 (50°C)

Supplier: Geirlich-Mitchel, Inc.
227 W. Grand Avenue
El Segundo, CA 90245
(310) 414-0150
Local Representative: Chick's Electric
3592 Main Street
San Diego, CA 92113
(619) 232-2162

12. Transport Winch

Number: 1
Manufacturer: Thern, Inc.
5712 Industrial Park Road
Winona, MN 55987
(507) 454-2996
Type: Worm/Spur Gear
Model: 4WS3M-S3
Load: 40,000 lbs
Line Pull Force: 3,100 lbs
Wire Rope: 3/8-inch diameter; 72 ft long; 316 SS
Special Features: Manual Clutch; SS Cable Pressure Bar
Supplier: Lenyork and Associates
P.O. Box 29076
Denver, CO 80229
(303) 288-4172
Local Representative: Lenyork and Associates
P.O. Box 29076
Denver, CO 80229
(303) 288-4172

13. Transport Winch Motor

Number: 1
Manufacturer: Baldor Electric
P.O. Box 2400
Fort Smith, AR 72902
(501) 646-4711
Horsepower: 3.0
RPM: 1725
Reduction Ratio: 120
Service: 3 phase, 60 Hz, 460 v
Enclosure: XP
Temperature Rise: Class B in 50°C Ambient
NEMA Design: C

Insulation:	Class F
Service Factor:	1.15
Supplier:	Lenyork and Associates P.O. Box 29076 Denver, CO 80229 (303) 288-4172
Local Representative:	Lenyork and Associates P.O. Box 29076 Denver, CO 80229 (303) 288-4172

14. Positioning Winch

Number:	1
Manufacturer:	Thern, Inc. 5712 Industrial Park Road Winona, MN 55987 (507) 454-2996
Type:	Worm/Spur Gear
Model:	4WS3M10-S
Load:	40,000 lbs
Line Pull Force:	3,200 lbs
Wire Rope:	3/8-inch diameter; 22 ft long; 316 SS
Special Features:	Manual Clutch; SS Cable Pressure Bar
Supplier:	Lenyork and Associates P.O. Box 29076 Denver, CO 80229 (303) 288-4172
Local Representative:	Lenyork and Associates P.O. Box 29076 Denver, CO 80229 (303) 288-4172

15. Positioning Winch Motor

Number:	1
Manufacturer:	Baldor Electric P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Horsepower:	3.0
RPM:	1725
Reduction Ratio:	120
Service:	3 phase, 60 Hz, 460 v
Enclosure:	XP

Temperature Rise:	Class B in 50°C Ambient
NEMA Design:	C
Insulation:	Class F
Service Factor:	1.15
Supplier:	Lenyork and Associates P.O. Box 29076 Denver, CO 80229 (303) 288-4172
Local Representative:	Lenyork and Associates P.O. Box 29076 Denver, CO 80229 (303) 288-4172

6.1.2 Influent Pump Station

1. IPS Wetwell Slide Gates

Number:	3
Manufacturer:	Golden Harvest 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238
Model:	GH-45, 316 SS
Size:	24-inch x 24-inch
Seating/Unseating Head:	8 ft/8 ft
Supplier:	Golden Harvest 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238
Local Representative:	Golden Harvest 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238

2. Slide Gates for Scum Removal

Number:	2
Manufacturer:	Golden Harvest 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238
Model:	GH-65, 316 SS
Size:	36-inch x 48-inch
Seating/Unseating Head:	0 ft/4 ft

Supplier:	Golden Harvest 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238
Local Representative:	Golden Harvest 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238

3. Constant Speed Influent Pumps

Number:	2
Manufacturer:	Fairbanks Morse Pump Corporation P.O. Box 6999 Kansas City, KS 66106-0999 (913) 371-5000
Model:	VTSH-AWF
Size:	24"
Type:	Vertical Turbine Solids Handling
Capacity:	16050 GPM at 60 ft. TDH
Speed:	713 RPM
Supplier:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504 (213) 849-7711

4. Constant Speed Influent Pump Motors

Number:	2 (One per pump)
Manufacturer:	U.S. Electric Motors Division of Emerson Electric Company 8100 Florissant Avenue P.O. Box 3946 St. Louis, MO 63136 (314) 553-2000
Horsepower:	350
RPM:	720
Special Features:	Solid State Starter
Service:	3ph, 60Hz, 460 volts
Enclosure:	EXP PRF

Temperature Rise:	Class B Rise in 50°C Ambient
Type:	EVE4
Insulation:	Class F
Service Factor:	1.15
Supplier:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	U.S. Electrical Motors 19877 Quiroz Court Walnut, CA 91789 (909) 594-5470

5. Variable Speed Influent Pumps

Number:	3
Manufacturer:	Fairbanks Morse Pump Corporation P.O. Box 6999 Kansas City, KS 66106-0999 (913) 371-5000
Model:	VTSH-AWF
Size:	24"
Type:	Vertical Turbine Solids Handling
Capacity:	16050 GPM at 60.0 ft. TDH (High Speed) 7000 GPM at 43.0 ft. TDH (Low Speed)
Speed:	713 RPM (High Speed)
Supplier:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504 (213) 849-7711

6. Variable Speed Influent Pump Motors

Number:	3 (One per pump)
Manufacturer:	U.S. Electric Motors Division of Emerson Electric Co. P.O. Box 3946 8100 Florrisant Avenue St. Louis, MO 63136 (314) 553-2000
Horsepower:	350
RPM:	720
Special Features:	Variable Frequency Drive
Service:	3 ph, 60 Hz, 460 volts
Enclosure:	EXP PRF
Temperature Rise:	Class B Rise in 50°C Ambient
Type:	EVE4
Insulation:	Class F
Service Factor:	1.15
Supplier:	Flo-Systems, Inc, 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	U.S. Electric Motors 19877 Quiroz Court Walnut, CA 91789 (919) 594-5470

7. Influent Magnetic Flowmeter

Number:	1
Manufacturer:	Fischer & Porter Company 17300 Redhill Ave. Irvine, CA 92714 (714) 252-1142
Model:	Series 3000; 10DX3111
Size:	60-inch flanged tube
Type:	Magnetic
Capacity:	0 to 70,000 gpm range
Enclosure:	NEMA 4X, Accidental Submergence
Liner:	Polyurethane
Electrodes:	316 SS
Power Supply:	1 phase, 60 Hz, 120 v

Supplier:	Fischer & Porter Company 17300 Redhill Ave. Irvine, CA 92714 (714) 252-1142
Local Representative:	Fischer & Porter Company 17300 Redhill Ave. Irvine, CA 92714 (714) 252-1142

6.1.3 Grit Handling Equipment

1. Grit Chamber Blowers

Number:	2
Manufacturer:	Gardner Denver Machinery, Inc. 1800 Gardner Expressway Quincy, IL 62301 (217) 222-5400
Type:	Rotary Positive Displacement
Model:	Sutorbilt 6ML-RHC, GAFMDL (A)
Capacity:	530 SCFM (max) at 1860 RPM 440 SCFM (design) at 1600 RPM 290 SCFM (min) at 1176 RPM
Supplier:	Colorado Compressor, Inc. 1609 E. 58th Avenue Denver, CO 80216 (303) 297-8100
Local Representative:	Colorado Compressor, Inc. 1609 E. 58th Avenue Denver, CO 80216 (303) 297-8100

2. Grit Chamber Blower Motors

Number:	2 (one per blower)
Manufacturer:	U.S. Electrical Motors 8100 W. Florissant Avenue St. Louis, MO 63136 (314) 553-1071
Model:	7972
Horsepower:	40
RPM:	1775
Service:	3 ph/60 Hz/460 volts
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F

Service Factor: 1.15
 NEMA Design: B
 Frame: Cast Iron, 324T
 Supplier: Colorado Compressor, Inc.
 1609 E. 58th Avenue
 Denver, CO 80216
 (303) 297-8100
 Local Representative: U.S. Electrical Motors
 19877 Quiroz Court
 Walnut, CA 91789
 (909) 594-5470

3. Grit Pumps

Number: 7 (One-off-the-shelf replacement)
 Manufacturer: Wemco Pump
 440 West 800 South
 Salt Lake City, UT 84101-0209
 (801) 359-8731
 Model: 4X4 Model C, Torque Flow
 Type: Recessed Impeller, Centrifugal
 Type of Seal: Crane Double Mechanical Capacity:
 160 gpm against 121 ft. TDH at
 1450 RPM
 160gpm against 80 ft. TDH at
 1180 RPM
 160gpm against 55 ft. TDH at
 980 RPM
 Supplier: Flo-Systems, Inc.
 3010 Floyd Street
 Burbank, CA 91504
 (213) 849-7711
 Local Representative: Flo-Systems, Inc.
 3010 Floyd Street
 Burbank, CA 91504
 (213) 849-7711

4. Grit Pump Motors

Number: 7 (One per pump)
 Manufacturer: Reliance Electric
 24701 Euclid Avenue
 Cleveland, OH 44117
 (216) 266-7000
 Model: A-C Motor, P32G3320

Horsepower:	40
RPM:	1800
Service:	3 ph, 60 hz, 460v
Enclosure:	TEFC-XEX
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

5. Grit Magnetic Flowmeters

Number:	2
Manufacturer:	Fischer & Porter Company 17300 Redhill Ave. Irvine, CA 92714 (714) 252-1142
Model:	Series 3000; 10DX3111
Size:	6-inch flanged tube
Type:	Magnetic
Capacity:	0 to 460 gpm range
Enclosure:	NEMA 4X, Accidental Submergence
Liner:	Teflon PTFE
Electrodes:	316 SS
Power Supply:	1 phase, 60 Hz, 120 v
Supplier:	Fischer & Porter Company 17300 Redhill Ave. Irvine, CA 92714 (714) 252-1142
Local Representative:	Fischer & Porter Company 17300 Redhill Ave. Irvine, CA 92714 (714) 252-1142

6. Grit Classifiers/Separators

Number:	3
Manufacturer:	Wemco Pump 440 West 800 South Salt Lake City, UT 84101-0209 (801) 359-8731
Model:	18in-FF Hydrogritter
Classifier:	18-inch diameter screw type, full-flared tank
Separator:	Cyclone type, WEMCLONE-1500C
Capacity:	500 GPM @ 8 PSIG
Feed Chamber Size:	15 in.
Reducer Type:	Orbital
Supplier:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711

7. Grit Classifier/Separator Motors

Number:	3 (One per classifier/separator)
Manufacturer:	Baldor Electric P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Horsepower:	1
RPM:	1750
Service:	3 ph, 60 hz, 230/460v
Enclosure:	TEXP, Premium Efficiency
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711

Local Representative: Chick's Electric
3592 Main Street
San Diego, CA 92113
(619) 232-2162

6.1.4 Odor Reduction Station

Equipment information for the Odor Reduction Station is according to the following:

1. Odor Reduction Station Exhaust Fans

Number: 2
Manufacturer: Ceilcote Air Pollution Control, Inc.
140 Sheldon Road
Berea, OH 44017
(216) 243-0700
Model: Club 3050
Type: Centrifugal
Size: 36-inch diameter inlet
Capacity: 16,400 CFM @ 12.0-inch SP
Speed: 1495 rpm
Supplier: Ceilcote Air Pollution Control, Inc.
140 Sheldon Road
Berea, OH 44017
(216) 243-0700
Local Representative: Leonard Engineered Products
11354 Burbank Blvd.
P.O. Box 868
North Hollywood, CA
(818) 760-4100

2. Odor Reduction Station Exhaust Fan Motors

Number: 2 (one per fan)
Manufacturer: Reliance Electric
24701 Euclid Avenue
Cleveland, OH 44117
(800) 245-4501
Model: Duty Master
Horsepower: 50
RPM: 1775
Service: 3 phase, 60 hz, 460 v
Enclosure: Explosion Proof, Chemical Duty
Temperature Rise: Class B Rise in 50°C Ambient
Insulation: Class F
Service Factor: 1.15

NEMA Design: B
Supplier: Ceilcote Air Pollution Control, Inc.
140 Sheldon Road
Berea, OH 44017
(216) 243-0700
Local Representative: Rockwell Automation-Reliance
Electric
3934 Murphy Canyon Road
Suite B200
San Diego, CA 92123
(619) 292-3290

3. Odor Reduction Station Scrubber

Number: 1
Manufacturer: R. J. Environmental
6197 Cornerstone Ct. East
Suite 108
San Diego, CA 92121
(619) 455-7688
Type: Packed Vertical Tower
Size: 7 ft diameter by 30 ft high
Capacity: 16,200 cfm
Inlet H₂S: 25 ppm
Removal Efficiency: 99%
Supplier: R. J. Environmental
6197 Cornerstone Ct. East
Suite 108
San Diego, CA 92121
(619) 455-7688
Local Representative: R. J. Environmental
6197 Cornerstone Ct. East
Suite 108
San Diego, CA 92121
(619) 455-7688

4. Packing Media

Manufacturer: Lantec
5308 Derry Avenue, Suite E
Agoura Hills, CA 91301
(818) 707-2285
Size: 3.5-inches

Supplier:	R.J. Environmental 6197 Cornerstone Court East, Suite 108 San Diego, CA 92121 (619) 455-7688
Local Representative:	R.J. Environmental 6197 Cornerstone Court East, Suite 108 San Diego, CA 92126 (619) 455-7688

5. Odor Reduction Station pH and ORP Controllers

Number:	2 (1 pH controller and 1 ORP controller)
Manufacturer:	Great Lakes Instruments 9020 West Dean Road Milwaukee, WI 53224 (414) 355-3601
Model:	pH Probe - 6028PO, Differential Electrode Type ORP Probe - 2028RO, Differential Electrode Type pH Transmitter - 692P3F5A7N ORP Transmitter - 692R3F5A7N
Supplier:	R. J. Environmental 6197 Cornerstone Ct. East Suite 108 San Diego, CA 92121 (619) 455-7688
Local Representative:	Westmark Sales, Inc. 2330 Westwood Blvd. Suite 100 Los Angeles, CA 90064 (310) 474-8211

6. Odor Reduction Station Recirculation Pumps

Number:	2
Manufacturer:	Met-Pro Corp.,Fybroc Division 700 Emlen Way P.O. Box 379 Telford, PA 18969 (215) 723-8155

Model:	1500
Type:	FRP, End Suction Centrifugal
Size:	3 x 4 x 10
Type of Seal:	Double Mechanical, Durametallic RX-0
Capacity:	240 gpm @ 65 ft
Speed:	1750 rpm
Supplier:	R. J. Environmental 6197 Cornerstone Ct. East Suite 108 San Diego, CA 92121 (619) 455-7688
Local Representative:	Process Equipment 820 N. Mountain Avenue Suite 108 Upland, CA 91784 (909) 920-3005

7. Odor Reduction Station Recirculation Pump Motors

Number:	2 (one per pump)
Manufacturer:	Siemens Energy & Automation 323 Norristown Road, Suite 210 Ambler, PA 19002 (215) 283-4720
Horsepower:	7.5
RPM:	1800
Service:	3 phase, 60 Hz, 460 volts
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	R.J. Environmental 6197 Cornerstone Ct. East Suite 108 San Diego, CA 92121 (619) 455-7688
Local Representative:	Arnhart Electric 3520 Main St. San Diego, CA 92113 (619) 232-7965

8. Odor Reduction Station NaOH Metering Pumps

Number: 2
Manufacturer: PulsaFeeder
2883 Brighton-Henrietta
Rochester, NY 14623
(716) 292-8000
Model: 680-S-AE
Type: Positive Displacement, Double
Diaphragm Metering
Size: 1/2-inch x 1/2-inch
Head Material: 316 Stainless
Valve Material: 316 Stainless
Capacity: 0.3 - 3.0 gph
Speed: 44 strokes per minute @ 1750 rpm
Supplier: Gierlich-Mitchell
227 West Grand Avenue
El Segundo, CA 90245
(310) 414-0150
Local Representative: ChemWest
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
(714) 858-7800

9. Odor Reduction Station NaOH Metering Pump Motors

Number: 2 (one per pump)
Manufacturer: Baldor
P.O. Box 2400
Fort Smith, AR 72902
(501) 646-4711
Horsepower: 1.0
RPM: 1750
Service: 3 phase, 60 Hz, 460 volts
Enclosure: TEFC, Chemical Duty
Temperature Rise: Class B Rise in 50°C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: B
Supplier: Gierlich-Mitchell
227 West Grand Avenue
El Segundo, CA 90245
(310) 414-0150

Local Representative: Chicks Electric
3592 Main Street
San Diego, CA 92113
(619) 232-2162

10. Odor Reduction Station NaOC1 Metering Pumps

Number: 2
Manufacturer: PulsaFeeder
2883 Brighton-Henrietta
Rochester, NY 14623
(716) 292-8000
Model: 880-S-AE
Type: Positive Displacement, Double
Diaphragm Metering
Size: 3/4-inch x 3/4-inch
Head Material: Teflon
Valve Material: Alloy C
Capacity: 1.7 to 15.0 gph
Speed: 58 strokes per minute @ 1750 rpm
Supplier: Gierlich-Mitchell
227 West Grand Avenue
El Segundo, CA 90245
(310) 414-0150
Local Representative: ChemWest
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
(714) 858-7800

11. Odor Reduction Station NaOC1 Metering Pump Motors

Number: 2 (one per pump)
Manufacturer: Baldor
P.O. Box 2400
Fort Smith, AR 72902
(501) 646-4711
Horsepower: 1.0
RPM: 1750
Service: 3 phase, 60 Hz, 460 volts
Enclosure: TEFC, Chemical Duty
Temperature Rise: Class B Rise in 50°C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: B

Supplier: Gierlich-Mitchell
227 West Grand Avenue
El Segundo, CA 90245
(310) 414-0150
Local Representative: Chick's Electric
3592 Main Street
San Diego, CA 92113
(619) 232-2162

12. Odor Reduction Station NaOH Storage Tank

Number: 1
Manufacturer: Belco Manufacturing
2303 Taylors Valley Road
Belton, TX 76513
(800) 251-8265
Type: FRP, Cylindrical, Closed Top
Size: 5 ft diameter x 7 ft high
Capacity: 1000 gallons (nominal)
Resin Material: Dow Derakane 411-350
Heating Element: Thermon TSX-6-2BNOJ Self Limiting
Cable, 240 VAC Operation
Insulation: 2.3-inch thick Trymer 1800 Brand
Polisocyanurate Foam
Supplier: Belco Manufacturing
2303 Taylors Valley Road
Belton, TX 76513
(800) 251-8265
Local Representative: Belco Manufacturing
2303 Taylors Valley Road
Belton, TX 76513
(800) 251-8265

13. Odor Reduction Station NaOC1 Storage Tank

Number: 1
Manufacturer: Belco Manufacturing
2303 Taylor's Valley Road
Belton, TX 76513
(800) 251-8265
Type: FRP, Cylindrical, Closed Top
Size: 8 ft diameter x 14 ft-6-inch high
Capacity: 5400 gallons (nominal)
Resin Material: Dow Derakane 411-350

Supplier:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265
Local Representative:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265

14. NaOH and NaOCl Containment Sump Pumps

Number:	2 (one in each area)
Manufacturer:	Barnes Pumps, Inc. 420 Third Street P.O. Box 603 Piqua, OH 45356-0603 (513) 773-2442
Model:	3SE1544DS
Type:	Submersible; Simplex Control
Type of Seal:	Tandem Mechanical Seal
Capacity:	120 gpm @ 15 ft. TDH
Horsepower:	1.5
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	NEMA 4X Weather Proof
Insulation:	Class B
Service Factor:	1.85
NEMA Design:	Class B, Completely Oil-Filled, Squirrel Cage Induction
Supplier:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627
Local Representative:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627

15. Odor Reduction Station Water Softener System

Number:	1
Manufacturer:	Culligan International Company One Culligan Parkway Northbrook, IL 60062
Model:	SMS-91/Model 9000

Type:	Ion Exchange
Size:	2 vessels of 12-inch diameter x 44-inch high
Capacity:	6 gpm up to 2,900 gpd
Supplier:	Culligan Technologies 3515 Olive Street Lemon Grove, CA 91945 (619) 463-8837
Local Representative:	Culligan Technologies 3515 Olive Street Lemon Grove, CA 91945 (619) 463-8837

16. Odor Reduction Station Water Softening System Calcium Ion Controller

Number:	1
Manufacturer:	Jenco Instruments, Inc. 7968 Arjons Drive, Suite C San Diego, CA 92126 (619) 578-2828
Model:	J3675
Probe Type:	Calcium Selective, PVC Membrane
Range:	0.02 to 40,000 ppm
Supplier:	Culligan Technologies 3515 Olive Street Lemon Grove, CA 91945 (619) 463-8837
Local Representative:	Jenco Instruments, Inc. 7968 Arjons Drive, Suite C San Diego, CA 92126 (619) 578-2828

17. Storage Bin Exhaust Fan No. 1

Number:	1
Manufacturer:	Hartzell Fan P.O. Box 919 Piqua, OH 45356 (800) 336-3267
Model:	37-24-FWK3
Type:	Roof Exhauster
Size:	24" Diameter Roof Exhauster
Capacity:	8400 cfm
Speed:	1940 rpm

Supplier: J.E. Philips
2720 South La Cienega Blvd.
Los Angeles, CA 90034
(310) 837-6173
Local Representative: J.E. Philips
2720 South La Cienega Blvd.
Los Angeles, CA 90034
(310) 837-6173

18. Storage Bin Exhaust Fan No. 1 Motor

Number: 1
Manufacturer: Reliance Electric
24701 Euclid Avenue
Cleveland, Ohio 44117
(800) 245-4501
Horsepower: 3
RPM: 1755
Service: 3 phase/60Hz/460 volts
Enclosure: XTXEXP
Temperature Rise: Class B Rise in 50°C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: B
Supplier: J.E. Philips
2720 South La Cienega Blvd.
Los Angeles, CA 90034
(310) 837-6173
Local Representative: Rockwell Automation-Reliance Electric
3934 Murphy Canyon Road
Suite B200
San Diego, CA 92123
(619) 292-3290

19. Storage Bin/Grit Dewatering Area Supply Fan No. 1

Number: 1
Manufacturer: Hartzell Fan Inc.
P.O. Box 919
Piqua, OH 45356
(800) 334-3267
Model: 35-32-EN3
Type: In-Line Axial
Size: 32" Diameter Inline Duct Fan
Capacity: 16,200 cfm at 1.5" SP

Fan Speed:	1636
Supplier:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173
Local Representative:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173

20. Storage Bin/Grit Dewatering Area Supply Fan No. 1 Motor

Number:	1
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 245-4501
Horsepower:	10
RPM:	1755
Service:	3 phase/60 Hz/460 volts
Enclosure:	XTXEXP
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

21. Grit Dewatering Area Exhaust Fan No. 2

Number:	1
Manufacturer:	Hartzell Fan Inc. P.O. Box 919 Piqua, OH 45356 (800) 334-3267
Model:	37-24-FWK3
Type:	Roof Exhauster

Size:	24" Diameter Roof Exhauster
Capacity:	7750 cfm at 0.5" SP
Fan Speed:	1820
Supplier:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173
Local Representative:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173

22. Grit Dewatering Area Exhaust Fan No. 2 Motor

Number:	1
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 245-4501
Horsepower:	3
RPM:	1755
Service:	3 phase/60 Hz/460 volts
Enclosure:	XTXEXP
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

23. Wetwell and Screening Channel Exhaust Fan No. 3

Number:	1
Manufacturer:	Hartzell Fan Inc. P.O. Box 919 Piqua, OH 45356 (800) 336-3267
Model:	40-15-GJ33

Type:	In-Line Centrifugal
Size:	15" Diameter Centrifugal Duct Fan
Capacity:	1300 cfm at 4.0" SP
Fan Speed:	2645
Supplier:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173
Local Representative:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173

24. Wetwell and Screening Channel Exhaust Fan No. 3 Motor

Number:	1
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 245-4501
Horsepower:	3.0
RPM:	1725
Service:	3 phase/60 Hz/460 volts
Enclosure:	XTXEXP
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

6.2 PRIMARY SEDIMENTATION FACILITIES

6.2.1 Primary Sedimentation Tanks

1. Effluent Weirs

Manufacturer:	Warminster Fiberglass Company P.O. Box 188 County Line Road Southampton, PA 18966 (215) 953-1260
Model:	WFWB1000
Size:	255 ft per tank
Material:	Rubatex Stock Number R-411-N, SCE-41; Type E
Supplier:	Warminster Fiberglass Company P.O. Box 188 County Line Road Southampton, PA 18966 (215) 953-1260
Local Representative:	Warminster Fiberglass Company P.O. Box 188 County Line Road Southampton, PA 18966 (215) 953-1260

6.2.2 Channel Aeration Facilities

1. Channel Air Blowers

Number:	2 (one duty, one standby)
Manufacturer:	Sutorbilt Gardner Denver 1800 Gardner Expressway Quincy, IL 62301 (217) 222-5400
Model:	8LP #GAHL-DPA
Type:	Rotary Positive Displacement
Capacity:	Nominal - 1900 scfm @ 5.5 psig discharge pressure High - 2200 scfm Low - 1100 scfm
Shaft Speed:	Nominal - 1340 rpm (sheaves provided for 1525 rpm and 845 rpm at high/low flow rates)

Supplier: Colorado Compressors, Inc
1609 E. 58th Ave
Denver, CO 80216
(303)297-8100
Local Representative: Colorado Compressors, Inc.
1609 E. 58th Ave
Denver, CO 80216
(303) 297-8100

2. Channel Air Blower Motors

Number: 2 (one per blower)
Manufacturer: U.S. Electrical Motors
8100 W. Florissant Avenue
P.O. Box 3946
St. Louis, MO 63136
(314) 553-1071
Model: 7975
Horsepower: 75
RPM: 1800
Service: 3ph/60Hz/460 volts
Enclosure: TEFC
Temperature Rise: Class B Rise in 50° C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: Class B
Supplier: Colorado Compressors, Inc.
1609 E. 58th Ave
Denver, CO 80216
(303) 297-8100
Local Representative: U.S. Electrical Motors
19877 Quiroz Court
Walnut, CA 91789
(909) 594-5470

3. Influent and Effluent Channel Diffusers

Number: Influent - 184
Effluent - 256
Manufacturer: EnviroQuip International, Inc.
8506 Beechmont Avenue
Cincinnati, OH 45255
(513) 388-4100
Model: Snap Cap Plus 5 Model 750-T-10
Type: Coarse Bubble

Maximum Capacity:	10 cfm
Base Material:	Standard Plastic
NPT Connection Size:	3/4-inch
Supplier:	EnviroQuip International, Inc. 8506 Beechmont Avenue Cincinnati, OH 45255 (513) 388-4100
Local Representative:	MISCO Southwest 1538 Brockhollow Drive, Suite C Santa Ana, CA 92705 (714) 979-6001

4. Air Supply Fans

Number:	2 (one duty, one standby)
Manufacturer:	Hartzell Fan, Inc. 1964 Shroyer Ave. Piqua, Ohio 45356 (800) 336-3267
Model:	P869505413009 59-20-FWF4
Size:	20-inches
Type:	Fiberglass Direct Drive Wall Ventilator
Capacity:	3275 scfm @ 1/8-inch SP
Shaft Speed:	1140 rpm
Supplier:	J.E. Phillips Co, Inc. 2720 S. La Cienga Blvd. Los Angeles, Ca 90034 (310) 837-6173
Local Representative:	J.E. Phillips Co, Inc. 2720 S. La Cienga Blvd. Los Angeles, Ca 90034 (310) 837-6173

5. Air Supply Fan Motors

Number:	2 (one per fan)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 321-2795
Horsepower:	1/2
RPM:	1200
Service:	3ph/60 Hz/460 volts

Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50° C Ambient
Insulation:	Class F
Service Factor:	1.0
NEMA Design:	Class B
Supplier:	J.E. Phillips Co, Inc. 2720 S. La Cienga Blvd. Los Angeles, Ca 90034 (310) 837-6173
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

6. PST Gallery Exhaust Fans

Number:	2 (one duty, one standby)
Manufacturer:	Hartzell Fan, Inc. 1964 Shroyer Ave. Piqua, Ohio 45356 (800) 336-3267
Model:	P869505413008 59-24-EF5
Size:	24-inches
Type:	Fiberglass Direct Drive Axial Flow
Capacity:	4000 scfm
Shaft Speed:	850 rpm
Supplier:	J.E. Phillips Co, Inc. 2720 S. La Cienga Blvd. Los Angeles, Ca 90034 (310) 837-6173
Local Representative:	J.E. Phillips Co, Inc. 2720 S. La Cienga Blvd. Los Angeles, Ca 90034 (310) 837-6173

7. PST Gallery Exhaust Fan Motors

Number:	2 (one per fan)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 321-2795
Horsepower:	1/2

RPM:	850
Service:	3ph/460v/60Hz
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50° C Ambient
Insulation:	Class F
Service Factor:	1.00
NEMA Design:	Class B
Supplier:	J.E. Phillips Co, Inc. 2720 S. La Cienga Blvd. Los Angeles, Ca 90034 (310) 837-6173
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

6.2.3 Rapid Mix Chamber System

1. 24" Pressure Slide Gates

Number:	10 (2 per tank)
Manufacturer:	Golden Harvest 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238
Model:	GH-100
Size:	24" X 24"
Seating/Unseating Head:	60 ft/15 ft
Supplier:	Golden Harvest 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238
Local Representative:	Golden Harvest 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238

2. 24" Slide Gates for Scum Removal

Number:	10 (2 per tank)
Manufacturer:	Golden Harvest 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238

Model:	GH-65
Size:	24" X 24"
Seating/Unseating Head:	2 ft/2 ft
Supplier:	Golden Harvest 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238
Local Representative:	Golden Harvest 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238

3. Rapid Mix Pumps

Number:	6 (one-off -the-shelf replacement)
Manufacturer:	Vaughan Company, Inc. 364 Monte-Elma Rd. Montesano, WA 98563 (360) 249-4042 ph (360) 249-6155 fax
Model:	VVDP4P6S-118
Size:	4 in (dis) x 6 in (suct)
Type:	"Chopper", Centrifugal
Capacity:	850 gpm @ 30' TDH
Speed:	1170 rpm
Supplier:	Rockwell Engineering & Equipment 2913 El Camino Real, Suite 337 Tustin Ranch, CA 92680 (714) 730-9409
Local Representative:	Rockwell Engineering & Equipment 2913 El Camino Real, Suite 337 Tustin Ranch, CA 92680 (714) 730-9409

4. Rapid Mix Pump Motors

Number:	6 (One for each pump)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 321-2795
Horsepower:	15
RPM:	1180
Service:	3 ph, 60 hz, 230/460v
Enclosure:	TEFC

Temperature Rise:	Class B Rise in 50° C Ambient
Insulation:	Class F
Service Factor:	1.15 (1.0 at 50°C)
NEMA Design:	Class B
Supplier:	Rockwell Engineering & Equipment 2913 El Camino Real, Suite 337 Tustin Ranch, CA 92680 (714) 730-9409
Local Representative:	Rockwell Automation Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

5. PST Gallery Sump Pumps

Number:	2
Manufacturer:	Barnes Pumps, Inc. 420 Third Street P.O. Box 603 Piqua, OH 45356-0603 (513) 773-2442
Model:	3SE1544DS
Type:	Submersible; Duplex Control
Type of Seal:	Tandem Mechanical
Capacity:	115 gpm @ 23' TDH
Horsepower:	1.5
RPM:	1750
Service:	3 ph/60Hz/460 volt
Enclosure:	NEMA 4X
Insulation:	Class B
Service Factor:	1.15
NEMA Design:	Class B, Completely Oil-Filled, Squirrel Cage Induction
Supplier:	Multi W Systems, Inc. 2615 Strozier Ave. El Monte, CA 91733 (818) 401-2627
Local Representative:	Multi W Systems, Inc. 2615 Strozier Ave. El Monte, CA 91733 (818) 401-2627

6.2.4 Sludge Collection and Pumping Facilities

1. Plastic Flight and Chain Sludge Collectors

Number:	5 (one for each PST)
Manufacturer:	NRG Company, Inc. P.O. Box 306 Ardmore, PA 19003 (610) 896-6850
Model:	720 CS
Capacity:	6000 lbs
Drive Chain Model:	NRGNH78
Chain Size:	6 in. Pitch
Reducer Type:	Helical-Bevel
Supplier:	Pacific Process Equipment 1124 N. Brand Blvd., 2nd Floor Glendale, CA 91202 (818) 500-9495
Local Representative:	Pacific Process Equipment 1124 N. Brand Blvd., 2nd Floor Glendale, CA 91202 (818) 500-9495

2. Sludge Collection Drive Assembly Motors

Number:	5 (one for each PST)
Manufacturer:	Sterling Electric 16752 Armstrong Ave. Irvine, CA 92714 (800) 654-6220
Model:	Cast Fe MAX RBY054FCA
Horsepower:	1/2
RPM:	1800
Service:	3 ph, 60 Hz, 460 volt
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 65°C Ambient
Insulation:	Class F
Service Factor:	1.15
Supplier:	Pacific Process Equipment 1124 N. Brand Blvd., 2nd Floor Glendale, CA 91202 (818) 500-9495

Local Representative: Sterling Electric
16752 Armstrong Ave.
Irvine, CA 92714
(800) 654-6220

3. Primary Sludge Pumps

Number: 4 (one-off-the-shelf replacement)
Manufacturer: Komline - Sanderson Eng. Corp.
12 Holland Ave
Peapack, NJ 07977
(908) 234-1000
Model: KS-11-1
Size: 11 in. Plunger diam.
Type: Heavy duty simplex plunger, dual valve
Capacity: 115 gpm @ 95' TDH
Speed: Constant @ 50 rpm
Reducer Type: Orbital
Reducer Reduction Ratio: 35:1
Supplier: Flo-Systems
3010 Floyd Street
Burbank, CA 91504
(213) 849-7711
Local Representative: Flo-Systems
3010 Floyd Street
Burbank, CA 91504
(213) 849-7711

4. Primary Sludge Pump Motors

Number: 4 (one for each pump)
Manufacturer: Baldor Electric
P.O. Box 2400
Fort Smith AR 72902
(501) 646-4711
Model: 0653M-213TC
Horsepower: 7.5
RPM: 1750
Service: 3 ph, 60 hz, 230/460v
Enclosure: TEFC
Temperature Rise: Class B Rise in 50° C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: Class B

Supplier:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	Chick's Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

5. Primary Sludge Pump Automatic Lubricators

Number:	4 (one per pump)
Manufacturer:	Lubriquip, Inc. 18901 Cranwood Parkway Cleveland, Ohio 44128 (216) 581-2000
Model:	Manzel 55
Type:	Force Feed
Capacity:	3 pint
Reservoir:	CODE SBL03, 2 Pump Max
Pump:	1/4 in. Diam.; CODE 88C, G, K; 3-50 Strokes/min
Max Pressure:	6000 psi
Drive Assembly:	Ratchet
Supplier:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711

6. Primary Sludge Magnetic Flowmeters

Number:	3 (one per pump; no off-the-shelf meter; only spool pieces)
Manufacturer:	Fischer & Porter Company 17300 Redhill Ave. Irvine, CA 92714 (714) 252-1142
Model:	Series 3000; 10DX3111
Size:	4 in. flanged tube
Type:	Magnetic
Capacity:	53 to 1056 gpm range

Enclosure:	NEMA 4X, Accidental Submergence
Liner:	TEFLON PTFE
Electrodes:	316 SS
Power Supply:	1 ph/60 Hz/120v
Supplier:	Fischer & Porter Co. 17300 Redhill Ave. Irvine, CA 92714 (714) 252-1142
Local Representative:	Fischer & Porter Co. 17300 Redhill Ave. Irvine, CA 92714 (714) 252-1142

7. Total Primary Sludge Magnetic Flowmeter on Common Sludge Line

Number:	1
Manufacturer:	Fischer & Porter Co. 17300 Redhill Ave. Irvine, CA 92714 (714) 252-1142
Model:	Series 3000; 10DX3111
Size:	6 in. flanged tube
Type:	Magnetic
Capacity:	133 to 2640 gpm
Enclosure:	NEMA 4X, Accidental Submergence
Liner:	TEFLON PTFE
Electrodes:	316 SS
Power Supply:	1 ph/60 Hz/120 v
Supplier:	Fischer & Porter Co. 17300 Redhill Ave. Irvine, CA 92714 (714) 252-1142
Local Representative:	Fischer & Porter Co. 17300 Redhill Ave. Irvine, CA 92714 (714) 252-1142

8. Primary Sludge Grinders

Number:	2 (one-off-the shelf replacement)
Manufacturer:	Franklin Miller, Inc. 60 Okner Pkwy Livingston, NJ 07939 (201) 535-9200
Model:	Taskmaster Supershredder 8000

Type:	TM8516-06
Capacity:	Double Shaft
Reducer Type:	600 gpm (nominal)
Reducer Reduction Ratio:	Helical
Supplier:	29:1
	Flo-Systems
	3010 Floyd Street
	Burbank, CA 91504
	(213) 849-7711
Local Representative:	Flo-Systems
	3010 Floyd Street
	Burbank, CA 91504
	(213) 849-7711

9. Primary Sludge Grinder Motors

Number:	2 (one per grinder)
Manufacturer:	Baldor Electric Company
	P.O. Box 2400
	Fort Smith, AR 72902
	(501) 646-4711
Model:	VEM3661T
Horsepower:	3 hp
RPM:	1760
Service:	3 ph, 60 hz, 230/460v
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 40° C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	Flo-Systems
	3010 Floyd Street
	Burbank, CA 91504
	(213) 849-7711
Local Representative:	Chick's Electric
	3592 Main Street
	San Diego, CA 92113
	(619) 232-2162

6.2.5 Primary Skimmings Processing Facilities

1. Surface Skimmers

Number:	5 (one per tank)
Manufacturer:	NRG Company, Inc. P.O. Box 306 Ardmore, PA 19003 (610) 896-6850
Size:	18 in. diameter, 20ft 8in. long, 60° slots
Type:	Worm Gear
Supplier:	Pacific Process Equipment 1124 N. Brand Blvd., 2nd Floor Glendale, CA 91202 (818) 500-9495
Local Representative:	Pacific Process Equipment 1124 N. Brand Blvd., 2nd Floor Glendale, CA 91202 (818) 500-9495

2. Surface Skimmer Actuators

Number:	5 (one per skimmer)
Manufacturer:	Limitorque Corporation 5114 Woodall Rd. P.O. Box 11318 Lynchburg, VA 24506 (804) 528-4400
Model:	L120-10-3-1800
Type:	Multi-Turn
Horsepower:	0.67
Service:	3 ph/60 Hz/460 v
Enclosure:	NEMA 4
Temperature Rise:	Class B Rise in 50° C Ambient
Capacity:	
Torque:	100 ft-lb
Thrust:	10000 lb
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	High Starting Torque
Supplier:	NRG Company, Inc. P.O. Box 306 Ardmore, PA 19003 (610) 896-6850

Local Representative: Pacific Process Equipment
1124 N. Brand Blvd., 2nd Floor
Glendale, CA 91202
(818) 500-9495

3. Primary Skimmings Pumps

Number: 2
Manufacturer: Wemco Pump
440 West 8000 South
Salt Lake City, Utah 84101-0209
(801) 359-8731
Model: C 4 x 4 Torque-flow pump
Type: Two-speed, centrifugal non-clog with recessed impeller
Type of Seal: Double Mechanical with NPW Seal Water
Capacity: 290 gpm @ 49' TDH (low flow)
500 gpm @ 108' TDH (high flow)
Speed: 965 RPM (low)
1450 RPM (high)
Supplier: Flo-Systems
3010 Floyd Street
Burbank, CA 91504
(213) 849-7711
Local Representative: Flo-Systems
3010 Floyd Street
Burbank, CA 91504
(213) 849-7711

4. Primary Skimmings Pump Motors

Number: 2 (one per pump)
Manufacturer: Reliance Electric
24701 Euclid Avenue
Cleveland, OH 44117
(800) 321-2795
Model: Duty Master AC Model
Horsepower: 50
RPM: 1800/1200 rpm
Service: 3 ph, 60 Hz, 460 volt
Enclosure: TEFC
Temperature Rise: Class B Rise in 50° C Ambient
Insulation: Class F
Service Factor: 1.15

NEMA Design:	B
Supplier:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

5. Primary Skimmings Grinders

Number:	2 (one- off- the- shelf replacement)
Manufacturer:	Franklin Miller, Inc. 60 Okner Pkwy Livingston, NJ 07939 (201) 535-9200
Model:	Taskmaster Supershredder 8000 TM8516-06
Type:	Double Shaft
Capacity:	600 gpm (nominal)
Reducer Type:	Helical
Reducer Reduction Ratio:	29:1
Supplier:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711

6. Primary Skimmings Grinder Motors

Number:	2 (one per grinder)
Manufacturer:	Baldor Electric Company P.O. Box 2400 Fort Smith, AR 72902 (501)646-4711
Model:	VEM3661T
Horsepower:	3
RPM:	1760
Service:	3 ph, 60 hz, 230/460v
Enclosure:	TEFC

Temperature Rise:	Class B Rise in 40° C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	Chick's Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

7. Primary Skimmings Dry Well Sump Pumps

Number:	2
Manufacturer:	Barnes Pumps, Inc. 420 Third Street P.O. Box 603 Piqua, OH 45356-0603 (513) 773-2442 (513) 773-2238 fax
Model:	3SE1544DS
Type:	Submersible; Duplex Control
Type of Seal:	Tandem Mechanical
Capacity:	115 gpm @ 23' TDH
Horsepower:	1.5
RPM:	1750
Service:	3 ph/60 Hz/460 volt
Enclosure:	NEMA 4X
Insulation:	Class B
Service Factor:	1.15
NEMA Design:	NEMA B, Completely Oil-Filled, Squirrel Cage Induction
Supplier:	Multi W Systems, Inc. 2615 Strozier Ave. El Monte, CA 91733 (818) 401-2627
Local Representative:	Multi W Systems, Inc. 2615 Strozier Ave. El Monte, CA 91733 (818) 401-2627

6.2.6 Chemical Addition Facilities

1. Sump Pumps

Number:	1-Polymer Bulk Storage Area 1-Ferric Chloride Storage Area 1-Polymer Mixing Area
Manufacturer:	Barnes Pumps, Inc. 420 Third Street P.O. Box 603 Piqua, OH 45356-0603 (513) 773-2442
Model:	3SE1544DS
Type:	Submersible; Simplex Control
Type of Seal:	Tandem Mechanical
Capacity:	120 gpm @15' TDH (Polymer Bulk Storage) 115 gpm @ 15' TDH (Ferric Chloride Storage) 120 gpm @ 12' TDH (Polymer Mixing)
Horsepower:	1.5
RPM:	1750
Service:	3 ph/60 Hz/460 volt
Enclosure:	NEMA 4X Weather Proof
Insulation:	Class B
Service Factor:	1.15
NEMA Design:	NEMA B, Completely Oil-Filled, Squirrel Cage Induction
Supplier:	Multi W Systems, Inc. 2615 Strozier Ave. El Monte, CA 91733 (818) 401-2627
Local Representative:	Multi W Systems, Inc. 2615 Strozier Ave. El Monte, CA 91733 (818) 401-2627

6.2.6.1 Polymer Addition System

1. Polymer Bulk Storage Tanks

Number:	2
Manufacturer:	Belco Manufacturing 2303 Taylors Valley Road Belton, TX 76513 (800) 251-8265
Type:	FRP, Cylindrical, Closed Top
Size:	8 ft. diameter x 9 ft. high
Capacity:	3300 gallons (nominal)
Resin Material:	FRP-Dow Derakane 411
Corrosion Barrier:	C-Veil/Chop Derakane 411
Supplier:	Belco Manufacturing 2303 Taylors Valley Road Belton, TX 76513 (800) 251-8265
Local Representative:	Belco Manufacturing 2303 Taylors Valley Road Belton, TX 76513 (800) 251-8265

2. Polymer Transfer Pumps

Number:	2
Manufacturer:	Moyno Industrial Products 1895 West Jefferson Street Springfield, OH 45506
Model:	1L3 SSQ SBB
Type:	Single Stage, Positive Displacement, Progressive Cavity
Size:	1.5" X 1.25"
Type of Seal:	Single Mechanical
Capacity:	0.5-2.0 gpm at 20 psi
Speed:	89-394 rpm
Supplier:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504-2599 (213) 849-7711
Local Representative:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504-2599 (213) 849-7711

3. Polymer Transfer Pump D.C. Motors

Number:	2
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 321-2795
Horsepower:	1.5
RPM:	1750
Special Features:	SCR Variable Speed Drive
Service to SCR:	1ph/60Hz/230 volts
Service to Motor:	D.C. 90 volts
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50° C Ambient
Insulation:	Class F
Service Factor:	1.15
Supplier:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504-2599 (213) 849-7711
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

4. Polymer Mixing Tanks

Number:	2
Manufacturer:	Belco Manufacturing 2303 Taylors Valley Road Belton, TX 76513 (800) 251-8265
Type:	FRP, Cylindrical, Open Top
Size:	5 ft. diameter x 6 ft. high
Capacity:	880 gallons (nominal)
Resin Material:	FRP-Dow Derakane 411
Corrosion Barrier:	C-Veil/Chop Derakane 411

Supplier: Belco Manufacturing
2303 Taylors Valley Road
Belton, TX 76513
(800) 251-8265
Local Representative: Belco Manufacturing
2303 Taylors Valley Road
Belton, TX 76513
(800) 251-8265

5. Polymer Mixers

Number 2
Manufacturer: Chemineer, Inc.
5870 Poe Avenue
Dayton, OH 45414
(513) 454-3200
Model: 5JTC
Type: Portable, Top Entry, Clamp Mount
Speed: 310 rpm
Reducer Type: Helical Double Reduction
Reducer Reduction Ratio: 6:1
Supplier: ChemWest
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
(714) 858-7800
Local Representative: ChemWest
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
(714) 858-7800

6. Polymer Mixer Motors

Number: 2 (one per mixer)
Manufacturer: Reliance Electric
24701 Euclid Avenue
Cleveland, OH 44117
(800) 321-2795
Horsepower: 2
RPM: 1750
Service: 3 ph/60 Hz/460 v
Enclosure: TEFC
Temperature Rise: Class B Rise in 50° C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: Class B

Supplier:	ChemWest 23241 Arroyo Vista Rancho Santa Margarita, CA 92688 (714) 858-7800
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

7. Polymer Addition Pumps

Number:	6 (one-off-the-shelf replacement)
Manufacturer:	Moyno Industrial Products 1895 West Jefferson Street Springfield, OH 45506
Model:	2L3 SSQ SBB
Size:	1.5" X 1.25"
Type:	Two-Stage, Positive Displacement, Progressive Cavity
Type of Seal:	Single Mechanical
Capacity:	0.75-5.5 gpm at 30 psi
Speed:	101-697 rpm
Supplier:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504-2599 (213) 849-7711
Local Representative:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504-2599 (213) 849-3217

8. Polymer Addition Pump D.C. Motors

Number:	6 (one for each pump)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 321-2795
Horsepower:	1.5
RPM:	1750
Special Features:	SCR Variable Speed Drive
Service to SCR:	1ph/60Hz/230 volts
Service to Motor:	D.C., 90 volt
Enclosure:	TEFC

Temperature Rise:	Class B Rise in 50° C Ambient
Insulation:	Class F
Service Factor:	1.15
Supplier:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504-2599 (213) 849-7711
Local Representative:	Rockwell Automation - Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

6.2.6.2 Ferric Chloride Addition System

1. Ferric Chloride Bulk Storage Tanks

Number:	2.
Manufacturer:	Belco Manufacturing 2303 Taylors Valley Road Belton, TX 76513 (800) 251-8265
Type:	FRP, Cylindrical, Closed Top
Size:	14 ft. diameter x 20 ft. high
Capacity:	23,000 gallons (nominal)
Resin Material:	FRP-Dow Derakane 411
Corrosion Barrier:	C-Veil/Chop Derakane 411
Supplier:	Belco Manufacturing 2303 Taylors Valley Road Belton, TX 76513 (800) 251-8265
Local Representative:	Belco Manufacturing 2303 Taylors Valley Road Belton, TX 76513 (800) 251-8265

2. Ferric Chloride Transfer Pumps

Number:	2
Manufacturer:	PulsaFeeder, Inc. 2883 Brighton-Henrietta Toll Road Rochester, NY 14623 (716) 292-8000
Model:	7660-S-AE

Size:	3" X 3"
Type:	Positive Displacement, Diaphragm Metering Pump
Capacity:	927 gph at 55 psig
Stroke Length:	2.4-inches
Stroke Rate:	116 spm
Supplier:	Geirlich-Mitchell, Inc. 227 W. Grand Avenue El Segundo, CA 90245 (301) 414-0150
Local Representative:	ChemWest, Inc. 23241 Arroyo Vista Rancho Santa Margarita, CA 92688 (714) 858-7800

3. Ferric Chloride Transfer Pump Motors

Number:	2
Manufacturer:	Baldor P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Horsepower:	1
RPM:	1750
Service:	3 phase/60Hz/460 volts
Enclosure:	TEFC, Chem Duty
Temperature Rise:	Class B Rise in 50° C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	ChemWest, Inc. 23241 Arroyo Vista Rancho Santa Margarita, CA 92688 (714) 858-7800
Local Representative:	Chick's Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

4. Ferric Chloride Mixing Tanks

Number:	2
Manufacturer:	Belco Manufacturing 2303 Taylors Valley Road Belton, TX 76513 (800) 251-8265
Type:	FRP, Cylindrical, Open Top
Size:	5 ft. diameter x 6 ft. high
Capacity:	880 gallons (nominal)
Resin Material:	FRP-Dow Derakane 411
Corrosion Barrier:	C-Veil/Chop Derakane 411
Supplier:	Belco Manufacturing 2303 Taylors Valley Road Belton, TX 76513 (800) 251-8265
Local Representative:	Belco Manufacturing 2303 Taylors Valley Road Belton, TX 76513 (800) 251-8265

5. Ferric Chloride Mixers

Number	2
Manufacturer:	Chemineer, Inc. 5870 Poe Avenue Dayton, OH 45414 (513) 454-3200
Model:	5JTC-0.5
Type:	Portable, Top Entry, Clamp Mount
Speed:	310 rpm
Supplier:	ChemWest 23241 Arroyo Vista Rancho Santa Margarita, CA 92688 (714) 858-7800
Local Representative:	ChemWest 23241 Arroyo Vista Rancho Santa Margarita, CA 92688 (714) 858-7800

6. Ferric Chloride Mixer Motors

Number:	2 (one per mixer)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 321-2795
Horsepower:	1/2
RPM:	1750
Service:	3 ph/60 Hz/460 v
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50° C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	ChemWest 23241 Arroyo Vista Rancho Santa Margarita, CA 92688 (714) 858-7800
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

7. Ferric Chloride PST Addition Pumps

Number:	6 (one-off-the-shelf replacement)
Manufacturer:	PulsaFeeder, Inc. 2883 Brighton-Henrietta Toll Road Rochester, NY 14623 (716) 292-8000
Model:	7660-S-AE
Size:	2.5" X 2.5"
Type:	Positive Displacement, Diaphragm Metering Pump
Capacity:	251 gph at 95 psig
Stroke Length:	2.4-inches
Stroke Rate:	58 spm
Supplier:	Geirlich-Mitchell, Inc. 227 W. Grand Avenue El Segundo, CA 90245 (301) 414-0150

Local Representative: ChemWest, Inc.
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
(714) 858-7800

8. Ferric Chloride PST Addition Pump Motors

Number: 6 (one for each pump)
Manufacturer: Baldor Electric
P.O. Box 2400
Fort Smith, AR 72902
(501) 646-4711
Horsepower: 1
RPM: 1750
Service: 3 phase/60Hz/460 volts
Enclosure: TEFC, Chem Duty
Temperature Rise: Class B Rise in 50° C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: Class B
Supplier: ChemWest, Inc.
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
(714) 858-7800
Local Representative: Chick's Electric
3592 Main Street
San Diego, CA 92113
(619) 232-2162

9. Ferric Chloride USST Addition Pumps

Number: 2
Manufacturer: PalsaFeeder, Inc.
2883 Brighton-Henrietta Toll Road
Rochester, NY 14623
(716) 292-8000
Model: 7120-S-AE
Size: 3/4-inch X 3/4-inch
Type: Positive Displacement, Diaphragm
Metering Pump
Capacity: 20 gph at 125 psig
Stroke Length: 1.0-inches
Stroke Rate: 70 spm

Supplier:	Geirlich-Mitchell, Inc. 227 W. Grand Avenue El Segundo, CA 90245 (301) 414-0150
Local Representative:	ChemWest, Inc. 23241 Arroyo Vista Rancho Santa Margarita, CA 92688 (714) 858-7800

10. Ferric Chloride USST Addition Pump Motors

Number:	2 (one per pump)
Manufacturer:	Baldor Electric P.O. Box 2400 Fort Smith, AR 72092 (501) 646-4711
Horsepower:	1
RPM:	1750
Service:	3 phase/60Hz/460 volts
Enclosure:	TEFC, Chem Duty
Temperature Rise:	Class B Rise in 50° C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	ChemWest, Inc. 23241 Arroyo Vista Rancho Santa Margarita, CA 92688 (714) 858-7800
Local Representative:	Chick's Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

6.2.7 Odor Reduction Station

1. Odor Reduction Station Exhaust Fans

Number:	2
Manufacturer:	Ceilcote Air Pollution Control 140 Sheldon Road Berea, OH 44017 (216) 243-0700
Model:	CLUB
Type:	Centrifugal, Single Width Impeller

Size:	3650
Capacity:	16,400 cfm @ 12-inch SP
Speed:	1495 rpm
Supplier:	Ceilcote Air Pollution Control 140 Sheldon Road Berea, OH 44017 (216) 243-7000
Local Representative:	Leonard Engineered Products 11354 Burbank Blvd. P.O. Box 868 North Hollywood, CA 91630 (818) 760-4100

2. Odor Reduction Station Exhaust Fan Motors

Number:	2 (one per fan)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 245-4501
Horsepower:	5.0
RPM:	1775
Service:	3 phase, 60 hz, 460 v
Enclosure:	Explosion Proof, Chemical Duty
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Ceilcote Air Pollution Control 140 Sheldon Road Berea, OH 44017 (216) 243-0700
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

3. Odor Reduction Station Scrubber

Number: 1
Manufacturer: R. J. Environmental
6197 Cornerstone Ct. East
Suite 108
San Diego, CA 92121
(619) 455-7688
Type: Packed Vertical Tower
Size: 7 ft diameter by 30 ft high
Capacity: 15,750 cfm
Inlet H₂S: 25 ppm
Removal Efficiency: 99%
Supplier: R. J. Environmental
6197 Cornerstone Ct. East
Suite 108
San Diego, CA 92121
(619) 455-7688
Local Representative: R. J. Environmental
6197 Cornerstone Ct. East
Suite 108
San Diego, CA 92121
(619) 455-7688

4. Packing Media

Manufacturer: Lantec
5308 Derry Avenue, Suite E
Agoura Hills, CA 91301
(818) 707-2285
Size: 3.5-inches
Supplier: R.J. Environmental
6197 Cornerstone Court East,
Suite 108
San Diego, CA 92121
(619) 455-7688
Local Representative: R.J. Environmental
6197 Cornerstone Court East,
Suite 108
San Diego, CA 92126
(619) 455-7688

5. Odor Reduction Station pH and ORP Controllers

Number:	2 (1 pH controller and 1 ORP controller)
Manufacturer:	Great Lakes Instruments 9020 West Dean Road Milwaukee, WI 53224 (414) 355-3601
Model:	pH Probe - 6028PO Differential Electrode Type ORP Probe - 2028RO Differential Electrode Type pH Transmitter - 692P3F5A7N ORP Transmitter - 692R3F5A7N
Supplier:	R. J. Environmental 6197 Cornerstone Ct. East Suite 108 San Diego, CA 92121 (619) 455-7688
Local Representative:	Westmark Sales, Inc. 2330 Westwood Blvd. Suite 100 Los Angeles, CA 90064 (310) 474-8211

6. Odor Reduction Recirculation Pumps

Number:	2
Manufacturer:	Met-Pro Corp. Fybroc Division 700 Emlen Way P.O. Box 379 Telford, PA 18969 (215) 723-8155
Model:	1500
Type:	FRP, End Suction Centrifugal
Size:	3 x 4 x 10
Type of Seal:	Double Mechanical Durametallic RX-0
Capacity:	240 gpm @ 65 ft
Speed:	1750 rpm

Supplier:	R. J. Environmental 6197 Cornerstone Ct. East Suite 108 San Diego, CA 92121 (619) 455-7688
Local Representative:	Process Equipment 820 N. Mountain Avenue Suite 108 Upland, CA 91784 (909) 920-3005

7. Odor Reduction Recirculation Pump Motors

Number:	2 (one per pump)
Manufacturer:	Siemens Energy & Automation 323 Norristown Road, Suite 210 Ambler, PA 19002 (215) 283-4720
Horsepower:	7.5
RPM:	1800
Service:	3 phase, 60 Hz, 460 volts
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	R.J. Environmental 6197 Cornerstone Ct. East Suite 108 San Diego, CA 92121 (619) 455-7688
Local Representative:	Arnhart Electric 3520 Main Street San Diego, CA 92113 (619) 232-7965

8. Odor Reduction Station NaOH Metering Pumps

Number:	2
Manufacturer:	PulsaFeeder 2833 Brighton-Henrietta Toll Road Rochester, NY 14623 (716) 292-8000
Model:	680-S-AE

Type:	Positive Displacement, Double Diaphragm Metering
Size:	1/2-inch x 1/2-inch
Head Material:	316 Stainless
Valve Material:	316 Stainless
Capacity:	0.3 - 3.0 gph
Speed:	44 strokes per minute @ 1750 rpm
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150
Local Representative:	ChemWest, Inc. 23241 Arroya Vista Rancho Santa Margarita, CA 92688 (714) 858-7800

9. Odor Reduction Station NaOH Metering Pump Motors

Number:	2 (one per pump)
Manufacturer:	Baldor P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Horsepower:	1.0
RPM:	1750
Service:	3 phase, 60 Hz, 460 volts
Enclosure:	Totally Enclosed, Chemical Duty
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150
Local Representative:	Chick's Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

10. Odor Reduction Station NaOC1 Metering Pumps

Number: 2
Manufacturer: PulsaFeeder
2883 Brighton-Henrietta Toll Road
Rochester, NY 14623
(716) 292-8000
Model: 880-S-AE
Type: Positive Displacement, Double
Diaphragm Metering
Size: 3/4-inch x 3/4-inch
Head Material: Teflon
Valve Material: Alloy C
Capacity: 2.5 - 20.0 gph
Speed: 58 strokes per minute @ 1750 rpm
Supplier: Gierlich-Mitchell
227 West Grand Avenue
El Segundo, CA 90245
(310) 414-0150
Local Representative: ChemWest, Inc.
23241 Arroyo Vista
Rancho Margarita, CA 92688
(714) 858-7800

11. Odor Reduction Station NaOC1 Metering Pump Motors

Number: 2 (one per pump)
Manufacturer: Baldor
P.O. Box 2400
Fort Smith, AR 72902
(501) 646-4711
Horsepower: 1.0
RPM: 1750
Service: 3 phase, 60 Hz, 460 volts
Enclosure: TEFC, Chemical Duty
Temperature Rise: Class B Rise in 50°C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: B
Supplier: Gierlich-Mitchell
227 West Grand Avenue
El Segundo, CA 90245
(310) 414-0150

Local Representative: Chick's Electric
3592 Main Street
San Diego, CA 92113
(619) 232-2162

12. Odor Reduction Station NaOH Storage Tank

Number: 1
Manufacturer: Belco Manufacturing
2303 Taylor's Valley Road
Belton, TX 76513
(800) 251-8265
Type: FRP, Cylindrical, Closed Top
Size: 5 ft diameter x 7 ft high
Capacity: 1000 gallons (nominal)
Heating Element: Thermon TXS-6-2BNOJ Self Limiting
Cable, 240 VAC Operation
Insulation: 2.3-inch thick Trymer 1800 Brand
Polisocyanurate foam
Resin Material: Dow Derakane 411-350
Supplier: Belco Manufacturing
2303 Taylor's Valley Road
Belton, TX 76513
(800) 251-8265

13. Odor Reduction Station NaOC1 Storage Tank

Number: 1
Manufacturer: Belco Manufacturing
2303 Taylor's Valley Road
Belton, TX 76513
(800) 251-8265
Type: FRP, Cylindrical, Closed Top
Size: 8 ft diameter x 17 ft-3-inch high
Capacity: 6400 gallons (nominal)
Resin Material: Dow Derakane 411-350
Supplier: Belco Manufacturing
2303 Taylor's Valley Road
Belton, TX 76513
(800) 251-8265

14. NaOH and NaOCl Containment Sump Pumps

Number:	2 (one in each area)
Manufacturer:	Barnes Pumps, Inc. 420 Third Street P.O. Box 603 Piqua, OH 45356-0603 (513) 773-2442
Model:	3SE1544DS
Type:	Submersible; Simplex Control
Type of Seal:	Tandem Mechanical
Capacity:	120 gpm @ 15 ft. TDH
Horsepower:	1.5
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	NEMA 4X Weather Proof
Insulation:	Class B
Service Factor:	1.15
NEMA Design:	Class B, Completely Oil-Filled, Squirrel Cage Induction
Supplier:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627
Local Representative:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627

15. Odor Reduction Station Water Softener System

Number:	1
Manufacturer:	Culligan International Company One Culligan Parkway Northbrook, IL 60062
Model:	SMS-91/Model 9000
Type:	Ion Exchange
Size:	2 vessels of 12-inch diameter x 44- inch high
Capacity:	6 gpm up to 2,900 gpd
Supplier:	Culligan Technologies 3515 Olive Street Lemon Grove, CA 91945 (619) 463-8837

Local Representative: Culligan Technologies
3515 Olive Street
Lemon Grove, CA 91945
(619) 463-8837

16. Odor Reduction Station Water Softener Calcium Ion Controller

Number: 1
Manufacturer: Jenco Instruments, Inc.
7968 Arjons Drive, Suite C
San Diego, CA 92126
(619) 578-2828
Model: J3675
Probe Type: Calcium Selective PVC Membrane
Range: 0.02 to 40,000 ppm
Supplier: Culligan Technologies
3515 Olive Street
Lemon Grove, CA 91945
(619) 463-8837
Local Representative: Jenco
7968 Arjons Drive, Suite C
San Diego, CA 92126
(619) 578-2828

6.3 ACTIVATED SLUDGE FACILITIES

6.3.1 Activated Sludge Tanks

1. RAS Magnetic Flowmeters

Number:	7
Manufacturer:	Krohne, Inc. 7 Dearborn Rd. Peabody, MA 01960 (800) 356-9464 (978) 535-6060
Vendor:	Krohne 913 W. James St. Norristown, PA 19401 (610) 278-1833
Flowmeter Model:	VN044FA0A4131121X0H0000000000
Transmitter Model:	VN314NA046001100003
Size:	10-inch flanged tube
Type:	Magnetic
Capacity:	233 to 9,336 gpm range
Enclosure:	Die-cast Aluminum (polyurethane coated) Class IP 66/67
Liner:	PTFE
Electrode Material:	Hastelloy C4
Power Supply:	120 Volts, 3 phase, 60 Hz
Supplier:	Fluid IQs 2650 Napa Valley Corporate Dr. Napa, CA 94558 (707) 258-8400
Local Representative:	Fluid IQs 17701 Cowan St., Suite 130 Irvine, CA 92614

6.3.2 Selector Zone Mixing System

1. Submersible Mixers

Number:	45
Manufacturer:	ITT Water & Wastewater U.S.A., Inc. Flygt / WEDECO Products PO Box 1004 35 Nutmeg Dr. Trumbull, CT 06611 (203) 380-4700
Mixer Model:	SR-4640.411
Motor:	Direct drive, squirrel cage, induction
Enclosure:	316L SS
Insulation:	Class H
Service Factor:	1.10
Horsepower:	4
RPM:	855
Power Supply:	460 Volts, 3 phase, 60 Hz
Propeller:	3-blade, 316L SS
Blade Angle / Flow:	5°/ 4,030 gpm 6°/ 4,260 gpm 7°/ 4,490 gpm
Supplier / Local Rep:	ITT Flygt Corporation 13350 Gregg St., Suite 108 San Diego, CA 92064 (858) 679-9344

6.3.3 Air Diffusers

1. Motorized 6" Valve Actuators

Number:	7
Manufacturer:	Rotork Controls, Inc. 675 Mile Crossing Blvd. Rochester, NY 14624 (585) 247-2304
Model:	IQT250FA101
Motor:	Totally Enclosed, Non-Ventilated
Enclosure:	FM GRPS C,D,E,F&G
Insulation:	Class F
Service Factor:	1.0
Nom. Horsepower:	0.58
Power Supply:	460 Volts, 3 phase, 60 Hz

Supplier: DeZurik
250 Riverside Ave. North
Sartell, MN 56377
(320) 259-2000
Local Representative: CS-AMSCO
5862 Bolsa Ave., Suite 102
Huntington Beach, CA 92649
(714) 892-4200

2. Motorized 8" Valve Actuators

Number: 7
Manufacturer: Rotork Controls, Inc.
675 Mile Crossing Blvd.
Rochester, NY 14624
(585) 247-2304
Model: IQT500FA101
Motor: Totally Enclosed, Non-Ventilated
Enclosure: FM GRPS C,D,E,F&G
Insulation: Class F
Service Factor: 1.0
Nom. Horsepower: 0.58
Power Supply: 460 Volts, 3 phase, 60 Hz
Supplier: DeZurik
250 Riverside Ave. North
Sartell, MN 56377
(320) 259-2000
Local Representative: CS-AMSCO
5862 Bolsa Ave., Suite 102
Huntington Beach, CA 92649
(714) 892-4200

3. Motorized 10" Valve Actuators

Number: 7
Manufacturer: Rotork Controls, Inc.
675 Mile Crossing Blvd.
Rochester, NY 14624
(585) 247-2304
Model: IQT1000FA121
Motor: Totally Enclosed, Non-Ventilated
Enclosure: FM GRPS C,D,E,F&G
Insulation: Class F
Service Factor: 1.0
Nom. Horsepower: 0.6

Power Supply:	460 Volts, 3 phase, 60 Hz
Supplier:	DeZurik 250 Riverside Ave. North Sartell, MN 56377 (320) 259-2000
Local Representative:	CS-AMSCO 5862 Bolsa Ave., Suite 102 Huntington Beach, CA 92649 (714) 892-4200

4. PA Thermal Mass Flowmeters

Number:	21
Manufacturer:	Sierra Instruments, North America 5 Harris Ct, Building L Monterey, CA 93940 (800) 866-0200 (831) 373-0200
Flowmeter Model:	640S-FM-L18-M8-E4-P3-V4-DD
Probe Material:	316L SS
Probe Length:	18-inches
Type:	Thermal Mass Flow
Range:	0 to 3000 scfm
Enclosure:	NEMA 4X
Power Requirement:	120 Volts, 60 Hz, 15 watts maximum
Supplier:	Fluid IQs 2650 Napa Valley Corporate Dr. Napa, CA 94558 (707) 258-8400
Local Representative:	Fluid IQs 17701 Cowan St., Suite 130 Irvine, CA 92614

5. Dissolved Oxygen Measurement System

Number:	12
Manufacturer:	HACH Company PO Box 389 Loveland, CO 80539 (800) 227-4224
Vendor:	Ponton Industries, Inc. 22901 Savi Ranch Pkwy., Suite B Yorba Linda, CA 92887 (714) 998-9073

Model Nos.:

DO Probe:	57900-00
Transmitter/Analyzer:	LXV401.52.00002
Mounting Kit:	57944-00
Termination Box:	58670
Sensor Type:	Luminescent Coated
Sensor Length:	11-1/2-inchs
Type:	Dissolved Oxygen
Range:	0 to 15 ppm
Enclosure:	
DO Probe:	IP 62
Transmitter/Analyzer:	NEMA 4X / IP 66
Power Requirement:	120 Volts, 60 Hz
Supplier:	Fluid IQs 2650 Napa Valley Corporate Dr. Napa, CA 94558 (707) 258-8400
Local Representative:	Fluid IQs 17701 Cowan St., Suite 130 Irvine, CA 92614

6. Fine Bubble Diffusers

Manufacturer:	ITT Water and Wastewater Sanitaire Products 9333 N. 49 th St. Brown Deer, WI 53223 (414) 365-2200
Disc Diffuser: Type:	EPDM Membrane
Size:	9-inch nominal diameter
Flow Range:	0.6 to 1.9 scfm/diffuser
Diffuser Grid Total:	21
Grid 1: Number:	7
Location:	Aerobic Zone 1
Pipe Diameter:	10-inches
Airflow Range:	795 to 2508 scfm
Average:	1827 scfm
Diffuser Number:	1328 active/112 plugged
Grid 2: Number:	7
Location:	Aerobic Zone 2
Pipe Diameter:	8-inches
Airflow Range:	349 to 1102 scfm
Average:	803 scfm
Diffuser Number:	588 active/112 plugged

Grid 3: Number:	7
Location:	Aerobic Zone 3
Pipe Diameter:	6-inches
Airflow Range:	173 to 547 scfm
Average:	398 scfm
Diffuser Number:	288 active/64 plugged
Local Representative:	Saddleback Environmental Equipment 6965 Corte Langosta Carlsbad, CA 92009 (760) 304-4224

6.3.4 Process Air Preparation Facility

1. Process Air Blowers

Number:	3
Blower Manufacturer:	Dresser Roots, Dresser, Inc. 900 West Mount St. Connersville, IN 47331 (765) 827-9285
Model:	16" IGC-H
Type:	Centrifugal Compressor
Operating Conditions:	Condition 1: 12500 scfm @ 23.7 psia discharge Condition 2: 9100 scfm @ 23.21 psia discharge Condition 3: 7460 scfm @ 23.02 psia discharge Condition 4: 5610 scfm @ 22.9 psia discharge
Speed:	9855 rpm
Motor Manufacturer:	Siemens Energy & Automation, Inc. Power Conversion Division 4620 Forest Ave. Norwood, OH 45212 (513) 841-3100
Type:	CZ
Frame:	5013S
Horsepower:	700
RPM:	1800
Power Supply:	460 Volts, 3 phase, 60 Hz
Enclosure:	TEFC
Temperature Rise:	80° C / Class B
Insulation:	Class F
Service Factor:	1.15

Local Suppliers:

Parts Sales: Gary Bergman
Dresser Roots
900 West Mount St.
Connersville, IN 47331
(765) 827-9254

Service: Dave Jacobik
Dresser Roots
900 West Mount St.
Connersville, IN 47331
(765) 827-9358

Repair Centers: Dresser Roots – Connersville Service Center
900 West Mount St.
Connersville, IN 47331
(765) 927-9306/9271

Dresser Roots – Houston Service Center
11611B Tanner Rd.
Houston, TX 77041
(800) 866-6182
(713) 896-4810

2. Motorized 24" Process Air Isolation Valve Actuators

Number: 3

Manufacturer: Rotork Controls, Inc.
675 Mile Crossing Blvd.
Rochester, NY 14624
(585) 247-2304

Model: IQ10FA10B4

Motor: Totally Enclosed, Non-Ventilated

Enclosure: FM GRPS C,D,E,F&G

Insulation: Class F

Service Factor: 1.0

Nom. Horsepower: 0.17

Power Supply: 460 Volts, 3 phase, 60 Hz

Supplier: DeZurik
250 Riverside Ave. North
Sartell, MN 56377
(320) 259-2000

Local Representative: CS-AMSCO
5862 Bolsa Ave., Suite 102
Huntington Beach, CA 92649
(714) 892-4200

3. PA Blower Discharge Thermal Mass Flowmeters

Number:	3
Manufacturer:	Sierra Instruments, North America 5 Harris Ct, Building L Monterey, CA 93940 (800) 866-0200 (831) 373-0200
Flowmeter Model:	640S-FM-L24-M8-E4-P3-V4-DD
Probe Material:	316L SS
Probe Length:	24-inchs
Type:	Thermal Mass Flow
Range:	0 to 15000 scfm
Enclosure:	NEMA 4X
Power Requirement:	120 Volts, 60 Hz, 15 watts maximum
Supplier:	Fluid IQs 2650 Napa Valley Corporate Dr. Napa, CA 94558 (707) 258-8400
Local Representative:	Fluid IQs 17701 Cowan St., Suite 130 Irvine, CA 92614

4. PA Header Temperature Sensor/Transmitter

Number:	1
Manufacturer:	Rosemount Inc. 8200 Market Blvd. Chanhassen, MN 55317 (800) 999-9307
Sensor Model:	0068D21C30A045T26XA
Transmitter Model:	3144P-D1-A-1-I5-M5-T1
Type:	Temperature
Range:	0 to 250 °F
Enclosure:	NEMA 4X
Power Requirement:	loop 12 to 42 V(dc)
Supplier:	Fluid IQs 2650 Napa Valley Corporate Dr. Napa, CA 94558 (707) 258-8400
Local Representative:	Fluid IQs 17701 Cowan St., Suite 130 Irvine, CA 92614

5. PA Header Pressure Transmitter

Number: 1
Manufacturer: Rosemount Inc.
8200 Market Blvd.
Chanhausen, MN 55317
(800) 999-9307
Indicator/Transmitter Model: 3051CG4A02A1AI5M5S5
Type: Pressure
Range: 0 to 120 psig
Enclosure: NEMA 4X
Power Requirement: loop 10.5 to 55 V(dc)
Supplier: Fluid IQs
2650 Napa Valley Corporate Dr.
Napa, CA 94558
(707) 258-8400
Local Representative: Fluid IQs
17701 Cowan St., Suite 130
Irvine, CA 92614

6.3.5 Intermediate Mixed Liquor Return

1. Submersible Propeller (IMLR) Pumps

Number: 7
Manufacturer: ITT Water & Wastewater U.S.A., Inc.
Flygt / WEDECO Products
PO Box 1004
35 Nutmeg Dr.
Trumbull, CT 06611
(203) 380-4700
Model: PP-4680.410
Motor: Direct drive, squirrel cage, induction
Enclosure: 316L SS
Insulation: Class H
Service Factor: 1.10
Horsepower: 40
RPM: 440
Capacity: 9000 gpm @ 5.5' head
15294 gpm @ 3.1' head
Power Supply: 460 Volts, 3 phase, 60 Hz
Propeller: 3-blade, 9° pitch angle, 316L SS

Supplier / Local Rep: ITT Flygt Corporation
13350 Gregg St., Suite 108
San Diego, CA 92064
(858) 679-9344

2. Portable Electromagnetic Velocity Flowmeter

Number: 1
Manufacturer: HACH Company
4539 Metropolitan Ct.
Frederick, MD 21704
(800) 368-2723
Model: Marsh-McBirney Flo-Mate 2000
Type: Electromagnetic
Range: -0.5 to 20 ft/s
Housing: High impact molded Plastic
Enclosure: NEMA 4X
Power Supply: Battery Power: two (2) D Cells
Supplier: Fluid IQs
2650 Napa Valley Corporate Dr.
Napa, CA 94558
(707) 258-8400
Local Representative: Fluid IQs
17701 Cowan St., Suite 130
Irvine, CA 92614

6.3.6 Tank Drainage Facility

1. AST Tank Drain Pump

Number: 1
Pump Manufacturer: Crown (Crane Pumps & Systems)
420 Third St.
Piqua, OH 45356
(937) 773-2442
Model: PO8LA-12L
Type: Horizontal, self-priming centrifugal
Capacity: Primary Pt.: 1500 gpm @ 32'
Secondary Pt.: 1000 gpm @ 52'
Speed: 1,200 rpm
Motor Manufacturer: Baldor/Reliance
6480 Flotilla St.
Commerce, CA 90040
(323) 724-6771
Model: EM4103T

Frame Size:	284T
Horsepower:	25
RPM:	1,770
Power Supply:	460 Volts, 3 phase, 60 Hz
Enclosure:	TEFC
Temperature Rise:	80° C / Class B
Insulation:	Class F
Service Factor:	1.15
Supplier:	Gierlich-Mitchell 10533 Progress Way Suite A Cypress, CA 90630 (714) 236-6070
Local Representative:	Gierlich-Mitchell 10533 Progress Way Suite A Cypress, CA 90630 (714) 236-6070

2. Tank Drainage Sump Pumps

Number:	4
Manufacturer:	Barnes (Crane Pumps & Systems) 420 Third St. Piqua, OH 45356 (937) 773-2442
Model:	3SE1544DS
Type:	Submersible; Simplex Control
Type of Seal:	Tandem Mechanical
Capacity:	100 gpm @ 34' TDH 140 gpm @ 28.7' TDH
Horsepower:	1.5
Speed:	1,750 rpm
Power Supply:	460 Volts, 3 phase, 60 Hz
Service Factor:	1.85
Panel Enclosure:	NEMA 4X
Motor Design:	NEMA B- three phase torque curve, oil filled, squirrel cage induction
Insulation:	Class B
Supplier:	Gierlich-Mitchell 10533 Progress Way, Suite A Cypress, CA 90630 (714) 236-6070

Local Representative: Gierlich-Mitchell
10533 Progress Way, Suite A
Cypress, CA 90630
(714) 236-6070

6.3.7 Channel Aeration Facility

1. Channel Aeration Blowers

Number: 3
Blower Manufacturer: Robuschi USA, Inc.
3801 Beam Rd., Suite F
Charlotte, North Carolina 28217
(704) 424-1018
(877) 424-1020
Model: RBS 106
Type: Positive Displacement
Operating Conditions: 1100 scfm @ 1378 rpm
1650 scfm @ 1950 rpm
2000 scfm @ 2312 rpm
Motor Manufacturer: Worldwide Electric Corporation
Ozburn Hessey Logistics
2425 Perry Road
Plainfield, IN 46168
(800) 808-2131
Model: WWE100-18-405T
Frame: 405T
Horsepower: 100
RPM: 1785
Power Supply: 460 Volts, 3 phase, 60 Hz
Enclosure: TEFC
Temperature Rise: 80° C / Class B
Insulation: Class F
Service Factor: 1.15
Supplier: United Blower, Inc.
1198 Airport Dr.
Ball Ground, GA 30107
(770) 479-3000

2. Portable Thermal Mass Flowmeters

Number:	1
Manufacturer:	Sierra Instruments, North America 5 Harris Ct, Building L Monterey, CA 93940 (800) 866-0200 (831) 373-0200
Flowmeter Model:	640S-FM-L18-M8-E4-P3-V4-DD-Portable
Probe Material:	316L SS
Probe Length:	18-inchs
Type:	Thermal Mass Flow
Range:	0 to 2000 scfm
Enclosure:	NEMA 4X
Power Requirement:	120 Volts, 60 Hz, 15 watts maximum
Supplier:	Fluid IQs 2650 Napa Valley Corporate Dr. Napa, CA 94558 (707) 258-8400
Local Representative:	Fluid IQs 17701 Cowan St., Suite 130 Irvine, CA 92614

6.4 SECONDARY SEDIMENTATION FACILITIES

6.4.1 Sedimentation Tanks

1. Weir Gates

Number:	10 (one per SST)
Manufacturer:	Golden Harvest PO Box 287 Burlington, WA 98233 (360) 757-4334
Model:	GH-66 NRS Weir
Size:	18" x 18"
Reducer Type:	Helical
Supplier:	Golden Harvest PO Box 287 Burlington, WA 98233 (360) 757-4334
Local Representative:	Golden Harvest 1612 W. Mineral King Ave. Suite B Visalia, CA 93291 (559) 734-9778

2. Coarse Bubble Diffusers

Number:	92
Manufacturer:	ITT-Sanitaire 9333 N. 49 th St. Brown Deer, WI 53223 (414) 365-2200
Model:	SD-1000
Maximum Capacity	12 scfm
Supplier:	ITT-Sanitaire 9333 N. 49 th St. Brown Deer, WI 53223 (414) 365-2200
Local Representative:	Saddleback Environmental Equipment 6965 Corte Langosta Carlsbad, CA 92009 (760) 683-3134

6.4.2 Sludge Collection and Pumping Facilities

1. Chain and Flight Sludge Collector

Number:	10 (one per SST)
Manufacturer:	Taset, Inc. 4Da-206, Shi Hwa Industrial Complex 425-835, Ansan-City, Gyeonggi-Do Korea +82 (2) 6675-4037
Model:	NC2720S
Capacity:	8,360 lbs (guaranteed tensile strength)
Drive Chain Model:	NH78
Chain Size:	6-inch pitch
Reducer Type:	Helical
Supplier:	Wastewater Equipment International, Inc. 4312 Jade Ave. Cypress, CA 90630 (714) 243-5229
Local Representative:	Wastewater Equipment International, Inc. 4312 Jade Ave. Cypress, CA 90630 (714) 243-5229

2. Sludge Collection Drive Assembly Motors

Number:	10 (one per SST)
Manufacturer:	SEW Eurodrive, Inc. 30599 San Antonio St. Hayward, CA 94544 (510) 487-3560
Model:	R87R57DT80K4
Horsepower:	0.75
RPM:	1,680
Service:	3 phase, 60 Hz, 460 Volts
Enclosure:	TEFC (IP 55)
Temperature Rise:	80° C / Class B
Insulation:	Class F
Supplier:	Wastewater Equipment International, Inc. 4312 Jade Ave. Cypress, CA 90630 (714) 243-5229

Local Representative: Wastewater Equipment International, Inc.
4312 Jade Ave.
Cypress, CA 90630
(714) 243-5229

3. RAS Pumps

Number: 6
Manufacturer: Fairbanks Morse Pump
3601 Fairbanks Ave.
PO Box 6999
Kansas City, KS 66106-0906
(913) 371-2272
Model: VTSH-AWF
Type: Vertical turbine
Capacity: 2,700 gpm @ 44' total dynamic head (TDH)
Speed: 1,780 rpm (full load)
Supplier: Fairbanks Morse Pump
3601 Fairbanks Ave.
PO Box 6999
Kansas City, KS 66106-0906
(913) 371-2272
Local Representative: Flo-Systems, Inc.
3010 Floyd St.
Burbank, CA 91504
(818) 562-5282

4. RAS Pump Motors

Number: 6
Manufacturer: US Electrical Motors
PO Box 3946
St. Louis, MO 63136
(314) 553-2000
Frame Number: 324VP
Type: TVC14
Horsepower: 40
RPM: 1,780
Service: 3 phase, 60 Hz, 460 Volts
Enclosure: TEFC
Temperature Rise: 80° C / Class B
Insulation: Class F
Service Factor: 1.15

Supplier:	Fairbanks Morse Pump 3601 Fairbanks Ave. PO Box 6999 Kansas City, KS 66106-0906 (913) 371-2272
Local Representative:	Flo-Systems, Inc. 3010 Floyd St. Burbank, CA 91504 (818) 562-5282

5. SST Sludge Hopper RAS Magnetic Flowmeters

Number:	10
Manufacturer:	Krohne 7 Dearborn Rd. Peabody, MA 01960 (978) 535-6060
Flowmeter Model:	VN044FA0A4131121X0H0000000000
Transmitter Model:	VN31NA046001100003
Size:	10-inch flanged tube
Type:	Magnetic
Capacity:	233 to 9,336 gpm range
Enclosure:	IP 66/67
Liner:	PTFE
Electrode Material:	Hastelloy C4
Power Supply:	1 phase, 60 Hz, 120 Volts
Supplier:	Fluid IQs 2650 Napa Valley Corporate Dr. Napa, CA 94558 (707) 258-8400
Local Representative:	Fluid IQs 17701 Cowan St. Suite 130 Irvine, CA 92614

6. WAS Pumps

Number:	2
Manufacturer:	Netzsch 119 Pickering Way Exton, PA 19341 (610) 363-8010
Model:	NM105-01L
Type:	Progressive cavity
Capacity:	500 gpm @ 9.5' net positive suction head

Speed:	215 rpm (full load)
Supplier:	Netzsch 119 Pickering Way Exton, PA 19341 (610) 363-8010
Local Representative:	Gierlich-Mitchell 10533 Progress Way Suite A Cypress, CA 90630 (714) 236-6070

7. WAS Pump Motors

Number:	2
Manufacturer:	Baldor/Reliance 6480 Flotilla St. Commerce, CA 90040 (323) 724-6771
Frame Number:	286TC
Horsepower:	30
RPM:	1,800
Service:	3 phase, 60 Hz, 460 Volts
Enclosure:	TEFC-XEX
Temperature Rise:	80° C / Class B
Insulation:	Class F
Service Factor:	1.15
Supplier:	Netzsch 119 Pickering Way Exton, PA 19341 (610) 363-8010
Local Representative:	Gierlich-Mitchell 10533 Progress Way, Suite A Cypress, CA 90630 (714) 236-6070

8. WAS Discharge Magnetic Flowmeter

Number:	1
Manufacturer:	Krohne 7 Dearborn Rd. Peabody, MA 01960 (978) 535-6060
Flowmeter Model:	VN044EA0A4131121X0H0000000000
Transmitter Model:	VN31NA046001100003
Size:	8-inch flanged tube

Type:	Magnetic
Capacity:	149 to 5,976 gpm range
Enclosure:	IP 66/67
Liner:	PTFE
Electrode Material:	Hastelloy C4
Power Supply:	1 phase, 60 Hz, 120 Volts
Supplier:	Fluid IQs 2650 Napa Valley Corporate Dr. Napa, CA 94558 (707) 258-8400
Local Representative:	Fluid IQs 17701 Cowan St. Suite 130 Irvine, CA 92614

6.4.3 Secondary Skimmings Processing Facilities

1. Rotary Scum Skimmers

Number:	10
Manufacturer:	Newswanger Machine, Ltd. 7828 Planktown Rd. Shiloh, OH 44878 (419) 896-3336
Size:	18-inch trough
Material:	Schedule 40 carbon steel pipe
Supplier:	Newswanger Machine, Ltd. 7828 Planktown Rd. Shiloh, OH 44878 (419) 896-3336
Local Representative:	None

2. Rotary Scum Skimmer Motorized Actuators

Number:	10
Manufacturer:	Rotork Controls, Inc. 675 Mile Crossing Blvd. Rochester, NY 14624 (585) 247-2304
Model:	IQ25FA14Z
Horsepower:	1.04
Service:	3 phase, 50 Hz, 480 Volts
Enclosure:	IP68

Insulation:	Class F
Service Factor:	1
Supplier:	Netzsch 119 Pickering Way Exton, PA 19341 (610) 363-8010

3. Secondary Skimmings Pumps

Number:	2
Manufacturer:	TwinPumps 3601 Fairbanks Ave. Cypress, CA 90630 (714) 236-6080
Model:	3523C
Type:	Recessed impeller centrifugal
Capacity:	510 gpm @ 81.4' TDH
Speed:	1,670 rpm
Supplier:	Gierlich-Mitchell 10533 Progress Way Suite A Cypress, CA 90630 (714) 236-6070
Local Representative:	Gierlich-Mitchell 10533 Progress Way Suite A Cypress, CA 90630 (714) 236-6070

4. Secondary Skimmings Pump Motors

Number:	2
Manufacturer:	US Electrical Motors PO Box 3946 St. Louis, MO 63136 (314) 553-2000
Frame Number:	365T
Horsepower:	40 / 17.8
RPM:	1,800 / 1,200
Service:	3 phase, 60 Hz, 460 Volts
Enclosure:	TEFC
Temperature Rise:	80° C / Class B
Insulation:	Class F
Service Factor:	1.15

Supplier:	Gierlich-Mitchell 10533 Progress Way Suite A Cypress, CA 90630 (714) 236-6070
Local Representative:	Gierlich-Mitchell 10533 Progress Way Suite A Cypress, CA 90630 (714) 236-6070

5. Motorized Valve Actuators

Number:	3
Manufacturer:	Rotork Controls, Inc. 675 Mile Crossing Blvd. Rochester, NY 14624 (585) 247-2304
Model:	IQT500FA101
Horsepower:	0.58
Service:	3 phase, 50 Hz, 480 Volts
Enclosure:	FM GRPS C,D,E,F&G
Insulation:	Class F
Service Factor:	1
Supplier:	DeZurik 250 Riverside Ave. North Sartell, MN 56377 (320) 259-2000
Local Representative:	CS-AMSCO 5862 Bolsa Ave. Suite 102 Huntington Beach, CA 92649 (714) 892-4200

6. Secondary Skimmings Sump Pumps

Number:	2
Manufacturer:	Barnes (Crane Pumps & Systems) 420 Third St. Piqua, OH 45356 (937) 773-2442
Model:	3SE1544DS
Type:	Submersible; duplex control
Type of Seal:	Tandem mechanical

Capacity:	65 gpm @ 31' TDH 130 gpm @ 20' TDH
Horsepower:	1.5
Speed:	1,750 rpm
Service:	3 phase, 60 Hz, 460 Volts
Service Factor:	1.85
Panel Enclosure:	NEMA 4X
Motor Design:	NEMA L, single phase, NEMA B three phase torque curve, oil filled, squirrel cage induction
Insulation:	Class B
Supplier:	Gierlich-Mitchell 10533 Progress Way Suite A Cypress, CA 90630 (714) 236-6070
Local Representative:	Gierlich-Mitchell 10533 Progress Way Suite A Cypress, CA 90630 (714) 236-6070

6.4.4 RAS Chlorination

Equipment associated with RAS chlorination is described in Section 6.5.1 Chlorination Facilities.

6.4.5 Tank Drainage Facilities

1. Tank Drain Pump

Number:	1
Manufacturer:	Barnes (Crane Pumps & Systems) 420 Third St. Piqua, OH 45356 (937) 773-2442
Model:	PO6LB-12F
Type:	Self-priming centrifugal
Capacity:	910 gpm @ 25'
Speed:	1,750 rpm

Supplier: Gierlich-Mitchell
10533 Progress Way
Suite A
Cypress, CA 90630
(714) 236-6070

Local Representative: Gierlich-Mitchell
10533 Progress Way
Suite A
Cypress, CA 90630
(714) 236-6070

2. Tank Drain Pump Motors

Number: 1

Manufacturer: Baldor/Reliance
6480 Flotilla St.
Commerce, CA 90040
(323) 724-6771

Frame Number: 254T

Horsepower: 15

RPM: 1,750

Service: 3 phase, 60 Hz, 460 Volts

Enclosure: TEFC

Temperature Rise: 80° C / Class B

Insulation: Class F

Service Factor: 1.15

Supplier: Gierlich-Mitchell
10533 Progress Way
Suite A
Cypress, CA 90630
(714) 236-6070

Local Representative: Gierlich-Mitchell
10533 Progress Way
Suite A
Cypress, CA 90630
(714) 236-6070

3. Tank Drainage Sump Pumps

Number: 3

Manufacturer: Barnes
420 Third St.
Piqua, OH 45356
(937) 773-2442

Model: 3SE1044DS

Type:	Submersible; Simplex Control
Type of Seal:	Tandem Mechanical
Capacity:	120 gpm @ 21.1' TDH 150 gpm @ 10.5' TDH
Horsepower:	1
Speed:	1,750 rpm
Service:	3 phase, 60 Hz, 460 Volts
Service Factor:	1.85
Panel Enclosure:	NEMA 4X
Motor Design:	NEMA L, single phase, NEMA B three phase torque curve, oil filled, squirrel cage induction
Insulation:	Class B
Supplier:	Gierlich-Mitchell 10533 Progress Way Suite A Cypress, CA 90630 (714) 236-6070
Local Representative:	Gierlich-Mitchell 10533 Progress Way Suite A Cypress, CA 90630 (714) 236-6070

6.5 CHLORINATION, DECHLORINATION AND NON-POTABLE WATER FACILITIES

6.5.1 Chlorination Facilities

1. Sodium Hypochlorite Storage Tanks

Number:	2
Manufacturer:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265
Type:	FRP, Cylindrical, Closed Top
Size:	15'-6" diameter x 22'-6" high
Capacity:	31,650 gallons (nominal)
Resin Material:	Dow Derakane 411-350
Supplier:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265
Local Representative:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265

2. Effluent Chlorination Pumps

Number:	2
Manufacturer:	PulsaFeeder 2883 Brighton-Henrietta Road Rochester, NY 14623 (716) 292-8000
Model:	8480-S-AE
Type:	Positive Displacement, Diaphragm Metering
Size:	3-inch x 3-inch
Head Material:	Teflon
Valve Material:	Teflon
Capacity:	100 to 780 gph
Speed:	85 strokes per minute @ 1750 rpm

Supplier: Gierlich-Mitchell
227 West Grand Avenue
El Segundo, CA 90245
(310) 415-0150
Local Representative: Chemwest
23241 Arroyo Vista
Rancho Santa Margarita, CA
92688
(714) 858-7800

3. Effluent Chlorination Pump Motors

Number: 2 (one per pump)
Manufacturer: Fincor Electric
3750 East Market Street
York, PA 17402
(717) 751-4200
Model: TFB
Horsepower: 2.0
RPM: 1750
Special Features: SCR Variable Speed Drive
Service: 180 volt, DC
Enclosure: TEFC, Chemical Duty
Insulation: Class F
Service Factor: 1.15
NEMA Design: B
Supplier: Gierlich-Mitchell
227 West Grand Avenue
El Segundo, CA 90245
(310) 415-0150
Local Representative: Chemwest
23241 Arroyo Vista
Rancho Santa Margarita, CA
92688
(714) 858-7800

4. RAS Chlorination Pumps

Number: 1
Manufacturer: PulsaFeeder
2883 Brighton-Henrietta Rd.
Rochester, NY 14623
(716) 292-8000
Model: 7660-S-AE

Type:	Positive Displacement, Diaphragm Metering
Size:	2-1/2-inches x 2-1/2-inches
Head Material:	Teflon
Valve Material:	Teflon
Capacity:	42-333 gph
Speed:	58 strokes per minute @ 1750 rpm
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 415-0150
Local Representative:	Chemwest 23241 Arroyo Vista Rancho Santa Margarita, CA 92688 (714) 858-7800

5. RAS Chlorination Pump Motor

Number:	1
Manufacturer:	Baldor P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Model:	ECP35840T-4
Horsepower:	1.5
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC, Chemical Duty
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 415-0150
Local Representative:	Chick's Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

6. Pre-chlorination Pump 1

Number:	1
Manufacturer:	PulsaFeeder 2883 Brighton-Henrietta Rd. Rochester, NY 14623 (716) 292-8000
Model:	7660-S-AE
Type:	Positive Displacement, Diaphragm Metering
Size:	2-1/2-inches x 2-1/2-inches
Head Material:	Teflon
Valve Material:	Teflon
Capacity:	42-333 gph
Speed:	58 strokes per minute @ 1750 rpm
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 415-0150
Local Representative:	Chemwest 23241 Arroyo Vista Rancho Santa Margarita, CA 92688 (714) 858-7800

7. Pre-chlorination Pump 1 Motor

Number:	1
Manufacturer:	Baldor P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Model:	ECP35840T-4
Horsepower:	1.5
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC, Chemical Duty
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 415-0150

Local Representative:

Chick's Electric
3592 Main Street
San Diego, CA 92113
(619) 232-2162

8. NPWPS2 Chlorination Pumps

Number:	2
Manufacturer:	PulsaFeeder 2883 Brighton-Henrietta Rd. Rochester, NY 14623 (585) 292-8000
Model:	HypoPump - Model 25HJ
Type:	Positive Displacement, Diaphragm Metering
Size:	1 inch FNPT
Head Material:	PVC
Diaphragm Material:	TFE Faced
Check Valve Material (ball):	Alumina Ceramic
Check Valve Material (seat):	PVC
Check Valve Material (gasket):	Viton
Capacity:	2 – 20 gph
Speed:	115 strokes per minute @ 1750 rpm
Supplier:	Charles P. Crowley Company 15861 Business Center Drive Irwindale, CA 91706 (626) 856-5656

9. NPWPS2 Chlorination Pump Motors

Number:	2
Manufacturer:	Marathon Electric Motors 100 E. Randolph Street, PO Box 8003 Wausau, WI 54401-8003 Phone: (715) 675-3311
Model:	T869523-001
Horsepower:	0.75
RPM:	1800
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC, Chemical Duty
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F

Service Factor:	1.15
NEMA Design:	B
Supplier:	Charles P. Crowley Company 15861 Business Center Drive Irwindale, CA 91706 (626) 856-5656

10. NaOCl Area Containment Sump Pump

Number:	1
Manufacturer:	Barnes Pumps, Inc. 420 Third Street P.O. Box 603 Piqua, OH 45356-0603 (513) 773-2442
Model:	3SE1544DS
Type:	Submersible; Simplex Control
Type of Seal:	Tandem Mechanical
Capacity:	115 gpm @ 15 ft. TDH
Horsepower:	1.5
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	NEMA 4X Weather Proof
Insulation:	Class B
Service Factor:	1.15
NEMA Design:	Class B, Completely oil-filled, Squirrel Cage Induction
Supplier:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627
Local Representative:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627

6.5.2 Dechlorination Facility

1. Sodium Bisulfite Storage Tanks

Number: 2
Manufacturer: Belco Manufacturing
2303 Taylor's Valley Road
Belton, TX 76513
(800) 251-8265
Type: FRP, Cylindrical, Closed Top
Size: 12'-0" diameter x 15'-6" high
Capacity: 13,150 gallons (nominal)
Resin Material: Dow Derakane 411-350
Heating Element: Thermon TSX-6-2BNOJ Self
Limiting Cable, 240 VAC
Operation
Insulation: 2.3-inch thick Trymer 1800
Brand Polisocyanurate
Supplier: Belco Manufacturing
2303 Taylor's Valley Road
Belton, TX 76513
(800) 251-8265
Local Representative: Belco Manufacturing
2303 Taylor's Valley Road
Belton, TX 76513
(800) 251-8265

2. Dechlorination Pumps

Number: 2
Manufacturer: PulsaFeeder
2883 Brighton-Henrietta Rd.
Rochester, NY 14623
(716) 292-8000
Model: 7660-S-AE
Type: Positive Displacement,
Diaphragm Metering
Size: 2-1/2-inches x 2-1/2-inches
Head Material: 316 SS
Valve Material: 316 SS
Capacity: 40-330 gph
Speed: 58 strokes per minute
@ 1750 rpm

Supplier: Gierlich-Mitchell
227 West Grand Avenue
El Segundo, CA 90245
(310) 415-0150
Local Representative: Chemwest
23241 Arroyo Vista
Rancho Santa Margarita, CA
92688
(714) 858-7800

3. Dechlorination Pump Motors

Number: 2 (one per pump)
Manufacturer: Fincor Electric
3750 East Market Street
York, PA 17402
(717) 751-4200
Model: TFB
Horsepower: 1.5
RPM: 1750
Special Features: SCR Variable Speed Drive
Service: 180 volt, DC
Enclosure: TEFC, Chemical Duty
Insulation: Class F
Service Factor: 1.15
NEMA Design: B
Supplier: Gierlich-Mitchell
227 West Grand Avenue
El Segundo, CA 90245
(310) 415-0150
Local Representative: Chemwest
23241 Arroyo Vista
Rancho Santa Margarita, CA
92688
(714) 858-7800

4. NaHSO₃ Containment Sump Pump

Number: 1
Manufacturer: Barnes Pumps, Inc.
420 Third Street
P.O. Box 603
Piqua, OH 45356-0603
(513) 773-2442
Model: 3SE1544DS

Type:	Submersible; Simplex Control
Type of Seal:	Tandem Mechanical Seal
Capacity:	115 gpm @ 18 ft. TDH
Horsepower:	1.5
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	NEMA 4X Weather Proof Enclosure
Insulation:	Class B
Service Factor:	1.15
NEMA Design:	Class B, Completely Oil-Filled, Squirrel Cage Induction
Supplier:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627
Local Representative:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627

6.5.3 Non-Potable Water Pump Station No.1 Facilities

1. Air Receiver

Number:	1
Manufacturer:	Atlas Copco Industrial Compressors, Inc. P.O. Box 431 161 Lower Westfield Road Holyoke, MA 01040 (413) 536-0600
Capacity:	80 gallons
Rating:	ASME
Supplier:	Fluid Kinetics Corporation 2368 Eastman Avenue, #8 Ventura, CA 93003 (805) 644-5587
Local Representative:	Fluid Kinetics Corporation 2368 Eastman Avenue, #8 Ventura, CA 93003 (805) 644-5587

2. Air Compressors

Number:	2
Manufacturer:	Atlas Copco Industrial Compressors, Inc. P.O. Box 431 161 Lower Westfield Road Holyoke, MA 01040 (413) 536-0600
Model:	LE-6
Type:	Single-Stage, Two Cylinder, Lubricated
Capacity:	11.5 cfm at 100 psi
Rating:	ASME
Supplier:	Fluid Kinetics Corporation 2368 Eastman Avenue, #8 Ventura, CA 93003 (805) 644-5587
Local Representative:	Fluid Kinetics Corporation 2368 Eastman Avenue, #8 Ventura, CA 93003 (805) 644-5587

3. Air Compressor Motors

Number:	2 (one per pump)
Manufacturer:	Baldor P.O. Box 2400 Fort Smith, AR 72908 (501) 646-4711
Model:	ECP3665T-4
Type:	Squirrel Cage
Horsepower:	5.0
RPM:	1760
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC, Hostile Environment
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B

Supplier:	Atlas Copco Industrial Compressors, Inc. P.O. Box 431 161 Lower Westfield Road Holyoke, MA 01040 (413) 536-0600
Local Representative:	Chick's Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

4. Hydropneumatic Tank

Number:	1
Manufacturer:	Fluid Kinetics Corporation 2368 Eastman Avenue, #8 Ventura, CA 93003 (805) 644-5587
Size:	6 ft. x 18 ft. (including support legs)
Capacity:	3,600 gallons (nominal)
Rating:	ASME
Supplier:	Fluid Kinetics Corporation 2368 Eastman Avenue, #8 Ventura, CA 93003 (805) 644-5587
Local Representative:	Fluid Kinetics Corporation 2368 Eastman Avenue, #8 Ventura, CA 93003 (805) 644-5587

5. Non-Potable Water Pumps

Number:	4
Manufacturer:	Floway Pumps 2494 South Railroad Avenue Fresno, CA 93707 (209) 442-4000
Model:	10 LKM
Type:	Vertical Turbine
Number of Stages:	5
Capacity:	420 GPM at 187 TDH
Speed:	1770 RPM

Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 415-0150
Local Representative:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 415-0150

6. Non-Potable Water Pump Motors

Number:	4 (one per pump)
Manufacturer:	U.S. Electric Motors Division of Emerson Electric Co. 8100 Florissant Avenue P.O. Box 3946 St. Louis, MO 63136 (314) 553-1071
Model:	USEM G95366
Horsepower:	30
RPM:	1770
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50°C Ambient
Type:	TVS4
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 415-0150
Local Representative:	Chick's Electric Motor Service 3592 Main Street San Diego, CA 92113 (619) 232-2162

6.5.4 Non-Potable Water Pump Station No. 2 Facilities

1. Non-Potable Water Main Pumps

Number:	3
Manufacturer:	Fairbanks Morse Pump 3601 Fairbanks Ave. Kansas City, KS 66106 (913) 371-5000
Size:	13H
Model:	7000 AWF
Type:	Vertical Turbine
Number of Stages:	3
Capacity:	1,500 GPM at 185 TDH
Speed:	1785 RPM
Supplier:	Fairbanks Morse Pump 3601 Fairbanks Ave. Kansas City, KS 66106 (913) 371-5000
Local Representative:	Flo Systems 3010 Floyd Street Burbank, CA 91504 (818) 562-5282

2. Non-Potable Water Main Pump Motors

Number:	3 (one per pump)
Manufacturer:	U.S. Electric Motors P.O. Box 3946 St. Louis, MO 63136 (314) 553-2000
Serial Number:	20083478
Horsepower:	125
RPM:	1785
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC
Frame:	444VP
Max. Temperature Rise:	105 °C at 1.0 SF
Type:	TVI4
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	A
Supplier:	U.S. Electric Motors P.O. Box 3946 St. Louis, MO 63136 (314) 553-2000

Local Representative: Flo Systems
3010 Floyd Street
Burbank, CA 91504
(818) 562-5282

3. Non-Potable Water Jockey Pumps

Number: 2
Manufacturer: Fairbanks Morse Pump
3601 Fairbanks Ave.
Kansas City, KS 66106
(913) 371-5000
Size: 10M
Model: 7000 AWF
Type: Vertical Turbine
Number of Stages: 4
Capacity: 500 GPM at 185 TDH
Speed: 1780 RPM
Supplier: Fairbanks Morse Pump
3601 Fairbanks Ave.
Kansas City, KS 66106
(913) 371-5000
Local Representative: Flo Systems
3010 Floyd Street
Burbank, CA 91504
(818) 562-5282

4. Non-Potable Water Jockey Pump Motors

Number: 2 (one per pump)
Manufacturer: U.S. Electric Motors
P.O. Box 3946
St. Louis, MO 63136
(314) 553-2000
Serial Number: 8696901-1&2
Horsepower: 40
RPM: 1780
Service: 3 phase, 60 hz, 460 v
Enclosure: TEFC
Frame: 324VP
Max. Temperature Rise: 105 °C at 1.0 SF
Type: TVI4
Insulation: Class F
Service Factor: 1.15
NEMA Design: B

Supplier: U.S. Electric Motors
P.O. Box 3946
St. Louis, MO 63136
(314) 553-2000

Local Representative: Flo Systems
3010 Floyd Street
Burbank, CA 91504
(818) 562-5282

5. Non-Potable Water Weir Gate

Number: 1

Manufacturer: Golden Harvest, Inc.
P.O. Box 287
Burlington, WA 98233
(360) 757-4334

Type: GH-66 WEIR

Size: 54 x 54

Supplier: Golden Harvest, Inc.
P.O. Box 287
Burlington, WA 98233
(360) 757-4334

Local Representative: Golden Harvest, Inc.
P.O. Box 287
Burlington, WA 98233
(360) 757-4334

6.6 WASTE ACTIVATED SLUDGE THICKENING FACILITIES

6.6.1 Dissolved Air Flotation (DAF) Tanks

1. Inlet Assembly

Number: 1 (Per Unit)
Manufacturer: Hi-Tech Environmental, Inc.
532 Mineral Trace
Birmingham, AL 35244
(205) 987-8976
Local Representative: Saddleback Environmental Equipment
6955 Corte Langosta
Carlsbad, CA 92009
(760) 304-4224
(760) 683-3134

2. Flotation Compartment Baffle

Number: 1 (Per Unit)
Manufacturer: Hi-Tech Environmental, Inc.
532 Mineral Trace
Birmingham, AL 35244
(205) 987-8976
Size: 26' Diameter
Local Representative: Saddleback Environmental Equipment
6955 Corte Langosta
Carlsbad, CA 92009
(760) 304-4224
(760) 683-3134

3. Effluent Weir

Number: 1 (Per Unit)
Manufacturer: Hi-Tech Environmental, Inc.
532 Mineral Trace
Birmingham, AL 35244
(205) 987-8976
Model: V-Notches

Local Representative: Saddleback Environmental Equipment
6955 Corte Langosta
Carlsbad, CA 92009
(760) 304-4224
(760) 683-3134

4. TWAS and Sludge Collector Mechanism

Number: 2 Arms (Per unit)
Manufacturer: Hi-Tech Environmental, Inc.
532 Mineral Trace
Birmingham, AL 35244
(205) 987-8976
Supplier: Hi-Tech Environmental, Inc.
532 Mineral Trace
Birmingham, AL 35244
(205) 987-8976
Local Representative: Saddleback Environmental Equipment
6955 Corte Langosta
Carlsbad, CA 92009
(760) 304-4224
(760) 683-3134

5. Collector Drive Motor with Worm Gear Reducer

Number: 1
Model: 9WB, R37
Frame: 56C
Horse Power: 0.75
Special Features: Variable Speed Drive
RPM: 1740//1440
Service: 3 phase, 60//50 Hz
Output RPM: 0.072 – 0.38 RPM
Ratio: 10:1
Enclosure: XPFC
Insulation: Class F
Service Factor: 1

Manufacturer:	
Motor:	Baldor Electric Co. 3855 Forest Street Denver, CO 80207-1120 (303) 623-0127
Gear Drive:	SEW-Eurodrive, Inc. 30599 San Antonio Street Hayward, CA 94544 (510) 487-3560
Supplier:	Hi-Tech Environmental, Inc. 532 Mineral Trace Birmingham, AL 35244 (205) 987-8976
Local Representative:	Saddleback Environmental Equipment 6955 Corte Langosta Carlsbad, CA 92009 (760) 304-4224 (760) 683-3134

6.6.2 Pressurization and Air Injection System

1. Pressurization Pump

Number:	1 (Per Unit)
Manufacturer:	Goulds Pump Inc. Seneca Falls, NY 13148 (315) 568-2811
Model:	3196 MT /LT
Size:	4X6-13
Capacity:	800 GPM @ 142'
Speed:	1780 RPM
Supplier:	Hi-Tech Environmental, Inc. 532 Mineral Trace Birmingham, AL 35244 (205) 987-8976
Local Representative:	Saddleback Environmental Equipment 6955 Corte Langosta Carlsbad, CA 92009 (760) 304-4224 (760) 683-3134

2. Drive Motor

Number:	2
Horse Power:	50
Frame:	326T
RPM:	1800
Service:	3 phase, 60 Hz, 230/460 volts
Enclosure:	TEFC
Insulation:	Class "F"
Service Factor:	1.15
Manufacturer:	Goulds Pump Inc. Seneca Falls, NY 13148 (315) 568-2811
Local Representative:	Saddleback Environmental Equipment 6955 Corte Langosta Carlsbad, CA 92009 (760) 304-4224 (760) 683-3134

3. Pressurization Tank

Number:	1 (Per Unit)
Manufacturer:	Hi-Tech Environmental, Inc. 532 Mineral Trace Birmingham, AL 35244 (205) 987-8976
Size:	4' Diameter, 11'-3" High
Working Pressure:	100 psig
Pressurized Range:	500-1000 GPM
Supplier:	Hi-Tech Environmental, Inc. 532 Mineral Trace Birmingham, AL 35244 (205) 987-8976
Local Representative:	Saddleback Environmental Equipment 6955 Corte Langosta Carlsbad, CA 92009 (760) 304-4224 (760) 683-3134

4. Back Pressure Valve

Number: 1
Manufacturer: Hi-Tech Environmental, Inc.
532 Mineral Trace
Birmingham, AL 35244
(205) 987-8976
Size: 8"
Supplier: Hi-Tech Environmental, Inc.
532 Mineral Trace
Birmingham, AL 35244
(205) 987-8976
Local Representative: Saddleback Environmental Equipment
6955 Corte Langosta
Carlsbad, CA 92009
(760) 304-4224
(760) 683-3134

5. Air Control Panel

Number: 1 (Per Unit)
Manufacturer: Hi-Tech Environmental, Inc.
532 Mineral Trace
Birmingham, AL 35244
(205) 987-8976
Supplier: Hi-Tech Environmental, Inc.
532 Mineral Trace
Birmingham, AL 35244
(205) 987-8976
Local Representative: Saddleback Environmental Equipment
6955 Corte Langosta
Carlsbad, CA 92009
(760) 304-4224
(760) 683-3134

6. DAF Standby Air Compressor

Number: 2
Manufacturer: Ingersoll Rand
Davidson, NC 28036
(704) 655-4000
Model: 2545E10

RPM (max):	1050
Flow Rate:	35.2 ACFM at 125 psi
Supplier:	Hi-Tech Environmental, Inc. 532 Mineral Trace Birmingham, AL 35244 (205) 987-8976
Local Representative:	Saddleback Environmental Equipment 6955 Corte Langosta Carlsbad, CA 92009 (760) 304-4224 (760) 683-3134

7. DAF Standby Air Compressor Drive Motor

Number:	2
Horse Power:	10
Service:	3 phase, 60 Hz, 460 Volts
Enclosure:	TEFC
Insulation:	Class F
Temperature Rise:	Class B rise over 50 C
Service Factor:	1.15
Supplier:	Hi-Tech Environmental, Inc. 532 Mineral Trace Birmingham, AL 35244 (205) 987-8976
Local Representative:	Saddleback Environmental Equipment 6955 Corte Langosta Carlsbad, CA 92009 (760) 304-4224 (760) 683-3134

6.6.3 TWAS Pumping and Metering System

1) TWAS Pump

Number:	1 (Per Unit)
Manufacturer:	Netzch Inc. 119 Pickering Way Exton, PA 19241 (610) 363-8010
Model:	NM053-01L

Capacity: 80 GPM @ 40 psi TDH
Speed: 1800 RPM
Supplier: Netzch Inc.
Local Representative: Gierlich-Mitchell Inc.
10533 Progress Way, Suite A
Cypress CA 90630
(714) 236-6070

2) Drive Motor

Number: 1 (Per Unit)
Horse Power: 5
Special Features: Constant Speed Motor
Frame: 184tc
RPM: 1800
Service: 3 phase, 60 Hz, 460 Volts
Enclosure: TEFC
Insulation: Class F
Service Factor: 1.15
Manufacturer: Baldor Reliance
5711 R.S. Boreham, Jr. Street
Fort Smith, AR 72901
(479) 646-4711

Local Representative: Gierlich-Mitchell Inc.
10533 Progress Way, Suite A
Cypress CA 90630
(714) 236-6070

3) Bubbler Panel

Number: BCP-SSKPS1
Supplier: FluidIQs LLC
2650 Napa Valley Corporate Drive
Napa, CA 94558
(707) 258-8400

4) TWAS Flow Meter

Manufacturer: Krohne
Model: VN034BA0A4S31121
Supplier: FluidIQs LLC
2650 Napa Valley Corporate Drive
Napa, CA 94558
(707) 258-8400

6.6.4 DAF Polymer Addition System

1. Bulk Polymer Storage Tank

Number: 1
Manufacturer: Pacific Tank Ltd.
17177 Muskrat Ave,
Adelanto, CA 92301
Phone: (760) 246-6136
Size: 9' Diameter, 11'-9" High
Capacity: 5590
Supplier: Pacific Tank Ltd.
Local Representative: Gierlich-Mitchell Inc.
10533 Progress Way, Suite A
Cypress CA 90630
(714) 236-6070

2. Bulk Polymer Storage Tank Sump Pump

Number: 1
Manufacturer: Barnes Pumps, A division of Crane Pumps &
Systems
420 Third Street
Piqua, Ohio 45356
Model: 3SE544DS
Special Features: Submersible, End Suction, Centrifugal Pump
Size: 9' Diameter, 11'-9" High
Capacity: 100 GPM @ 8 feet TDH
Supplier: Gierlich-Mitchell Inc.
10533 Progress Way, Suite A
Cypress CA 90630
(714) 236-6070

Local Representative: Gierlich-Mitchell Inc.
10533 Progress Way, Suite A
Cypress CA 90630
(714) 236-6070

3. Bulk Polymer Storage Tank Sump Pump Motor

Number: 1
Horse Power: 1.5
RPM: 1750
Service: 3 phase, 60 Hz, 460 Volts
Enclosure: NEMA 4X
Insulation: Class "B"
Service Factor: 1.85
NEMA Design: "B" Temperature Rise
Manufacturer: Barnes Pumps, A division of Crane Pumps & Systems
420 Third Street
Piqua, Ohio 45356

Local Representative: Gierlich-Mitchell Inc.
10533 Progress Way, Suite A
Cypress CA 90630
(714) 236-6070

4. Bulk Polymer Transfer Pump

Number: 1
Manufacturer: Netzch Inc.
119 Pickering Way
Exton, PA 19241
(610) 363-8010
Model: NM015-01L
Capacity: 35 GPH @ 20 psi TDH
Speed: 160 RPM
Supplier: Netzch Inc.

Local Representative: Gierlich-Mitchell Inc.
10533 Progress Way, Suite A
Cypress CA 90630
(714) 236-6070

5. Bulk Polymer Transfer Pump Drive Motor

Number: 1
Horse Power: 0.5 HP
Special Features: Adjustable Speed Drive
Frame: S56C
RPM: 1750
Service: 1 phase, 60 Hz, 230 Volts
Enclosure: TEFC
Insulation: Class F
Service Factor: 1.15
Manufacturer: Leeson
Supplier: Netzch Inc.
Local Representative: Gierlich-Mitchell Inc.
10533 Progress Way, Suite A
Cypress CA 90630
(714) 236-6070

6. Mix Tank

Number: 1
Manufacturer: Pacific Tank Ltd.
17177 Muskrat Ave,
Adelanto, CA 92301
(760) 246-6136
Size: 4' Diameter, 6' High
Capacity: 563 Gallons
Supplier: Air Chem Systems, Inc.
15222 Connector Lane
Huntington Beach, CA 92649
(714) 897-0639
Local Representative: Gierlich-Mitchell Inc.
10533 Progress Way, Suite A
Cypress CA 90630
(714) 236-6070

7. Mixer

Number: 1
Manufacturer: Grovhac Inc
4310 North 126th Street
Brookfield, WI 53005
(262) 781-5020
Model: 400-1000-GE3d
Speed: 425 RPM
Local Representative: Harrington Industrial Plastics
7557 Convoy Court
San Diego, CA 92111
(858) 278-9311

8. Mixer Motor

Number: 1
Horse Power: 1
RPM: 1725
Service: 460 V
Enclosure: TEFC
Insulation: Class F
Local Representative: Harrington Industrial Plastics
7557 Convoy Court
San Diego, CA 92111
(858) 278-9311

9. Polymer Solution Feed Pumps

Number: 1 (Per Unit)
Manufacturer: Netzch Inc.
119 Pickering Way
Exton, PA 19241
(610) 363-8010
Model: NM031-01L
Capacity: 10 GPM @ 30 psi TDH
Speed: 280 RPM
Supplier: Netzch Inc.
Local Representative: Gierlich-Mitchell Inc.
10533 Progress Way, Suite A
Cypress CA 90630
(714) 236-6070

10. Polymer Solution Feed Pump Drive Motor

Number:	1
Horse Power:	1
Special Features:	Variable Speed Drive
RPM:	1750
Service:	1 phase, 60 Hz, 230 Volts
Enclosure:	TEFC
Insulation:	Class F
Temperature Rise:	Class B
Service Factor:	1.15
Manufacturer:	Leeson
Supplier:	Netzch Inc.
Local Representative:	Gierlich-Mitchell Inc. 10533 Progress Way, Suite A Cypress CA 90630 (714) 236-6070

6.7 UNSTABILIZED SLUDGE STORAGE FACILITIES

6.7.1 Sludge Mixing System

1. Unstabilized Sludge Storage Tank 1 Sludge Mixing Pumps

Number:	4 (one off-the-shelf replacement)
Manufacturer:	Goulds Pumps, Inc. Municipal Business Unit 31 East Genesee Street P.O. Box 419 Baldwinsville, NY 13027 (315) 635-3931
Model:	6100
Type:	Severe Duty, Recessed Impeller
Size:	8 x 8-25
Type of Seal:	Double mechanical seal
Capacity:	3400 gpm @ 55ft TDH
Speed:	700 rpm
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150
Local Representative:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150

2. Unstabilized Sludge Storage Tank 1 Sludge Mixing Pump Motors

Number:	4 (one per pump)
Manufacturer:	U. S. Electrical Motors 8100 West Florissant Avenue P.O. Box 3946, Bldg. L St. Louis, MO 63136 (314) 553-1071
Horsepower:	125
RPM:	1800
Service:	3 phase, 60hz, 460v
Enclosure:	TEFC, Explosion proof
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B

Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 415-0150
Local Representative:	Chick's Electric Motor Service 3592 Main Street San Diego, CA 92113 (619) 232-2162

3. Unstabilized Sludge Storage Tank 2 Sludge Mixing Pumps

Number:	4 (one off-the-shelf replacement)
Manufacturer:	Weir Specialty Pumps 440 West 800 South Salt Lake City, UT 84101 (801) 359-8731
Model:	H8K-S-H4SM
Type:	Screw centrifugal pumps with regulable liner
Size:	8 x 10
Type of Seal:	John Crane double type 21
Capacity:	3900/3400/2800 gpm at 50/55/60 ft TDH
Speed:	1030/1050 rpm
Supplier:	Weir Specialty Pumps 440 West 800 South Salt Lake City, UT 84101 (801) 359-8731
Local Representative:	Flo-Systems Inc. 3010 Floyd Street Burbank, CA 91540 (818) 562-5282

4. Unstabilized Sludge Storage Tank 2 Sludge Mixing Pump Motors

Number:	4 (one per pump)
Manufacturer:	Baldor Electric Company P.O. Box 2400 Fort Smith, AR 72901 (479) 646-4711
Horsepower:	75
RPM:	1800
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 40°C Ambient

Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Baldor Electric Company P.O. Box 2400 Fort Smith, AR 72901 (479) 646-4711
Local Representative:	Weir Specialty Pumps 400 West 800 South Salt Lake City, UT 84101 (801) 530-7531

6.7.2 Odor Reduction Station

1. Odor Reduction Station Exhaust Fans

Number:	2
Manufacturer:	Ceilcote Air Pollution Control 140 Sheldon Road Berea, OH 44017 (216) 243-0700
Model:	CLUB
Type:	Centrifugal, Single Width Impeller
Size:	3000
Capacity:	12,000 cfm @ 8-inch SP
Speed:	1562 rpm
Supplier:	Ceilcote Air Pollution Control 140 Sheldon Road Berea, OH 44017 (216) 243-0700
Local Representative:	Leonard Engineered Products 11354 Burbank Blvd. P.O. Box 868 North Hollywood, CA 91630 (818) 760-4100

2. Odor Reduction Station Exhaust Fan Motors

Number:	2 (one per fan)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 245-4501
Horsepower:	25
RPM:	1770
Service:	3 phase, 60 hz, 460 v
Enclosure:	Explosion Proof, Chemical Duty

Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Ceilkote Air Pollution Control 140 Sheldon Road Berea, OH 44017 (216) 243-0700
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

3. Odor Reduction Station Scrubber

Number:	1
Manufacturer:	R. J. Environmental 6197 Cornerstone Ct. East, Suite 108 San Diego, CA 92121 (619) 455-7688
Type:	Packed Vertical Tower
Size:	6 ft. diameter by 30 ft. high
Capacity:	12,000 cfm
Inlet H ₂ S:	50 ppm
Removal Efficiency:	99%
Supplier:	R. J. Environmental 6197 Cornerstone Ct. East, Suite 108 San Diego, CA 92121 (619) 455-7688
Local Representative:	R. J. Environmental 6197 Cornerstone Ct. East, Suite 108 San Diego, CA 92121 (619) 455-7688

4. Packing Media

Manufacturer:	Lantec 5308 Derry Avenue, Suite E Agoura Hills, CA 91301 (818) 707-2285
Size:	3.5-inches

Supplier:	R.J. Environmental 6197 Cornerstone Ct. East, Suite 108 San Diego, CA 92121 (619) 455-7688
Local Representative:	R.J. Environmental 6197 Cornerstone Ct. East, Suite 108 San Diego, CA 92121 (619) 455-7688

5. Odor Reduction Station pH and ORP Controllers

Number:	2 (1 pH Controller and 1 ORP Controller)
Manufacturer:	GLI International, Inc. Great Lakes Instruments 9020 West Dean Road Milwaukee, WI 53224 (414) 355-3601
Models:	pH Probe - 6028PO, Differential Electrode Type ORP Probe - 2028RO, Differential Electrode Type pH Transmitter - 692P3F5A7N ORP Transmitter- 692R3F5A7N
Supplier:	R. J. Environmental 6197 Cornerstone Ct. East, Suite 108 San Diego, CA 92121 (619) 455-7688
Local Representative:	Westmark Sales, Inc. 2330 Westwood Blvd., Suite 100 Los Angeles, CA 90064 (310) 474-8211

6. Odor Reduction Recirculation Pumps

Number:	2
Manufacturer:	Met-Pro Corp. Fybroc Division 700 Emlen Way P.O. Box 379 Telford, PA 18969 (215) 723-8155
Model:	1500
Type:	FRP, End Suction, Centrifugal
Size:	2 x 3 x 10
Type of Seal:	Double Mechanical Durametalllic RX-0
Capacity:	180 gpm @ 65 ft
Speed:	1750 RPM

Supplier:	R. J. Environmental 6197 Cornerstone Ct. East, Suite 108 San Diego, CA 92121 (619) 455-7688
Local Representative:	Process Equipment 820 N. Mountain Avenue, Suite 108 Upland, CA 91784 (909) 920-3005

7. Odor Reduction Recirculation Pump Motors

Number:	2 (one per pump)
Manufacturer:	Siemens Energy & Automation 323 Norristown Road, Suite 210 Ambler, PA 19002 (215) 283-4720
Horsepower:	7.5
RPM:	1800
Service:	3 phase, 60 Hz, 460 volts
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	R.J. Environmental 6197 Cornerstone Ct. East, Suite 108 San Diego, CA 92121 (619) 455-7688
Local Representative:	Arnhart Electric 3520 Main Street San Diego, CA 92113 (619) 232-7965

8. Odor Reduction Station NaOH Metering Pumps

Number:	2
Manufacturer:	PulsaFeeder 2883 Brighton-Henrietta Rochester, NY 14623 (716) 292-8000
Model:	680-S-AE
Type:	Positive Displacement, Double Diaphragm Metering
Size:	1/2-inch x 1/2-inch
Head Material:	316 Stainless
Valve Material:	316 Stainless

Capacity:	0.3 - 3.0 gph
Speed:	44 strokes per minute @ 1750 rpm
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150
Local Representative:	ChemWest, Inc. 23241 Arroyo Vista Rancho Santa Margarita, CA 92688 (714) 858-7800

9. Odor Reduction Station NaOH Metering Pump Motors

Number:	2 (one per pump)
Manufacturer:	Baldor P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Horsepower:	1.0
RPM:	1750
Service:	3 phase, 60 Hz, 460 volts
Enclosure:	TEFC, Chemical Duty
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150
Local Representative:	Chick's Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

10. Odor Reduction Station NaOCl Metering Pumps

Number:	2
Manufacturer:	PulsaFeeder 2883 Brighton-Henrietta Rochester, NY 14623 (716) 292-8000
Model:	880-S-AE
Type:	Positive Displacement, Double Diaphragm Metering
Size:	3/4-inch x 3/4-inch

Head Material:	Teflon
Valve Material:	Alloy C
Capacity:	3.1- 23.0 gph
Speed:	58 strokes per minute @ 1750 rpm
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150
Local Representative:	ChemWest, Inc. 23241 Arroyo Vista Rancho Margarita, CA 92688 (714) 858-7800

11. Odor Reduction Station NaOC1 Metering Pump Motors

Number:	2 (one per pump)
Manufacturer:	Baldor P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Horsepower:	1.0
RPM:	1750
Service:	3 phase, 60 Hz, 460 volts
Enclosure:	TEFC, Chemical Duty
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150
Local Representative:	Chick's Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

12. Odor Reduction Station NaOH Storage Tank

Number:	1
Manufacturer:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265
Type:	FRP, Cylindrical, Closed Top
Size:	5' diameter x 8' high

Capacity:	1200 gallons (nominal)
Heating Element:	Thermon TSX-6-2BNOJ Self Limiting Cable, 240 VAC Operation
Insulation:	2.3-inch thick Trymer-1800 Brand Polisocyanurate foam
Resin Material:	Dow Derakane 411-350
Supplier:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265

13. Odor Reduction Station NaOCl Storage Tank

Number:	1
Manufacturer:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265
Type:	FRP, Cylindrical, Closed Top
Size:	9 ft. diameter x 17 ft. - 3-inch high
Capacity:	8200 gallons (nominal)
Resin Material:	Dow Derakane 411-350
Supplier:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265

14. NaOH and NaOCl Containment Sump Pump

Number:	2 (one in each area)
Manufacturer:	Barnes Pumps, Inc. 420 Third Street P.O. Box 603 Piqua, OH 45356-0603 (513) 773-2442
Model:	3SE1544DS
Type:	Submersible; Simplex Control
Type of Seal:	Tandem Mechanical Seal
Capacity:	115 gpm @ 13 ft. TDH
Horsepower:	1.5
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	NEMA 4X Weather Proof Enclosure
Insulation:	Class B
Service Factor:	1.85

NEMA Design:	Class B, Completely Oil-Filled, Squirrel Cage Induction
Supplier:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627
Local Representative:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627

15. Odor Reduction Station Water Softener System

Number:	1
Manufacturer:	Culligan International Company One Culligan Parkway Northbrook, IL 60062
Model:	SMS-91/Model 9000
Type:	Ion Exchange
Size:	2 vessels of 12-inch diameter x 44- inch high
Capacity:	6 gpm up to 2,900 gpd
Supplier:	Culligan Technologies 3515 Olive Street Lemon Grove, CA 91945 (619) 463-8837
Local Representative:	Culligan Technologies 3515 Olive Street Lemon Grove, CA 91945 (619) 463-8837

16. Odor Reduction Station Water Softener Calcium Ion Controller

Number:	1
Manufacturer:	Jenco Instruments, Inc. 7968 Arjons Drive, Suite C San Diego, CA 92126 (619) 578-2828
Model:	J3675
Probe Type:	Calcium Selective, PVC Membrane
Range:	0.02 to 40,000 ppm
Supplier:	Culligan Technologies 3515 Olive Street Lemon Grove, CA 91945 (619) 463-8837

Local Representative: Jenco Instruments, Inc.
7968 Arjons Drive, Suite C
San Diego, CA 92126
(619) 578-2828

6.8 SLUDGE DEWATERING FACILITIES

6.8.1 Dewatering System Pumping Facilities

1. Sludge Grinders

Number:	2 (one off the shelf replacement)
Manufacturer:	Franklin Miller, Inc. 60 Okner Pkwy Livingston, NJ 07939 (201) 535-9200
Model:	Taskmaster Supershredder 8000 TM 8516-6
Type:	Double Shaft
Capacity:	600 gpm (nominal)
Reducer Type:	Helical
Reducer Reduction Ratio:	29:1
Supplier:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711

2. Sludge Grinder Motors

Number:	2 (one per grinder)
Manufacturer:	Baldor Electric Company P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Model:	VEM3661T
Horsepower:	3 hp
RPM:	1760
Service:	3 ph, 60 hz, 230/460v
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 40° C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B

Supplier:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711 (818) 842-3217 fax
Local Representative:	Chick's Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

3. BFP Sludge Feed Pumps

Number:	4
Manufacturer:	Moyno Industrial Products 1895 West Jefferson Street Springfield, OH 45506 (513) 327-3510
Model:	2000 Series IF036G1 SSQ DBB
Size:	6-inch x 16-inch
Type:	Single stage, positive displacement, progressive cavity
Type of Seal:	Double mechanical
Capacity:	30-130 gpm @ 30 psi
Speed:	106 - 397 rpm
Supplier:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711

4. BFP Sludge Feed Pump Motors

Number:	4 (one for each pump)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 321-2795
Horsepower:	10
Special Features:	Variable Frequency Drive
RPM:	1750
Service:	3 ph, 60 hz, 460v
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50° C Ambient

Insulation:	Class F; VPI type
Service Factor:	1.15
Supplier:	Flo-Systems 3010 Floyd Street Burbank, CA 91504 (213) 849-7711
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

6.8.2 Dewatering System Polymer Conditioning Facilities

1. Polymer Bulk Storage Tanks

Number:	2
Manufacturer:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265
Type:	FRP, Cylindrical, Closed Top
Size:	12 ft. diameter x 15 ft. high
Capacity:	12,600 gallons (nominal)
Resin Material:	FRP-Dow Derakane 411
Corrosion Barrier:	C-Veil/Chop Derakane 411
Supplier:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265
Local Representative:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265

2. Solids Processing Bulk Polymer Storage Area Sump Pump

Number:	1
Manufacturer:	Barnes Pumps, Inc. 420 Third Street P.O. Box 603 Piqua, OH 45356-0603 (513) 773-2442
Model:	3SE1544DS

Type:	Submersible; Simplex Control
Type of Seal:	Tandem Mechanical
Capacity:	115 gpm @ 15 ft. TDH
Horsepower:	1.5
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	NEMA 4X Weather Proof
Insulation:	Class B
Service Factor:	1.85
NEMA Design:	Class B, Completely oil-filled, Squirrel Cage Induction
Supplier:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627
Local Representative:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627

3. Polymer Transfer Pumps

Number:	2 (one per pump)
Manufacturer:	Moyno Industrial Products 1895 West Jefferson Street Springfield, OH 45506
Model:	1L3 SSQ SBB
Type:	Single Stage, Positive Displacement Progressive Cavity
Size:	1.5" X 1.25"
Type of Seal:	Single Mechanical
Capacity:	0.1-1.5 gpm at 20 psi
Speed:	34-700 rpm
Supplier:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504-2599 (213) 849-7711
Local Representative:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504-2599 (213) 849-7711

4. Polymer Transfer Pump D.C. Motors

Number:	2 (one per pump)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 321-2795
Horsepower:	1.0
RPM:	1750
Special Features:	SCR Variable Speed Drive
Service to SCR:	1ph/60Hz/230 volts
Service to Motor:	D.C. 90 volts
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50° C Ambient
Insulation:	Class F
Service Factor:	1.15
Supplier:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504-2599 (213) 849-7711
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Road Suite B200 San Diego, CA 92123 (619) 292-3290

5. Polymer Mixing Tanks

Number:	2
Manufacturer:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265
Type:	FRP, Cylindrical, Open Top
Size:	6 ft. diameter x 8 ft. high
Capacity:	1600 gallons (nominal)
Resin Material:	FRP-Dow Derakane 411
Corrosion Barrier:	C-Veil/Chop Derakane 411
Supplier:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265

Local Representative: Belco Manufacturing
2303 Taylor's Valley Road
Belton, TX 76513
(800) 251-8265

6. Polymer Mixers

Number 2
Manufacturer: Chemineer, Inc.
5870 Poe Avenue
Dayton, OH 45414
(513) 454-3200
Model: 5JTC
Type: Portable, Top Entry, Clamp Mount
Speed: 310 rpm
Reducer Type: Helical Double Reduction
Reducer Reduction Ratio: 6:1
Supplier: ChemWest
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
(714) 858-7800
Local Representative: ChemWest
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
(714) 858-7800

7. Polymer Mixer Motors

Number: 2 (one per mixer)
Manufacturer: Reliance Electric
24701 Euclid Avenue
Cleveland, OH 44117
(800) 321-2795
Horsepower: 2.0
RPM: 1750
Service: 3 phase, 60 hz, 230/460 v
Enclosure: TEFC
Temperature Rise: Class B Rise in 50° C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: Class B
Supplier: ChemWest
23241 Arroyo Vista

Rancho Santa Margarita, CA 92688
(714) 858-7800

Local Representative: Rockwell Automation - Reliance
Electric
3934 Murphy Canyon Rd., Suite B200
San Diego, CA 92123
(619) 292-3290

8. Polymer Feed Pumps

Number: 4
Manufacturer: Moyno Industrial Products
1895 West Jefferson Street
Springfield, OH 45506
Model: 2L4 SSQ DBB
Size: 2.5-inch X 2.0-inch
Type: Two Stage, Positive Displacement,
Progressive Cavity
Type of Seal: Double Mechanical
Capacity: 0.75-15 gpm at 20 psi
Speed: 47-780 rpm
Supplier: Flo-Systems, Inc.
3010 Floyd Street
Burbank, CA 91504-2599
(213) 849-7711
Local Representative: Flo-Systems, Inc.
3010 Floyd Street
Burbank, CA 91504-2599
(213) 849-3217

9. Polymer Feed Pump Motors

Number: 4 (one per pump)
Manufacturer: Reliance Electric
24701 Euclid Avenue
Cleveland, OH 44117
(800) 321-2795
Horsepower: 2.0
RPM: 1750
Special Features: SCR Variable Speed Drive
Service to SCR: 1ph/60Hz/230 volts
Service to Motor: D.C., 90 volt
Enclosure: TENV
Temperature Rise: Class B Rise in 50° C Ambient
Insulation: Class F

Service Factor:	1.15
Supplier:	Flo-Systems, Inc. 3010 Floyd Street Burbank, CA 91504-2599 (213) 849-7711
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Rd., Suite B200 San Diego, CA 92123 (619) 292-3290

6.8.3 Belt Filter Presses

1. Belt Filter Presses

Number:	4
Manufacturer:	Ashbrook-Simon-Hartley 11600 East Hardy Houston, TX 77093 (713) 449-0322
Model:	Winklepress
Type:	Continuous Belt
Size:	3V, 2 Meter
Belt Size:	2.2 Meter
Supplier:	Ashbrook-Simon-Hartley 11600 East Hardy Houston, TX 77093 (713) 449-0322
Local Representative:	Gierlich Mitchell 227 W. Grand El Segundo, CA 90245 (213) 414-0150

2. Belt Drive Motors

Number:	8 (2 per belt filter press)
Manufacturer:	Baldor Electric P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Horsepower:	3
Special Features:	Variable Frequency Drive
RPM:	1760
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC

Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	Ashbrook-Simon-Hartley 11600 East Hardy Houston, TX 77093 (713) 449-0322
Local Representative:	Baldor Electric 6840 Flotilla City of Commerce, CA 90040 (213) 724-6771

3. Hydraulic Unit Pumps

Number:	4 (1 per belt filter press)
Manufacturer:	Delta Power Hydraulic Company 4484 Boeing Drive Rockford, IL 61109 (815) 397-6628
Model:	C6
Type:	Hydraulic Gear
Capacity:	2.5 gpm max. 1500 psig max.
Speed:	1720
Supplier:	Ashbrook-Simon-Hartley 11600 East Hardy Houston, TX 77093 (713) 449-0322
Local Representative:	Gierlich Mitchell 227 W. Grand El Segundo, CA 90245 (213) 414-0150

4. Hydraulic Unit Pump Motors

Number:	4 (1 per pump)
Manufacturer:	Sterling Electric 16752 Armstrong Avenue Irvine, CA 92714 (800) 654-6220
Horsepower:	1.5
RPM:	1720
Service:	3 phase, 60 hz, 230/480 v
Enclosure:	TEFC

Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	Ashbrook-Simon-Hartley 11600 East Hardy Houston, TX 77093 (713) 449-0322
Local Representative:	Sterling Electric 16752 Armstrong Avenue Irvine, CA 92714 (800) 654-6220

5. Washwater Booster Pumps

Number:	4 (1 per belt filter press)
Manufacturer:	Peerless Pump Company P.O. Box 7026 Indianapolis, IN 46207 (317) 925-9661
Model:	Peerless F1815GBF
Type:	Centrifugal, End Suction
Size:	1.5 x 2 x 8
Capacity:	120 gpm @ 190 psi TDH
Speed:	3525
Supplier:	Ashbrook-Simon-Hartley 11600 East Hardy Houston, TX 77093 (713) 449-0322
Local Representative:	Peerless Pump Company 14330 Marquardt Avenue Santa Fe Springs, CA 90670 (310) 921-3191

6. Washwater Booster Pump Motors

Number:	4 (1 per pump)
Manufacturer:	Baldor Electric P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Horsepower:	15
RPM:	3,252
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50°C Ambient

Insulation: Class F
Service Factor: 1.15
NEMA Design: Class B

Supplier: Ashbrook-Simon-Hartley
11600 East Hardy
Houston, TX 77093
(713) 449-0322
Local Representative: Chick's Electric
3592 Main Street
San Diego, CA 92113
(619) 232-2162

7. Magnetic Flowmeters for Sludge Feed Line

Number: 4 (one per pump)
Manufacturer: Fischer & Porter Company
17300 Redhill Ave.
Irvine, CA 92714
(714) 252-1142
Model: Series 3000; 10DX3111
Size: 4 in. flanged tube
Type: Magnetic
Capacity: 0 to 200 gpm range
Enclosure: NEMA 4X, Accidental Submergence
Liner: TEFLON PTFE
Power Supply: 1 ph/60 Hz/120v
Supplier: Fischer & Porter Co.
17300 Redhill Ave.
Irvine, CA 92714
(714) 252-1142
Local Representative: Fischer & Porter Co.
17300 Redhill Ave.
Irvine, CA 92714
(714) 252-1142

6.8.4 Odor Reduction Station

1. Odor Reduction Station Scrubber Exhaust Fans (OREF-7 and OREF-8) for Scrubber No. 1 & No. 2.

Number:	2
Manufacturer:	Ceilcote Air Pollution Control, Inc. 140 Sheldon Road Berea, OH 44017 (216) 243-0700
Model:	Club 4850
Type:	Centrifugal, Single Width Impeller
Size:	48-inch diameter inlet
Capacity:	30,000 CFM @ 14-inch SP
Speed:	1210 rpm
Supplier:	Ceilcote Air Pollution Control, Inc. 140 Sheldon Road Berea, OH 44017 (216) 243-0700
Local Representative:	Leonard Engineered Products 11354 Burbank Blvd. P.O. Box 868 North Hollywood, CA (818) 760-4100

2. Odor Reduction Station Exhaust Fan OREF-7 and OREF-8 Motors

Number:	2 (one per fan)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 245-4501
Model:	Duty Master
Horsepower:	100
RPM:	1785
Service:	3 phase, 60 hz, 460 v
Enclosure:	Explosion Proof, Chemical Duty
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Ceilcote Air Pollution Control, Inc. 140 Sheldon Road Berea, OH 44017

Local Representative: Rockwell Automation-Reliance
Electric
3934 Murphy Canyon Rd., Suite B200
San Diego, CA 92123
(619) 292-3290

3. Odor Reduction Station Exhaust Fan (OREF-9) for Scrubbers No. 1 and No. 2

Number: 1
Manufacturer: Ceilcote Air Pollution Control, Inc.
140 Sheldon Road
Berea, OH 44017
(216) 243-0700
Model: Club 3650
Type: Centrifugal, Single Width Impeller
Size: 36-inch diameter inlet
Capacity: 20,000 CFM @ 12.0-inch SP
Speed: 1546 rpm
Supplier: Ceilcote Air Pollution Control, Inc.
140 Sheldon Road
Berea, OH 44017
(216) 243-0700
Local Representative: Leonard Engineered Products
11354 Burbank Blvd.
P.O. Box 868
North Hollywood, CA
(818) 760-4100

4. Odor Reduction Station Exhaust Fan OREF-9 Motor

Number: 1
Manufacturer: Reliance Electric
24701 Euclid Avenue
Cleveland, OH 44117
(800) 245-4501
Model: Duty Master
Horsepower: 60
RPM: 1780
Service: 3 phase, 60 hz, 460 v
Enclosure: Explosion Proof, Chemical Duty
Temperature Rise: Class B Rise in 50°C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: B

Supplier: Ceilcote Air Pollution Control, Inc.
140 Sheldon Road
Berea, OH 44017
(216) 243-0700

Local Representative: Rockwell Automation-Reliance
Electric
3934 Murphy Canyon Rd., Suite B200
San Diego, CA 92123
(619) 292-3290

5. Odor Reduction Station Scrubber No. 1

Number: 1

Manufacturer: R. J. Environmental
6197 Cornerstone Ct. East, Suite 108
San Diego, CA 92121
(619) 455-7688

Type: Packed Vertical Tower

Size: 12 ft diameter by 30 ft high

Capacity: 48,500 cfm

Inlet H₂S: 10 ppm

Inlet NH₃: 30 ppm

Removal Efficiency: 99%

Supplier: R. J. Environmental
6197 Cornerstone Ct. East, Suite 108
San Diego, CA 92121
(619) 455-7688

Local Representative: R. J. Environmental
6197 Cornerstone Ct. East, Suite 108
San Diego, CA 92121
(619) 455-7688

6. Packing Media

Manufacturer: Lantec
5308 Derry Avenue, Suite E
Agoura Hills, CA 91301
(818) 707-2285

Size: 3.5-inches

Supplier: R.J. Environmental
6197 Cornerstone Ct. East, Suite 108
San Diego, CA 92121
(619) 455-7688

Local Representative: R.J. Environmental
6197 Cornerstone Ct. East, Suite 108
San Diego, CA 92126
(619) 455-7688

7. Odor Reduction Station Scrubber No. 1 pH Controller

Number: 1
Manufacturer: Great Lakes Instruments
9020 West Dean Road
Milwaukee, WI 53224
(414) 355-3601
Models: pH Probe - 6028PO, Differential Electrode Type
pH Transmitter - 692P3F5A7N
Supplier: R. J. Environmental
6197 Cornerstone Ct. East, Suite 108
San Diego, CA 92121
(619) 455-7688
Local Representative: Westmark Sales, Inc.
2330 Westwood Blvd., Suite 100
Los Angeles, CA 90064
(310) 474-8211

8. Odor Reduction Station Scrubber No. 1 Recirculation Pumps

Number: 2
Manufacturer: Met-Pro Corp., Fybroc Division
700 Emlen Way
P.O. Box 379
Telford, PA 18969
(215) 723-8155
Model: 1500
Type: FRP, End Suction, Centrifugal
Size: 4 x 6 x 10
Type of Seal: Double Mechanical Durametallic
RX-O
Capacity: 700 gpm @ 65 ft
Speed: 1750 rpm
Supplier: R. J. Environmental
6197 Cornerstone Ct. East, Suite 108
San Diego, CA 92121
(619) 455-7688

Local Representative: Process Equipment
820 N. Mountain Ave., Suite 108
Upland, CA 91784
(909) 920-3005

9. Odor Reduction Station Scrubber No. 1 Recirculation Pump Motors

Number: 2 (one per pump)
Manufacturer: Siemens Energy & Automation
323 Norristown Road, Suite 210
Ambler, PA 19002
(215) 283-4720
Horsepower: 20
RPM: 1800
Service: 3 phase/ 60 Hz/ 460 volts
Enclosure: TEFC
Temperature Rise: Class B Rise in 50°C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: B
Supplier: R.J. Environmental
6197 Cornerstone Ct. East, Suite 108
San Diego, CA 92121
(619) 455-7688
Local Representative: Arnhart Electric
3520 Main Street
San Diego, CA 92113
(619) 232-7965

10. Odor Reduction Scrubber No. 1 H₂SO₄ Metering Pumps

Number: 2
Manufacturer: PulsaFeeder
2883 Brighton-Henrietta
Rochester, NY 14623
(716) 292-8000
Model: 680-S-AE
Type: Positive Displacement, Double
Diaphragm Metering
Size: 1/2-inch x 1/2-inch
Head Material: 316 Stainless
Valve Material: Alloy C
Capacity: 0.3 - 3.0 gph
Speed: 44 strokes per minute @ 1750 rpm

Supplier: Gierlich-Mitchell
227 West Grand Avenue
El Segundo, CA 90245
(310) 414-0150

Local Representative: ChemWest, Inc.
23241 Arroyo Vista
Rancho Santa Margarita, CA 92688
(714) 858-7800

11. Odor Reduction Scrubber No. 1 H₂SO₄ Metering Pump Motors

Number: 2 (one per pump)
Manufacturer: Baldor
P.O. Box 2400
Fort Smith, AR 72902
(501) 646-4711

Horsepower: 1.0
RPM: 1750
Service: 3 phase, 60 Hz, 460 volts
Enclosure: TEFC, Chemical Duty
Temperature Rise: Class B Rise in 50°C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: B
Supplier: Gierlich-Mitchell
227 West Grand Avenue
El Segundo, CA 90245
(310) 414-0150

Local Representative: Chicks Electric
3592 Main Street
San Diego, CA 92113
(619) 232-2162

12. Odor Reduction Scrubber No. 1 H₂SO₄ Storage Tank and Vent Scrubber Tank

Number: 1 Storage Tank
1 Vent Scrubber Tank
Manufacturer: Poly Processing Company
Western Region
8055 South Ash Street
French Camp, CA 95231
(209) 982-4904

Type:	Cross Linked Polyethylene, Cylindrical, Closed Top
Storage Tank Size:	5 ft Diameter by 12 ft High
Scrubber Tank Size:	37.5-inch Diameter by 55-inch High
Storage Tank Capacity:	1520 gal
Scrubber Tank Capacity:	200 gal
Material:	Cross Linked (XLPE) Polyethylene Marlex CL-200
Supplier:	Santa Fe Industrial Plastics, Inc. 11908 Hamden Place Santa Fe Springs, CA 90670 (310) 949-5570

13. Odor Reduction Station Scrubber No. 2

Number:	1
Manufacturer:	R. J. Environmental 6197 Cornerstone Ct. East, Suite 108 San Diego, CA 92121 (619) 455-7688
Type:	Packed Vertical Tower
Size:	12 ft diameter by 30 ft high
Capacity:	48,500 cfm
Inlet H ₂ S:	10 ppm
Inlet NH ₃ :	< 0.3 ppm
Removal Efficiency:	99%
Supplier:	R. J. Environmental 6197 Cornerstone Ct. East, Suite 108 San Diego, CA 92121 (619) 455-7688

14. Odor Reduction Station Scrubber No. 2 pH and ORP Controllers

Number:	1 ORP Controller and 1 pH Controller
Manufacturer:	Great Lakes Instruments 9020 West Dean Road Milwaukee, WI 53224 (414) 355-3601
Models:	pH Probe - 6028PO, Differential Electrode Type ORP Probe - 2028RO, Differential Electrode Type pH Transmitter - 692P3F5A7N ORP Transmitter- 692R3F5A7N
Supplier:	R. J. Environmental 6197 Cornerstone Ct. East, Suite 108 San Diego, CA 92121

Local Representative: (619) 455-7688
Westmark Sales, Inc.
2330 Westwood Blvd., Suite 100
Los Angeles, CA 90064
(310) 474-8211

15. Odor Reduction Station Scrubber No. 2 Recirculation Pumps

Number: 2
Manufacturer: Met-Pro Corp., Fybroc Division
700 Emlen Way
P.O. Box 379
Telford, PA 18969
(215) 723-8155
Model: 1500
Type: FRP, End Suction, Centrifugal
Size: 4 x 6 x 10
Type of Seal: Double Mechanical Durametalllic
RX-0
Capacity: 700 gpm @ 65 ft
Speed: 1750 rpm
Supplier: R. J. Environmental
6197 Cornerstone Ct. East, Suite 108
San Diego, CA 92121
(619) 455-7688
Local Representative: Process Equipment
820 N. Mountain Avenue, Suite 108
Upland, CA 91784
(909) 920-3005

16. Odor Reduction Station Scrubber No. 2 Recirculation Pump Motors

Number: 2 (one per pump)
Manufacturer: Siemens Energy & Automation
323 Norristown Road, Suite 210
Ambler, PA 19002
(215) 283-4720
Model: RGZESD
Horsepower: 20
RPM: 1800
Service: 3 phase, 60 Hz, 460 volts
Enclosure: TEFC
Temperature Rise: Class B Rise in 50°C Ambient
Insulation: Class F
Service Factor: 1.15

NEMA Design:	B
Supplier:	R.J. Environmental 6197 Cornerstone Ct. East, Suite 108 San Diego, CA 92121 (619) 455-7688
Local Representative:	Arnhart Electric 3520 Main Street San Diego, CA 92113 (619) 232-7965

17. Odor Reduction Station Scrubber No. 2 NaOH Metering Pumps

Number:	2
Manufacturer:	PulsaFeeder 2883 Brighton-Henrietta Rochester, NY 14623 (716) 292-8000
Model:	680-S-AE
Type:	Positive Displacement, Double Diaphragm Metering
Size:	1/2-inch by 1/2-inch
Head Material:	316 Stainless
Valve Material:	316 Stainless
Capacity:	0.3 - 3.0 gph
Speed:	44 strokes per minute @ 1750 rpm
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150
Local Representative:	ChemWest, Inc. 23241 Arroyo Vista Rancho Santa Margarita, CA 92688 (714) 858-7800

18. Odor Reduction Station Scrubber No. 2 NaOH Metering Pump Motors

Number:	2 (one per pump)
Manufacturer:	Baldor P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Horsepower:	1.0
RPM:	1750
Service:	3 phase, 60 Hz, 460 volts
Enclosure:	TEFC, Chemical Duty

Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150
Local Representative:	Chicks Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

19. Odor Reduction Station Scrubber No. 2 NaOC1 Metering Pumps

Number:	2
Manufacturer:	PulsaFeeder 2883 Brighton-Henrietta Rochester, NY 14623 (716) 292-8000
Model:	880-S-AE
Type:	Positive Displacement, Double Diaphragm Metering
Size:	3/4-inch x 3/4-inch
Head Material:	Teflon
Valve Material:	Alloy C
Capacity:	2.1 - 21.0 gph
Speed:	58 strokes per minute @ 1750 rpm
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150
Local Representative:	ChemWest, Inc. 23241 Arroyo Vista Rancho Santa Margarita, CA 92688 (714) 858-7800

20. Odor Reduction Station Scrubber No. 2 NaOC1 Metering Pump Motors

Number:	2 (one per pump)
Manufacturer:	Baldor P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Horsepower:	1.0

RPM:	1750
Service:	3 phase/ 60 Hz/ 460 volts
Enclosure:	TEFC, Chemical Duty
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	Gierlich-Mitchell 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150
Local Representative:	Chicks Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

21. Odor Reduction Station Scrubber NaOH Storage Tank

Number:	1
Manufacturer:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265
Type:	FRP, Cylindrical, Closed Top
Size:	5 ft diameter by 7 ft high
Capacity:	1000 gallons (nominal)
FRP Resin Material:	Dow Derakane 411-350
Heating Element:	Thermon TSX-6-2BNOJ Self Limiting Cable, 240 VAC Operation
Insulation:	2.3-inch thick Trymer 1800 Brand Polisocyanurate Foam
Supplier:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265

22. Odor Reduction Station Scrubber No. 2 NaOC1 Storage Tank

Number:	1
Manufacturer:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265
Type:	FRP, Cylindrical, Closed Top
Size:	8 ft diameter x 14 ft - 6-inch high

Capacity:	5,400 gallons (nominal)
FRP Resin Material:	Dow Derakane 411-350
Supplier:	Belco Manufacturing 2303 Taylor's Valley Road Belton, TX 76513 (800) 251-8265

23. H₂SO₄, NaOH and NaOCl Containment Sump Pumps

Number:	3 (one in each area)
Manufacturer:	Barnes Pumps, Inc. 420 Third Street P.O. Box 603 Piqua, OH 45356-0603 (513) 773-2442
Model:	3SE1544DS
Type:	Submersible; Simplex Control
Type of Seal:	Tandem Mechanical
Capacity:	115 gpm @ 15 ft. TDH (H ₂ SO ₄) 115 gpm @ 13 ft. TDH (NaOH) 110 gpm @ 16 ft. TDH (NaOCl)
Horsepower:	1.5
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	NEMA 4X Weather Proof
Insulation:	Class B
Service Factor:	1.85
NEMA Design:	Class B, Completely Oil-Filled, Squirrel Cage Induction
Supplier:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627
Local Representative:	Multi W Systems, Inc. 2615 Strozier Avenue El Monte, CA 91733 (818) 401-2627

24. Odor Reduction Station Water Softener System for Scrubbers No. 1 and No. 2

Number:	1
Manufacturer:	Culligan International Company One Culligan Parkway Northbrook, IL 60062

Model:	SMF-365/Model 9500
Type:	Ion Exchange
Size:	2 vessels of 16-inch diameter by 69-inch high
Capacity:	25 gpm up to 21,600 gpd
Supplier:	Culligan Technologies 3515 Olive Street Lemon Grove, CA 91945 (619) 463-8837
Local Representative:	Culligan Technologies 3515 Olive Street Lemon Grove, CA 91945 (619) 463-8837

25. Odor Reduction Station Water Softening System Calcium Ion Controller

Number:	1
Manufacturer:	Jenco Instruments, Inc. 7968 Arjons Drive, Suite C San Diego, CA 92126 (619) 578-2828
Model:	J3675
Probe Type:	Calcium, Selective, PVC Membrane
Range:	0.02 to 40,000 ppm
Supplier:	Culligan Technologies 3515 Olive Street Lemon Grove, CA 91945 (619) 463-8837
Local Representative:	Jenco Instruments, Inc. 7968 Arjons Drive, Suite C San Diego, CA 92126 (619) 578-2828

26. Sludge Dewatering Air Supply Fans (SF-2 & SF-3)

Number:	2
Manufacturer:	Hartzell Fan Inc. P.O. Box 919 Piqua, OH 45366 (800) 334-3267
Model:	35-28EM3
Type:	In-Line Axial
Size:	18" Diameter Inline Axial Duct Fan
Capacity:	15,000 cfm at 1.0 SP
Fan Speed:	1997 rpm

Supplier: J.E. Philips
2720 South La Cienega Blvd.
Los Angeles, CA 90034
(310) 837-6173
Local Representative: J.E. Philips
2720 South La Cienega Blvd.
Los Angeles, CA 90034
(310) 837-6173

27. Sludge Dewatering Air Supply Fan SF-2 and SF-3 Motors

Number: 2 (one per fan)
Manufacturer: Reliance Electric
24701 Euclid Avenue
Cleveland, OH 44117
(800) 245-4501
Horsepower: 7.5
RPM: 1755
Service: 3 phase/60 Hz/460 volts
Enclosure: XTXEXP
Temperature Rise: Class B Rise in 50°C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: B
Supplier: J.E. Philips
2720 South La Cienega Blvd.
Los Angeles, CA 90034
(310) 837-6173
Local Representative: Rockwell Automation-Reliance
Electric
3934 Murphy Canyon Rd., Suite B200
San Diego, CA 92123
(619) 292-3290

28. Sludge Dewatering Building Exhaust Fans EF-4 through EF-7

Number: 4
Manufacturer: Hartzell Fan Inc.
P.O. Box 919
Piqua, OH 45356
(800) 334-3267
Model: 59-28MG4
Type: Panel Fan
Size: 28: Diameter Panel Fan
Capacity: 7780 cfm at 1/8" SP

Fan Speed:	1140 rpm
Supplier:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173
Local Representative:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173

29. Sludge Dewatering Building Exhaust Fan EF-4 through EF-7 Motors

Number:	4 (one per fan)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (216) 266-7000 (800) 245-4501
Horsepower:	3/4
RPM:	1140
Service:	3 phase/60 Hz/460 volts
Enclosure:	XTXEXP
Temperature Rise:	Class B in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173
Local Representative:	Rockwell Automation - Reliance Electric 3934 Murphy Canyon Rd., Suite B200 San Diego, CA 92123 (619) 292-3290

30. Truck Loading Air Supply Fans (SF-4 and SF-5)

Number:	2
Manufacturer:	Hartzell Fan Inc. P.O. Box 919 Piqua, OH 45356 (800) 334-3267
Model:	58-28FWK3
Type:	Hooded Roof Supply Fan

Size:	28" Diameter Hooded Ventilator
Capacity:	9650 cfm at 1/8" SP
Fan Speed:	2645 rpm
Supplier:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173
Local Representative:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173

31. Truck Loading Air Supply Fan SF-4 and SF-5 Motors

Number:	2 (one per fan)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 245-4501
Horsepower:	3.0
RPM:	1725
Service:	3 ph/60 Hz/460 volts
Enclosure:	XTXEXP
Temperature Rise:	Class B in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	B
Supplier:	J.E. Philips 2720 South La Cienega Blvd. Los Angeles, CA 90034 (310) 837-6173
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Rd., Suite B200 San Diego, CA 92123 (619) 292-3290

6.9 SLUDGE CONVEYANCE AND LIME STABILIZATION FACILITIES

6.9.1 Dewatered Sludge Conveyance System

1. Belt Filter Press Conveyors

Number:	4 (two per train)
Manufacturer:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Conveyor Type:	Trough Belt
Belt Model:	Scandura, No. 74
Type:	MOR-SC, 2-ply, nylon carcass, with 1/8-inch x 1/16-inch covers
Belt Capacity:	220 lbs/in of width
Belt Width:	24-inch
Reducer Type:	Helical Gear
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Gierlich-Mitchell, Inc. 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150

2. Belt Filter Press Conveyor Motors

Number:	4 (one per conveyor)
Manufacturer:	Teco American, Inc. 6140 Valley View Buena Park, CA 90620 (714) 670-2722
Model:	MAX-E2 Premium Efficiency, Severe Duty
Horsepower:	3.0
Special Features:	Variable Frequency Drive
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC
RPM:	1750
NEMA Design:	B
Temperature Rise:	Class B Rise in 50°C Ambient

Insulation:	Class F
Service Factor:	1.15
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Sloan Electric, Inc. 3520 Main Street San Diego, CA 92113 (619) 239-5174

6.9.2 Lime Storage Facilities

1. Lime Storage Silos

Number:	2 (one per train)
Manufacturer:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Type:	Vertical, Cylindrical, Steel with Conical Bottom
Size	12 ft. diameter by 54 ft. high
Capacity:	3278 cubic ft. (excluding conical bottom)
Material:	Steel ASTM A36
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Gierlich-Mitchell, Inc. 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150

2. Silo Dust Collectors

Number:	2 (one per silo)
Manufacturer:	Dust Control Equipment 11301 Electron Drive Louisville, KY 40299-9900 (502) 267-0707

Type:	Bag House/Shaker, with 250 ft ² of Polypropylene Fabric Media, Flanged Roof Mounted
Model:	UMA 250H-G5-AD-WC
Fan Type:	Centrifugal
Capacity:	1200 CFM @ 6-inch SP
Fan Speed:	1140 RPM
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Winsaco 1111 La Limonar Road Santa Ana, CA 92705 (714) 978-7279

3. Silo Dust Collector Fan Motors

Number:	2 (one per collector)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 245-4501
Horsepower:	5.0
RPM:	1140
Service:	3 phase, 60 Hz, 460 v
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Rd., Suite B200 San Diego, CA 92123 (619) 292-3290

4. Silo Dust Collector Shaker Motors

Number:	2 (one per collector)
Manufacturer:	Reliance Electric 24701 Euclid Avenue Cleveland, OH 44117 (800) 245-4501
Horsepower:	1/4
RPM:	1140
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Rockwell Automation-Reliance Electric 3934 Murphy Canyon Rd., Suite B200 San Diego, CA 92123 (619) 292-3290

5. Silo Ventilation Fans

Number	2 (one per silo)
Manufacturer:	Hartzell Fan Inc. P.O. Box 919 1964 Shroyer Avenue Piqua, OH 45356 (800) 336-3267
Type:	Aluminum Panel Fan LV Filter Box
Model:	Series 02L-24-LF4
Capacity:	1590 CFM @ 3/8-inch SP
Fan Speed:	1140 RPM
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776

Local Representative: J. E. Philips Co., Inc.
2720 South La Cienega Blvd.
Los Angeles, CA 90034
(310) 837-6173

6. Silo Ventilation Fan Motors

Number: 2 (one per silo)
Manufacturer: Reliance Electric
24701 Euclid Avenue
Cleveland, OH 44117
(800) 245-4501

Horsepower: 3/4
RPM: 1140
Service: 3 phase, 60 hz, 460 v
Enclosure: TEFC
Temperature Rise: Class B Rise in 50°C Ambient
Insulation: Class F
Service Factor: 1.15
NEMA Design: Class B
Supplier: Taunton Engineering Co., Inc.
P.O. Box 1227
700 West Water Street
Taunton, MA 02780
(508) 823-1776

Local Representative: Rockwell Automation-Reliance Electric
3934 Murphy Canyon Rd., Suite B200
San Diego, CA 92123
(619) 292-3290

6.9.3 Lime Conveyance Facilities

1. Lime Volumetric Feeders

Number: 2 (one per silo)
Manufacturer: Metalfab Inc.
P.O. Box 9
Prices Switch Road
Vernon, NJ 07462
(201) 764-2000

Model: DB1-3
Type: Double Auger, Metering Screen
Capacity: 3-32 ft.³/hr
Reducer Type: Spur Gear

Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Rosco Inc. P.O. Box 5069 Fullerton, CA 92838 (310) 930-0115

2. Lime Volumetric Feeder Motors

Number:	2 (one per feeder)
Manufacturer:	Baldor Electric P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Model:	CD 5318
Horsepower:	1.0
Special Features:	SCR Variable Speed Drive
Service:	1 phase, 60 Hz, 240 v
Enclosure:	TEFC
RPM:	1800 at full load
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.0
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Chick's Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

3. Lime Silo Bin Activators

Number:	2 (one per bin)
Manufacturer:	Metalfab Inc. P.O. Box 9 Prices Switch Road Vernon, NJ 07462 (201) 764-2000
Model:	DB-2

Size and Type:	6.0 ft. diameter, 45° cone with Suspended Secondary Baffle
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Rosco Inc. P.O. Box 5069 Fullerton, CA 92838 (310) 930-0115

4. Lime Silo Bin Activator Motors

Number:	2 (one per feeder)
Manufacturer:	Metalfab Inc. P.O. Box 9 Prices Switch Road Vernon, NJ 07462 (201) 764-2000
Model:	CD18-5370
Horsepower:	3.0
Service:	3 phase, 60 hz, 230/460 v
Enclosure:	TENV
Temperature Rise:	Class B Rise in 50°C Ambient
RPM:	1732 full load
NEMA Design:	B
Insulation:	Class F
Service Factor:	1.15
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Rosco Inc. P.O. Box 5069 Fullerton, CA 92838 (310) 930-0115

5. Lime Transfer Screw Conveyors

Number:	2 (one per train)
Manufacturer:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Screw Model:	LTC1, LTC2
Type:	Single-Screw
Drive Model:	207FC25 x 2" diameter
Capacity:	32 ft. ³ /hr @ a 30% max. trough loading
Screw RPM:	Not to exceed 20 RPM
Screw Flight Diameter:	9-inch
Trough Type:	CEMA Angle Flanged U-Type
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Gierlich-Mitchell, Inc. 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150

6. Lime Transfer Screw Conveyor Motors

Number:	2 (one per train)
Manufacturer:	Teco American, Inc. 6140 Valley View Buena Park, CA 90620 (714) 670-2722
Model:	MAX-E2, Premium Efficiency, Severe Duty
Horsepower:	3.0
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC
NEMA Design:	Class B
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.15

Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Sloan Electric, Inc. 3520 Main Street San Diego, CA 92113 (619) 239-5174

6.9.4 Sludge/Lime Mixing Facilities

1. Sludge/Lime Mixers

Number:	2 (one per train)
Manufacturer:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Type:	Twin-Screw
Screw Diameter:	14-inch
Capacity:	2.5 to 5.8 tons/hr sludge 165 to 1,760 lbs/hr lime
Mixer Body Length:	24 ft.
Maximum Speed:	30 rpm w/minimum turndown ratio of 4:1
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Gierlich-Mitchell, Inc. 227 West Grand Avenue El Segundo, CA 90245 (310) 414-0150

2. Sludge/Lime Mixer Motors

Number:	4 (two per train)
Manufacturer:	Teco American, Inc. 6140 Valley View Buena Park, CA 90620 (714) 670-2722

Model:	MAX-E2 Premium Efficient, Severe Duty
Horsepower:	7.5
Special Features:	Variable Frequency Drive
Service:	3 phase, 60 hz, 460 v
RPM:	1750
Enclosure:	TEFC
NEMA Design:	Class B
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Local Representative:	Sloan Electric, Inc. 3520 Main Street San Diego, CA 92113 (619) 239-5174

6.9.5 Stabilized Sludge Conveyance/Truck Loading System

1. Truck Loading Conveyors

Number:	2 (one per train)
Manufacturer:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776
Conveyor Type:	Trough-Belt
Belt Model:	Scandura, No. 74
Belt Type:	MOR-SC, 2-ply, nylon carcass, with 1/8-inch x 1/16-inch covers
Belt Capacity:	220 lbs/in of width
Belt Width:	24-inch
Reducer Type:	Helical Gear
Supplier:	Taunton Engineering Co., Inc. P.O. Box 1227 700 West Water Street Taunton, MA 02780 (508) 823-1776

Local Representative: Gierlich-Mitchell, Inc.
227 West Grand Avenue
El Segundo, CA 90245
(310) 414-0150

2. Truck Loading Conveyor Motors

Number: 2 (one per conveyor)
Manufacturer: Teco American, Inc.
6140 Valley View
Buena Park, CA 90620
(714) 670-2722
Model: MAX-E2, Premium Efficiency,
Severe Duty
Horsepower: 3.0
Special Features: Variable Frequency Drive
Service: 3 phase, 60 hz, 460 v
Enclosure: TEFC
RPM: 1750
Temperature Rise: Class B in 50°C Ambient
NEMA Design: B
Insulation: Class F
Service Factor: 1.15
Supplier: Taunton Engineering Co., Inc.
P.O. Box 1227
700 West Water Street
Taunton, MA 02780
(508) 823-1776
Local Representative: Sloan Electric, Inc.
3520 Main Street
San Diego, CA 92113
(619) 239-5174

3. Truck Loading Scales

Number: 2
Manufacturer: Fairbanks Scales
4827 Cheynne Way
Chino, CA 91710
(800) 451-4107
Type: Cast Lever Pit, Type S
Model: 11-3485
Number of Sections: 5
Capacity: 0 - 160,000 lbs
Sectional Capacity: 80,000 lbs

Size:	80 ft by 10 ft
Supplier:	Fairbanks Scales 4827 Cheynne Way Chino, CA 91710 (800) 451-4107
Local Representative:	Fairbanks Scales 4827 Cheynne Way Chino, CA 91710 (800) 451-4107

6.10 PRIMARY EFFLUENT STRUCTURES

6.10.1 Primary Effluent Bypass Structure

1. Primary Effluent Bypass Structure Drain Pump

Number:	1
Manufacturer:	The Gorman-Rupp Company 1485 Lexington Ave. Mansfield, Ohio 44907-2674 (419) 774-1511
Model:	83A52-B
Size:	3-inch x 3-inch
Type:	Self-Priming Centrifugal
Type of Seal:	Type 44 Mechanical Self-Lubricated
Capacity:	160 gpm @ 30.2 ft TDH/ 200 gpm @ 23 ft TDH
Speed:	1750 RPM
Supplier:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867
Local Representative:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867

2. Primary Effluent Bypass Structure Drain Pump Motor

Number:	1
Manufacturer:	U.S. Electric Motors Division of Emerson Electric Co. 8100 Florissant Ave. P.O. Box 3946 Street Louis, MO 63136 (314) 553-1071
Model:	USEM 7964
Type:	TCE
Horsepower:	3.0
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B

Supplier: Barrett Engineered Pumps
1695 National Ave.
San Diego, CA 92113
(619) 232-7867
Local Representative: Chick's Electric Motor Service
3592 Main Street
San Diego, CA 92113
(619) 232-2162

3. Automatic Wastewater Sampler

Number: 1
Manufacturer: America Sigma, Inc.
11601 Maple Ridge Road
P.O. Box 820
Medina, New York 14103
(800) 635-1230
Model: 900 MAX
Cabinet: FRP with UV inhibit polymer laminate
Intake Tubing: 3/8-inch ID Vinyl
Sample Bottle Capacity: 3.0 gallons plastic bottle
Pump Vertical Lift: 27 ft maximum
Pump Capacity: 60 ml/sec at 3 ft vertical lift in a 3/8-inch ID intake tube
RPM: 1750
Service: 1 phase, 60 hz, 115 v
Enclosure: NEMA 4X
Supplier: Ponton Industries
8118 Allport Ave.
Santa Fe Spring, CA 90670
(310) 945-1621
Local Representative: Ponton Industries
8118 Allport Ave.
Santa Fe Spring, CA 90670
(310) 945-1621

4. Stainless Steel Slide Gate

Number: 1
Manufacturer: Golden Harvest, Inc.
1353 A5 Peterson Road
P.O. Box 287
Burlington, WA 98233
(800) 338-6238

Model:	GH-65
Size:	24-inch by 48-inch
Supplier:	Golden Harvest, Inc. 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238
Local Representative:	Golden Harvest, Inc. 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238

5. Effluent Channel Diffusers

Number:	96
Manufacturer:	EnviroQuip International, Inc. 8506 Beechmont Avenue Cincinnati, OH 45255 (513) 388-4100
Model:	Snap Cap Plus 5 Model 750-T-10
Type:	Coarse Bubble
Maximum Capacity:	10 cfm
Base Material:	Standard Plastic
NPT Connection Size:	3/4-inch
Supplier:	EnviroQuip International, Inc. 8506 Beechmont Avenue Cincinnati, OH 45255 (513) 388-4100
Local Representative:	MISCO Southwest 1538 Brockhollow Drive, Suite C Santa Ana, CA 92705 (714) 979-6001

6.10.2 Primary Effluent Bypass Metering Structure

1. Primary Effluent Bypass Metering Structure Sump Pump

Number:	1
Manufacturer:	Barnes Pumps, Inc. 1485 Lexington Ave. Mansfield, Ohio 44907-2674 (419) 774-1511
Model:	3SE2044
Type:	Submersible, Duplex Control
Type of Seal:	Tandem Mechanical Seal

Capacity:	120 gpm @ 45.4 ft TDH 150 gpm @ 28 ft TDH
Horsepower:	3.7
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	NEMA 4X Weather Proof Enclosure
Insulation:	Class B
Service Factor:	1.15
NEMA Design:	Class B, Completely Oil-Filled, Squirrel Cage Induction
Supplier:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867
Local Representative:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867

2. Magnetic Flowmeters

Number:	2
Manufacturer:	Bailey-Fischer & Porter Company 17300 Redhill Ave. Irvine, CA 92714 (800) 497-6890
Models:	24-inch - Series 10D1465 48-inch - Series 10D1465
Sizes:	24-inch - Flanged Tube 48-inch - Flanged Tube
Type:	Magnetic
Capacities:	24-inch - 2,150 ~ 43,300 gpm range 48-inch - 9,300 ~ 184,900 gpm range
Enclosure:	NEMA 4X, Accidental Submergence
Liner:	Polyurethane
Power Supply:	1 phase, 60 hz, 120 v
Supplier:	Bailey-Fischer & Porter Co. 17300 Redhill Ave. Irvine, CA 92714 (800) 497-6890
Local Representative:	Bailey-Fischer & Porter Co. 17300 Redhill Ave. Irvine, CA 92714 (800) 497-6890

3. Flow Control Valves

Number: 2
Manufacturer: DeZurik
250 Riverside Avenue
Sartell, MN 56377
(320) 259-2000
Type: Butterfly
Sizes: 18-inch and 42-inch
Style: BAW
Models: 18-inch - AZ0221
42-inch - AZ0220
Body: Cast Iron
Supplier: Familian Commercial
3280 Market Street
San Diego, CA 92102
(619) 239-0371
Local Representative: CS Company
23032 South Normandie
Torrance, CA 90502
(619) 571-3161

4. Flow Control Valve Actuators

Number: 2
Manufacturer: EIM Company
13840 Pike Road
Missouri City, TX 77489
(713) 499-1561
Models: 18-inch - R5L4-3
42-inch - MFG4-3
Loads: 18-inch - 740 ft-lb
42-inch - 10,000 ft-lb
Horsepower: 18-inch - 1/12 hp
42-inch - 1.0 hp
Service: 3 phase, 60 Hz, 460 v
Enclosure: NEMA 4
Insulation: Class F
Service Factor: 1.0
Supplier: Familian Commercial
3280 Market Street
San Diego, CA 92102
(619) 239-0371

Local Representative: CS Company
23032 South Normandie
Torrance, CA 90502
(619) 571-3161

6.10.3 Primary Effluent Bypass Junction Structure

1. Primary Effluent Residual Sample Pump

Number: 1
Manufacturer: The Gorman-Rupp Company
1485 Lexington Ave.
Mansfield, Ohio 44907-2674
(419) 774-1511
Model: 811/2 E3-E1
Size: 1.5-inch x 1.5-inch
Type: Self-Priming Centrifugal
Type of Seal: Type 21 Mechanical Self-Lubricated
Capacity: 50 gpm @ 55 ft TDH/ 69 gpm @ 40 ft TDH
Speed: 3450 RPM
Supplier: Barrett Engineered Pumps
1695 National Ave.
San Diego, CA 92113
(619) 232-7867
Local Representative: Barrett Engineered Pumps
1695 National Ave.
San Diego, CA 92113
(619) 232-7867

2. Primary Effluent Residual Sample Pump Motor

Number: 1
Manufacturer: U.S. Electric Motors
Division of Emerson Electric Co.
8100 Florissant Ave.
P.O. Box 3946
Street Louis, MO 63136
(314) 553-1071
Model: USEM 7964
Type: TCE
Horsepower: 1.0
RPM: 3450
Service: 3 phase, 60 hz, 460 v

Enclosure:	TEFC
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867
Local Representative:	Chick's Electric Motor Service 3592 Main Street San Diego, CA 92113 (619) 232-2162

3. Primary Chlorination Dilution Water Pump

Number:	1
Manufacturer:	The Gorman-Rupp Company 1485 Lexington Ave. Mansfield, Ohio 44907-2674 (419) 774-1511
Model:	88A20-B
Size:	8-inch x 8-inch
Type:	Self-Priming Centrifugal
Type of Seal:	Mechanical Oil-Lubricated Double Floating, Self-Aligning
Capacity:	1150 gpm @ 45 ft TDH/ 1400 gpm @ 38 ft TDH
Speed:	1750 RPM
Supplier:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867
Local Representative:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867

4. Primary Chlorination Dilution Water Pump Motor

Number:	1
Manufacturer:	U.S. Electric Motors Division of Emerson Electric Co. 8100 Florissant Ave. P.O. Box 3946 Street Louis, MO 63136 (314) 553-1071
Model:	USEM 7970
Type:	TCE
Horsepower:	25.0
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867
Local Representative:	Chick's Electric Motor Service 3592 Main Street San Diego, CA 92113 (619) 232-2162

5. pH/ORP Controller with Pump

Number:	1
Manufacturer:	GLI International, Inc. Great Lakes Instruments 9020 West Dean Road Milwaukee, WI 53224 (414) 355-3601
pH Probe:	672P, Differential Electrode Type
ORP Probe:	672R, Differential Electrode Type
Supplier:	Rockwell Electric, Inc. 545 Corporate Dr. Escondido, CA 92029 (619) 489-6190
Local Representative:	Pulse Instrument, Inc. 7243 Alondra Blvd. Paramount, CA 90723 (562) 529-2377

6. Electrical Manhole Sump Pumps

Number:	2
Manufacturer:	Barnes Pumps, Inc. 1485 Lexington Ave. Mansfield, Ohio 44907-2674 (419) 774-1511
Model:	SE411HT
Type:	Submersible, Simplex Control
Type of Seal:	Single Mechanical Oil-Filled with Secondary Exclusion Seal
Capacity	50 gpm @ 16 ft TDH 40 gpm @ 17.5 ft TDH
Horsepower:	0.4
RPM:	1750
Service:	1 phase, 115 v
Enclosure:	NEMA 4X Weather Proof Enclosure
Insulation:	Class B
Service Factor:	1.15
NEMA Design:	Class B, Completely Oil-Filled, Squirrel Cage Induction
Supplier:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867
Local Representative:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867

6.11 FINAL EFFLUENT STRUCTURES

6.11.1 Effluent Blending Structure

1. Chlorine Dilution Water Pumps

Number:	2
Manufacturer:	Crane Pumps and Systems. 420 Third Street Piqua, Ohio 45356 (937) 778-8947
Model:	PO3LA-8D
Size:	3-inch x 3-inch
Type:	Self-Priming Centrifugal
Type of Seal:	Single Mechanical Seal with Tungsten carbide faces- grease lubricated.
Capacity:	250 gpm @ 40 ft. TDH 100 gpm @ 52 ft. TDH 25 ft. max. priming lift
Speed:	1750 RPM
Supplier:	Gierlich-Mitchell, Inc 10533 Progress Way, Suite A Cypress, CA 90630 (714) 236-6070
Local Representative:	Gierlich-Mitchell, Inc 10533 Progress Way, Suite A Cypress, CA 90630 (714) 236-6070

2. Chlorine Dilution Water Pump Motors

Number:	2
Manufacturer:	Baldor Motors 6480 Flotilla Street Commerce, CA 90040 (323) 724-6771
Model:	EM3710T
Frame:	213T
Type:	3736M
Horsepower:	7-1/2
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC
Insulation:	Class F

Service Factor:	1.15
Supplier:	Gierlich-Mitchell, Inc 10533 Progress Way, Suite A Cypress, CA 90630 (714) 236-6070
Local Representative:	Gierlich-Mitchell, Inc 10533 Progress Way, Suite A Cypress, CA 90630 (714) 236-6070

3. Primary Bisulfite Dilution Water Pump

Number:	1
Manufacturer:	The Gorman-Rupp Company 1485 Lexington Ave. Mansfield, Ohio 44907-2674 (419) 774-1511
Model:	88A20-B
Size:	8-inch x 8-inch
Type:	Self-Priming Centrifugal
Type of Seal:	Mechanical Oil-Lubricated Double Floating Self-Aligning
Capacity:	1400 gpm @ 45 ft. TDH 1750 gpm @ 38 ft. TDH
Speed:	1750 RPM
Supplier:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867
Local Representative:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867

4. Primary Bisulfite Dilution Water Pump Motor

Number:	1
Manufacturer:	U.S. Electric Motors Division of Emerson Electric Co. 8100 Florissant Ave. P.O. Box 3946 Street Louis, MO 63136 (314) 553-1071
Model:	USEM 7970
Type:	TCE

Horsepower:	25.0
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867
Local Representative:	Chick's Electric Motor Service 3592 Main Street San Diego, CA 92113 (619) 232-2162

5. Stainless Steel Slide Gates

Number:	3
Manufacturer:	Golden Harvest, Inc. 1353 A5 Peterson Road P.O. Box 287 Burlington, WA 98233 (800) 338-6238
Model:	GH-100
Size:	1 - 66-inch x 66-inch 1 - 84-inch x 84-inch 1 - 96-inch x 96-inch
Supplier:	Golden Harvest, Inc. 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238
Local Representative:	Golden Harvest, Inc. 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238

6. Electric Actuators

Number:	3
Manufacturer:	Baldor Electric P.O. Box 2400 Fort Smith, AR 72902 (501) 646-4711
Horsepower:	2.0

RPM:	1800
Service:	3 phase, 60 hz, 480v
Enclosure:	NEMA 4X
Temperature Rise:	Class B Rise in 50° C Ambient
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	Golden Harvest, Inc. 1353 A5 Peterson Road Burlington, WA 98233 (800) 338-6238
Local Representative:	Chick's Electric 3592 Main Street San Diego, CA 92113 (619) 232-2162

6.11.2 Effluent Metering Structure

1. Effluent Metering Structure Sump Pump

Number:	1
Manufacturer:	Barnes Pumps, Inc. 1485 Lexington Ave. Mansfield, Ohio 44907-2674 (419) 774-1511
Model:	3SE1544
Type:	Submersible, Simplex Control
Type of Seal:	Tandem Mechanical Seal
Capacity	110 gpm @ 27 ft. TDH 150 gpm @ 24 ft. TDH
Horsepower:	2.8
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	NEMA 4X Weather Proof Enclosure
Insulation:	Class B
Service Factor:	1.15
NEMA Design:	Class B, Completely Oil-Filled, Squirrel Cage Induction
Supplier:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867

Local Representative: Barrett Engineered Pumps
1695 National Ave.
San Diego, CA 92113
(619) 232-7867

2. Plant Effluent Residual Sample Pump

Number: 1
Manufacturer: The Gorman-Rupp Company
1485 Lexington Ave.
Mansfield, Ohio 44907-2674
(419) 774-1511
Model: 81 1/2 E3-E1
Size: 1.5-inch x 1.5-inch
Type: Self-Priming Centrifugal
Type of Seal: Type 21 Mechanical Self-Lubricated
Capacity: 50 gpm @ 55 ft. TDH
69 gpm @ 40 ft. TDH
Speed: 3450 RPM
Supplier: Barrett Engineered Pumps
1695 National Ave.
San Diego, CA 92113
(619) 232-7867
Local Representative: Barrett Engineered Pumps
1695 National Ave.
San Diego, CA 92113
(619) 232-7867

3. Plant Effluent Residual Sample Pump Motor

Number: 1
Manufacturer: U.S. Electric Motors
Division of Emerson Electric Co.
8100 Florissant Ave.
P.O. Box 3946
Street Louis, MO 63136
(314) 553-1071
Model: USEM7964
Type: TCE
Horsepower: 1.0
RPM: 3450
Service: 3 phase, 60 hz, 460 v
Enclosure: TEFC
Insulation: Class F
Service Factor: 1.15

NEMA Design:	Class B
Supplier:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867
Local Representative:	Chick's Electric Motor Service 3592 Main Street San Diego, CA 92113 (619) 232-2162

4. Total Chlorine Residual Analyzer

Number:	1
Manufacturer:	Hach Company 5600 Lindbergh Drive Loveland, CO 80538 (800) 227-4224
Model:	CL17 Total Residual Chlorine Analyzer
Supplier:	PONTON Industries, Inc. 22901 Savi Ranch Parkway, Suite B. Yorba Linda, CA 92887 (714) 998-9073
Local Representative:	PONTON Industries, Inc. 22901 Savi Ranch Parkway, Suite B. Yorba Linda, CA 92887 (714) 998-9073

5. Automatic Wastewater Sampler

Number:	1
Manufacturer:	America Sigma, Inc. 11601 Maple Ridge Road P.O. Box 820 Medina, New York 14103 (800) 635-1230
Model:	900 MAX
Cabinet:	FRP with UV inhibit polymer laminate
Intake Tubing:	3/8-inch ID Vinyl
Sample Bottle Capacity:	3.0 gallons plastic bottle
Pump Vertical Lift:	27 ft. maximum
Pump Capacity	60 ml/sec at 3 ft. vertical lift in a 3/8-inch ID intake tube
RPM:	1750
Service:	1 phase, 60 hz, 115 v

Enclosure:	NEMA 4X
Supplier:	Ponton Industries 8118 Allport Ave. Santa Fe Spring, CA 90670 (310) 945-1621
Local Representative:	Ponton Industries 8118 Allport Ave. Santa Fe Spring, CA 90670 (310) 945-1621

6. Magnetic Flowmeter

Number:	1
Manufacturer:	Bailey-Fischer & Porter Company 17300 Redhill Ave. Irvine, CA 92714 (800) 497-6890
Model:	Series 10D1465
Size:	48-inch - Flanged Tube
Type:	Magnetic
Capacity:	9300 ~ 184,900 gpm range
Enclosure:	NEMA 4X, Accidental Submergence
Liner:	Polyurethane
Power Supply:	1 phase, 60 hz, 120v
Supplier:	Bailey-Fischer & Porter Co. 17300 Redhill Ave. Irvine, CA 92714 (800) 497-6890
Local Representative:	Bailey-Fischer & Porter Co. 17300 Redhill Ave. Irvine, CA 92714 (800) 497-6890

6.11.3 Canyon Collector Meter Vault

1. Canyon Collector Meter Vault Sump Pump

Number:	1
Manufacturer:	Barnes Pumps, Inc. 1485 Lexington Ave. Mansfield, Ohio 44907-2674 (419) 774-1511
Model:	3SE1544
Type:	Submersible, Simplex Control
Type of Seal:	Tandem Mechanical Seal

Capacity:	120 gpm @ 9 ft. TDH 150 gpm @ 7 ft. TDH
Horsepower:	2.8
RPM:	1750
Service:	3 phase, 60 hz, 460 v
Enclosure:	NEMA 4X, Weather Proof Enclosure
Insulation:	Class B
Service Factor:	1.15
NEMA Design:	Class B, Completely Oil-Filled, Squirrel Cage Induction
Supplier:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867
Local Representative:	Barrett Engineered Pumps 1695 National Ave. San Diego, CA 92113 (619) 232-7867

2. Magnetic Flowmeters

Number:	2
Manufacturer:	Bailey-Fischer & Porter Company 17300 Redhill Ave. Irvine, CA 92714 (800) 497-6890
Models:	16-inch - Series 10D1465 30-inch - Series 10D1465
Sizes:	16-inch - Flanged Tube 30-inch - Flanged Tube
Type:	Magnetic
Capacities:	16-inch - 1,000 ~ 19,800 gpm range 30-inch - 3,600 ~ 71,300 gpm range
Enclosure:	NEMA 4X, Accidental Submergence
Liner:	Polyurethane
Power Supply:	1 phase, 60 hz, 120v
Supplier:	Bailey-Fischer & Porter Co. 17300 Redhill Ave. Irvine, CA 92714 (800) 497-6890
Local Representative:	Bailey-Fischer & Porter Co. 17300 Redhill Ave. Irvine, CA 92714 (800) 497-6890

3. Automatic Wastewater Sampler (IWS No. 2)

Number:	1
Manufacturer:	America Sigma, Inc. 11601 Maple Ridge Road P.O. Box 820 Medina, New York 14103 (800) 635-1230
Model:	900 MAX
Cabinet:	FRP with UV inhibit polymer laminate
Intake Tubing:	3/8-inch ID Vinyl
Sample Bottle Capacity:	3.0 gallons plastic bottle
Pump Vertical Lift:	27 ft. maximum
Pump Capacity:	60 ml/sec at 3 ft. vertical lift in a 3/8-inch ID intake tube
RPM:	1750
Service:	1 phase, 60 hz, 115 v
Enclosure:	NEMA 4X
Supplier:	Ponton Industries 8118 Allport Avenue Santa Fe Spring, CA 90670 (310) 945-1621
Local Representative:	Ponton Industries 8118 Allport Avenue Santa Fe Spring, CA 90670 (310) 945-1621

4. Vortex Valve

Number:	1
Manufacturer:	H.I.T. Technology, Inc. 94 Hutchins Dr. Portland, ME 04102 (800) 848-2706
Model:	Reg-U-Flo
Type:	CH
Design Head:	4 ft.
Outlet Diameter:	8.02-inch
Material:	12 gauge (minimum) 304 L Stainless Steel
Supplier:	H.I.T. Technology, Inc. 94 Hutchins Dr. Portland, ME 04102 (800) 848-2706

Local Representative: H.I.T. Technology, Inc.
94 Hutchins Dr.
Portland, ME 04102
(800) 848-2706

6.12 STANDBY POWER GENERATION FACILITIES

6.12.1 Mobile Standby Generator No. 1

1. Alternator No. 1

Number:	1
Manufacturer:	Kato Engineering P.O. Box 8447 Mankato, MN 56002 (517) 625-4011
Rating with Accessories:	2000 kW, 2500 kVA, 12 kV
RPM:	1800
Power Factor:	0.8
Service:	3 phase, 60 Hz
Type:	4-pole revolving field brushless type
Construction:	Two Bearing
Insultation:	Class F
Enclosure:	Open drip-proof self ventilation
Supplier:	Hawthorne Power Systems 8050 Othello Ave. San Diego, CA 92111 (619) 974-6800
Local Representative:	Hawthorne Power Systems 8050 Othello Ave. San Diego, CA 92111 (619) 974-6800

- | | | |
|----|-------------------|------------------|
| A. | Pilot Exciter | |
| | Manufacturer: | Kato Engineering |
| | Model: | PMG Series |
| | Type: | Permanent Magnet |
| B. | Voltage Regulator | |
| | Manufacturer: | Kato Engineering |
| | Model: | KCR 760 |
| | Type: | Solid State |

2. Engine No. 1

Number:	1
Manufacturer:	Caterpillar, Inc. 100 NE Adams Peoria, IL 61629 (309) 675-1000

Model: 3516, 2T
Engine Type: Diesel Driven Four-Stroke-Cycle,
16-Valve
Supplier: Hawthorne Power Systems
8050 Othello Ave.
San Diego, CA 92111
(619) 974-6800
Local Representative: Hawthorne Power Systems
8050 Othello Ave.
San Diego, CA 92111
(619) 974-6800

A. Starting System

1. Batteries
Manufacturer: Caterpillar
Model: 8D, 9G4231
Voltage: 24 VDC
Type: Lead Acid
2. Remote-Mounted Battery Charger
Manufacturer: La Marche
Model: A46-20-24V
Type: Automatic 20 amp Float Charger
3. Battery Charging Alternator
Manufacturer: Caterpillar
Model: PA2354
Type: Automatic, 35 amp

B. Cooling System

Manufacturer: IEA, Inc.
Model: EC046F
Type: Liquid Filled Radiator with Cooling Fan
Fluid: 50 percent Ethylene Glycol
Fan Speed: 791 RPM
Fan Diameter: 72-inch

C. Jacket Water Heaters

Manufacturer: Watlow Industries
Parameters: 3kW, 480 V

- | | | |
|----|---|--|
| D. | Exhaust System
Manufacturer:
Model:
Type: | Hapco Engine Products
8828CFHI8
Hospital Critical Silencing Muffler |
| E. | Fuel System
Manufacturer:
Fuel Type:
Capacity: | Caterpillar
Diesel Fuel Oil No. 2
133 Gallons per Hour at 100 percent Load |
| F. | Electronic Governor
Manufacturer:
Model:
Type: | Woodward Governor Company
2301A
Solid State Electro-Mechanical |
| G. | Lubrication System
Manufacturer:
Type: | Caterpillar
Force Fed with Gear-Type Pump |

6.12.2 Diesel Fuel Storage Tank No. 1

1. Diesel Fuel Storage Tank

Number:	1
Manufacturer:	The Quickset Organization Associated Concrete Products Div. 4301 W. MacArthur Blvd. Santa Ana, CA 92704 (714) 557-7470
Model:	ConVault CVT-10000-3-SPEC
Type:	Welded Carbon Steel with Concrete Encasement
Capacity:	10,000 gallons
Supplier:	Western Pump Inc. 3253 Finch Street San Diego, CA 92102-3315 (619) 239-9988
Local Representative:	Western Pump Inc. 3253 Finch Street San Diego, CA 92102-3315 (619) 239-9988

6.12.3 Diesel Fuel Transfer Pump Station No. 1

1. Diesel Fuel Transfer Pumps

Number:	2
Manufacturer:	Oberdorfer Pumps, Inc. P.O. Box 4770 Syracuse, NY 13221 (800) 448-1668
Model:	992
Size:	3/8-inch x 3/8-inch
Type:	Rotary Gear
Type of Seal:	Positive Spring-Loaded Buna Lip Seal
Capacity:	4.0 gpm @ 20 ft. TDH of water
Supplier:	Hawthorne Power System 8050 Othello Ave. San Diego, CA 92111 (619) 974-6800
Local Representative:	RF Partridge and Associates 13875 Cerritos Corporate Dr, Suite B Cerritos, CA 90703 (562) 802-7345

2. Diesel Fuel Transfer Pump Motors

Number:	2
Manufacturer:	Marathon Electric P.O. Box 8033 Wausau, WI 54401 (715) 675-3311
Model:	V56T17F5300
Horsepower:	0.5
RPM:	1800
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC, Explosion Proof
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	Hawthorne Power System 8050 Othello Ave. San Diego, CA 92111 (619) 974-6800

Local Representative: RF Partridge and Associates
13875 Cerritos Corporate Dr, Suite B
Cerritos, CA 90703
(562) 802-7345

3. Diesel Fuel System Day Tank and Overflow Tanks

Number: 2
Manufacturer: Pryco, Inc.
4301 W. MacArthur Blvd.
Santa Ana, CA 92704
(714) 557-7470
Models: 25 gallons - PY25LDW
300 gallons - PY300ULDW
Type: Double Walled with Heavy Gauge
Steel Welded
Dimensions: 25 gallons - 30-inch W x 18-inch D x 35-inch H
300 gallons - 34-inch W x 72-inch D x 60-inch H
Supplier: Hawthorne Power System
8050 Othello Ave.
San Diego, CA 92111
(619) 974-6800
Local Representative: RF Partridge and Associates
13875 Cerritos Corporate Dr, Suite B
Cerritos, CA 90703
(562) 802-7345

4. Diesel Fuel Return Pump

Number: 1
Manufacturer: Oberdorfer Pumps, Inc.
P.O. Box 4770
Syracuse, NY 13221
(800) 448-1668
Model: 3000R
Size: 3/8-inch x 3/8-inch
Type: Rotary Gear
Type of Seal: Positive Spring-Loaded Buna Lip
Seal
Capacity: 7.0 gpm @ 20 ft. TDH of water
Supplier: Hawthorne Power Systems
8050 Othello Ave.
San Diego, CA 92111
(619) 974-6800

Local Representative: RF Partridge and Associates
13875 Cerritos Corporate Dr, Suite B
Cerritos, CA 90703
(562) 802-7345

5. Diesel Fuel Return Pump Motor

Number: 1
Manufacturer: Marathon Electric
P.O. Box 8033
Wausau, WI 54401
(715) 675-3311
Model: V56T17F5300
Horsepower: 0.5
RPM: 1800
Service: 3 phase, 60 hz, 460 v
Enclosure: TEFC, Explosion Proof
Insulation: Class F
Service Factor: 1.15
NEMA Design: Class B
Supplier: Hawthorne Power Systems
8050 Othello Ave.
San Diego, CA 92111
(619) 974-6800
Local Representative: RF Partridge and Associates
13875 Cerritos Corporate Dr, Suite B
Cerritos, CA 90703
(562) 802-7345

6.12.4 Mobile Standby Generator No. 2

1. Alternator No. 2

Number: 1
Manufacturer: Marathon Electric
P.O. Box 8033
Wausau, WI 54401
(715) 675-3311
Rating with Accessories: 2000 kW, 2500 kVA, 12 kV
RPM: 1800
Power Factor: 0.8
Service: 3 Phase, 60 Hz
Type: Ext. Voltage regulated, Brushless
Construction: Double Bearings
Insulation: Class F
Enclosure: Self-Ventilated and Drip-proof

- | | | |
|----|--|--|
| | Local Representative: | W.W. Williams
2602 South 19 th Avenue
Phoenix, AZ 85009-9127
Phone: (602) 257-0561 |
| A. | Pilot Exciter
Manufacture:
Model:
Type: | Marathon Electric
MagnaPower 1020FDH5582
Permanent Magnet |
| B. | Voltage Regulator
Manufacture:
Model:
Type: | Marathon Electric
DVR 2000E
Solid State |
2. Engine No. 2
- | | | |
|--|-----------------------|---|
| | Number: | 1 |
| | Manufacturer: | MTU Detroit Diesel
100 Power Drive
Mankato, MN 56001
(507) 625-7973 |
| | Model: | 2000-XC6DT2 Base |
| | Engine Model: | 16V4000 G43 |
| | Engine Type: | Diesel Driven Four-Stroke-Cycle,
16- Valve |
| | Local Representative: | W.W. Williams
2602 South 19 th Avenue
Phoenix, AZ 85009-9127
(602) 257-0561 |
- A. Starting System
- | | | |
|----|--|--|
| 1. | Batteries
Manufacturer:
Model:
Voltage:
Type: | MTU Onsite Energy
EXIDE Commercial Battery
12-24 VDC
COM-8D-P |
| 2. | Remote-Mounted Battery Charger
Manufacturer:
Model:
Type: | SENS
EnerGenius NRG24-20-RC
Automatic 20 amp Float Charger |

3. Battery Charging Alternator
Manufacturer: MTU Onsite Energy
Model: PD-1080
Type: Automatic, 35 amp
- B. Cooling System
Manufacturer: IEA, Inc.
Model: ECX46
Type: Liquid Filled Radiator with Cooling Fan
Fluid: 50/50 Ethylene Glycol/Water
Fan Diameter: 78-inch
- C. Jacket Water heaters
Manufacturer: Kim Hotstart Mfg.
Parameters: 6 kW, 4240 V
- D. Exhaust System
Manufacturer: MTU Onsite Energy
Type: 2 exhaust bellows 90°, 2 axial compensators with gaskets and companion flanges
- E. Fuel System
Manufacturer: MTU Onsite Energy
Fuel Type: Diesel Fuel Oil #2
Capacity: 147 Gallons per Hour at 100 percent Load
- F. Electronic Governor
Manufacturer: ADEC
Model: ECU-7
Type: Solid State Electro-Mechanical
- G. Lubrication System
Manufacturer: MTU Onsite Energy
Type: Closed crankcase breather system

6.12.5 Diesel Fuel Storage Tank No. 2

1. Diesel Fuel Storage Tank

Number: 1
Manufacturer: Con Vault, Inc.
4109 E. Zeering Rd.
Denair, CA 95316

Type:	(800) 222-7099 Welded Carbon Steel with Concrete Encasement
Capacity:	10,000 gallons
Supplier:	Core Engineering Solutions 620 Herndon Parkway, Suite 120 Herndon, VA 20170 (800) 628-5502
Local Representative:	W.W. Williams 2602 South 19 th Avenue Phoenix, AZ 85009-9127 (602) 257-0561

6.12.6 Diesel Fuel Transfer Pump Station No. 2

1. Diesel Fuel Transfer Pumps

Number:	2
Manufacturer:	Oberdorfer Pumps 5900 Firestone Drive Syracuse, NY 13321 (800) 448-1668
Model:	N3000R
Size:	3/8-inch x 3/8-inch
Type:	Rotary Gear
Type of Seal:	Positive Spring-Loaded Buna Lip Seal
Capacity:	4.0 gpm @ 10 ft. TDH of water
Supplier:	W.W. Williams 2602 South 19 th Avenue Phoenix, AZ 85009-9127 (602) 257-0561
Local Representative:	W.W. Williams 2602 South 19 th Avenue Phoenix, AZ 85009-9127 (602) 257-0561

2. Diesel Fuel Transfer Pump Motors

Number:	2
Manufacturer:	Clearwater Tech 1025 Exchange Street Boise, ID 83716 (800) 894-0412
Model:	Leeson 101647

Horsepower:	0.33
RPM:	1725
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC, Explosion Proof
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	Core Engineering Solutions 620 Herndon Parkway, Suite 120 Herndon, VA 20170 (800) 628-5502
Local Representative:	W.W. Williams 2602 South 19 th Avenue Phoenix, AZ 85009-9127 (602) 257-0561

3. Diesel Fuel System Day Tank and Overflow Tanks

Number:	2
Manufacturer:	Simplex 5300 Rising Moon Rd Springfield, IL 62711 (217) 483-1600
Models:	25 gallon – UL142 300 gallon – UL142
Type:	Double-Wall secondary containment
Dimensions:	25 gallon – 24-inch W x 20-inch D x 26-inch H 300 gallon – 32 inch W x 78-inch D x 48-inch H
Supplier:	Core Engineering Solutions 620 Herndon Parkway, Suite 120 Herndon, VA 20170 (800) 628-5502
Local Representative:	W.W. Williams 2602 South 19 th Avenue Phoenix, AZ 85009-9127 (602) 257-0561

4. Diesel Fuel Return Pump

Number:	1
Manufacturer:	Haight Pumps 133 Enterprise Street Evansville, WI 53536 (800) 871-9250
Model:	8U
Size:	3/8-inch x 3/8-inch

Type:	Rotary Gear
Type of Seal:	Positive Spring-Loaded Buna Lip Seal
Capacity:	7.0 gpm @ 15 ft. TDH of water
Supplier:	Core Engineering Solutions 620 Herndon Parkway, Suite 120 Herndon, VA 20170 (800) 628-5502
Local Representative:	W.W. Williams 2602 South 19 th Avenue Phoenix, AZ 85009-9127 (602) 257-0561

5. Diesel Fuel Return Pump Motor

Number:	1
Manufacturer:	Clearwater Tech 1025 Exchange Street Boise, ID 83716 (800) 894-0412
Model:	Leeson 100961
Horsepower:	0.5
RPM:	1725
Service:	3 phase, 60 hz, 460 v
Enclosure:	TEFC, Explosion Proof
Insulation:	Class F
Service Factor:	1.15
NEMA Design:	Class B
Supplier:	Core Engineering Solutions 620 Herndon Parkway, Suite 120 Herndon, VA 20170 (800) 628-5502
Local Representative:	W.W. Williams 2602 South 19 th Avenue Phoenix, AZ 85009-9127 (602) 257-0561

6.13 COLLECTION AND CONVEYANCE FACILITIES

6.13.1 Diversion Structures

1. Canyon del Sol Vortex Valve

Number:	1
Manufacturer:	H.I.L. Technology, Inc. 94 Hutchins Drive Portland, ME 04102 (207) 756-6200
Model:	Reg-U-Flo, Type C
Outlet Diameter:	10.50 inches
Design Head:	4.0 feet
Design Flow:	3.09 cubic feet/second
Features:	Pivoting by-pass door

2. Silva Drain Vortex Valve

Number:	1
Manufacturer:	H.I.L. Technology, Inc. 94 Hutchins Drive Portland, ME 04102 (207) 756-6200
Model:	Reg-U-Flo, Type CH
Outlet Diameter:	8.02 inches
Design Head:	4.0 feet
Design Flow:	1.54 cubic feet/second
Features:	Pivoting by-pass door

6.13.2 Conveyance Pipelines - No equipment.

6.13.3 Goat Canyon Pump Station

6.13.3.1 Lift Pumps

1. Sewage Lift Pumps P-1 and P-2

Number:	2
Manufacturer:	Ebara International Corporation 1651 Cedar Line Drive Rock Hill, SC 29730 (803) 327-5005
Model:	150DSC3-G0852-1760
Type:	Submersible, centrifugal, non-clog

Type of Seal:	Mechanical tandem (cartridge type)
Size:	6-inch discharge
Capacity:	1835 gpm @ 105' TDH
Special Features:	Guide rail lifting system
Supplier:	Pacific Process Equipment 1124 N. Brand Ave., Suite 200 Glendale, CA 91202 (818) 500-9495
Local Representative:	Pacific Process Equipment 1124 N. Brand Ave., Suite 200 Glendale, CA 91202 (818) 500-9495

2. Sewage Lift Pumps P-1 and P-2 Motors

Number:	2 (1 per pump)
Manufacturer:	Ebara International Corporation 1651 Cedar Line Drive Rock Hill, SC 29730 (803) 327-5005
Model:	150DSC3-G0852-1760
Type:	Submersible, Induction Motor
Horsepower:	75
RPM:	1760
Special Features:	Variable Frequency Drive
Service:	3 phase/60 Hertz/460 volts
Enclosure:	EXP PRF
Temperature Rating:	Ambient
Insulation:	Class F
Service Factor:	1.15
Supplier:	Pacific Process Equipment 1124 N. Brand Ave., Suite 200 Glendale, CA 91202 (818) 500-9495
Local Representative:	Pacific Process Equipment 1124 N. Brand Ave., Suite 200 Glendale, CA 91202 (818) 500-9495

3. Sewage Lift Pumps P-3 and P-4

Number:	2
Manufacturer:	Ebara International Corporation 1651 Cedar Line Drive Rock Hill, SC 29730

	(803) 327-5005
Model:	200DSC3-E1052-1760
Type:	Submersible, centrifugal, non-clog, sewage
Type of Seal:	Mechanical tandem (cartridge type)
Size:	8-inch discharge
Capacity:	3085 gpm @ 70' TDH
Special Features:	Guide rail lifting system
Supplier:	Pacific Process Equipment 1124 N. Brand Ave., Suite 200 Glendale, CA 91202 (818) 500-9495
Local Representative:	Pacific Process Equipment 1124 N. Brand Ave., Suite 200 Glendale, CA 91202 (818) 500-9495

4. Sewage Lift Pumps P-3 and P-4 Motors

Number:	2 (1 per pump)
Manufacturer:	Ebara International Corporation 1651 Cedar Line Drive Rock Hill, SC 29730 (803) 327-5005
Model:	200DSC3-E1052-1760
Type:	Submersible, Induction Motor
Horsepower:	75
RPM:	1760
Special Features:	Variable Frequency Drive
Service:	3 phase/60Hertz/460 volts
Enclosure:	EXP PRF
Temperature Rating:	Ambient
Insulation:	Class F
Service Factor:	1.15
Supplier:	Pacific Process Equipment 1124 N. Brand Ave., Suite 200 Glendale, CA 91202 (818) 500-9495
Local Representative:	Pacific Process Equipment 1124 N. Brand Ave., Suite 200 Glendale, CA 91202 (818) 500-9495

5. Sump Pumps

Number: 2
Manufacturer: Ebara International Corporation
1651 Cedar Line Drive
Rock Hill, SC 29730
(803) 327-5005
Model: DVFU
Type: Submersible, Vortex, Duplex Control
Type of Seal: Double Mechanical, Type A-25
Size: 2-inch discharge
Capacity: 119 gpm @ 9.9' TDH
Special Features: Guide rail lifting system
Speed: 1800 rpm
Supplier: Pacific Process Equipment
1124 N. Brand Ave., Suite 200
Glendale, CA 91202
(818) 500-9495
Local Representative: Pacific Process Equipment
1124 N. Brand Ave., Suite 200
Glendale, CA 91202
(818) 500-9495

6. Sump Pump Motors

Number: 2 (1 per pump)
Manufacturer: Ebara International Corporation
1651 Cedar Line Drive
Rock Hill, SC 29730
(803) 327-5005
Model: 80DVFU61.5
Type: Air filled, submersible
Horsepower: 2
RPM: 1740
Service: 3 phase/60 Hertz/460 volts
Enclosure: EXP PRF
Temperature Rating: 40° C Max. Water
Insulation: Class F
Service Factor: 1.15
Supplier: Pacific Process Equipment
1124 N. Brand Ave., Suite 200
Glendale, CA 91202
(818) 500-9495
Local Representative: Pacific Process Equipment
1124 N. Brand Ave., Suite 200
Glendale, CA 91202

(818) 500-9495

7. Well Water Supply Pump

Number: 1
Manufacturer: Grundfos Pumps Corporation
3131 N. Business Park Avenue
Fresno, CA 93727
(800) 333-1366
Model: 75S75-12
Type: Submersible
Size: 2-inch discharge
Capacity: 75 gpm @ 260 feet TDH
Speed: 3450
Supplier: Fain Pump Company, Inc.
12029 Old Castle Road
Valley Center, CA 92082
(619) 749-4211
Local Representative: Fain Pump Company, Inc.
12029 Old Castle Road
Valley Center, CA 92082
(619) 749-4211

8. Well Water Supply Pump Motor

Number: 1
Manufacturer: Franklin Electric
400 E. Spring Street
Bluffton, Indiana 46714
(219) 824-2900
Model: 4-inch
Type: Submersible, High Thrust
Horsepower: 7.5
Service: 3 phase/60 Hertz/460 volts
Enclosure: Submersible
Temperature Rating: 30° C Water
Supplier: Fain Pump Company, Inc.
12029 Old Castle Road
Valley Center, CA 92082
(619) 749-4211
Local Representative: Fain Pump Company, Inc.
12029 Old Castle Road
Valley Center, CA 92082
(619) 749-4211

9. Well Water Supply Tank

Number:	1
Manufacturer:	Amtrol, Inc. 1400 Division Road West Warwick, RI 02893 (401) 884-6300
Model:	WELL-X-TROL, WX-350
Type:	Pre-pressurized, Hydro-pneumatic
Material:	Steel
Diameter:	26-inches
Height:	61 7/8-inches
Capacity:	119 gallons
Pressure Range:	60 to 80 psig
Supplier:	Fain Pump Company, Inc. 12029 Old Castle Road Valley Center, CA 92082 (619) 749-4211
Local Representative:	Fain Pump Company, Inc. 12029 Old Castle Road Valley Center, CA 92082 (619) 749-4211

6.13.3.2 Surge Control System

1. Surge Arrester SA-1

Application:	Surge control for 12" force main
Number:	1
Manufacturer:	Young Engineering Manufacturing, Inc. 132 W. Chestnut Ave. Monrovia, CA 91016 (626) 359-6262
Diameter:	6'-0"
Shell Length:	8'-3"
Overall Length:	11'-3"
Capacity:	280 cubic ft
Max. Flow:	2435 gpm
Design Head:	106.25 ft
Max. Allowed Pressure:	40 psig
Max. Working Pressure:	100 psi @ 200°F
Type:	Horizontal, hydropneumatic surge tank
Materials:	Carbon Steel
Inlet/Outlet Connection:	6-inches
Level Control:	Manual

Supplier:	Young Engineering Manufacturing, Inc. 132 W. Chestnut Ave. Monrovia, CA 91016 (626) 359-6262
Local Representative:	Young Engineering Manufacturing, Inc. 132 W. Chestnut Ave. Monrovia, CA 91016 (626) 359-6262

2. Surge Arrester SA-2

Application:	Surge control for 16" force main
Number:	1
Manufacturer:	Young Engineering Manufacturing, Inc. 132 W. Chestnut Ave. Monrovia, CA 91016 (626) 359-6262
Diameter:	7'-0"
Shell Length:	12'-4"
Overall Length:	15'-11"
Capacity:	550 cubic ft
Max. Flow:	4,000 gpm
Design Head:	68 ft
Max. Allowed Pressure:	24 psig
Max. Working Pressure:	100 psi @ 200°F
Type:	Horizontal, hydropneumatic surge tank
Materials:	Carbon Steel
Inlet/Outlet Connection:	8-inches
Level Control:	Manual
Supplier:	Young Engineering Manufacturing, Inc. 132 W. Chestnut Ave. Monrovia, CA 91016 (626) 359-6262
Local Representative:	Young Engineering Manufacturing, Inc. 132 W. Chestnut Ave. Monrovia, CA 91016 (626) 359-6262

6.13.3.3 Odor Reduction Station

1. Odor Reduction Blower

Number:	1
Manufacturer:	The New York Blower Company 171 Factory Street

Model:	La Porte, IN 46350-2699 RFE-315
Type:	FRP, Radial Fume Exhauster (RFE)
Size:	315 FRP
Capacity:	670 cfm @ 5-inch static pressure
Speed:	2297 rpm
Supplier:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568
Local Representative:	Florida Blower, Inc. P.O. Box 47518 St. Pete, Florida 33743 (813) 347-0934

2. Odor Reduction Blower Motor

Number:	1
Manufacturer:	Baldor Electric 5711 RS Boreham Jr. St. Fort Smith AR 72901-8394 (501) 646-4711
Frame:	1457
Horsepower:	2.0
RPM:	1725
Service:	3 phase, 60 hertz, 230/460 volt
Enclosure:	Explosion Proof
Temperature Rise:	Class B Rise in 50°C Ambient
Insulation:	Class F
Service Factor:	1.00
NEMA Design:	B
Supplier:	The New York Blower Company 171 Factory Street La Port, IN 46350-2699
Local Representative:	The New York Blower Company 171 Factory Street La Port, IN 46350-2699

3. Odor Reduction Scrubber

Number:	1
Manufacturer:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568

Type:	Triplex Air Scrubber, Vertical, Counter-Flow, Multi-Stage, Packed-Bed
Material:	HDXLPE
Size:	18" X 21" X 7' High (each module)
Capacity:	670 cfm
Inlet H ₂ S:	25 ppm
Removal Efficiency:	99%, min.
Pressure Drop:	5-inch w.c., max.
Supplier:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568
Local Representative:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568

4. Packing Media

Material:	Corrosion Resistant Polyethylene
Manufacturer:	Jaeger Products, Inc. 1611 Peach Leaf Houston, TX 77039 (713) 449-9500
Type:	Tri-Packs, No.1
Bed Size:	4' (each stage)
Packing Size:	2" (nominal)
Supplier:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568
Local Representative:	Jaeger Products, Inc. 1611 Peach Leaf Houston, TX 77039 (713) 449-9500

5. Odor Reduction pH Controller

Number:	1
Manufacturer:	Great Lakes Instruments 9020 West Dean Road Milwaukee, WI 53324 (414) 355-3601
Types:	pH Sensor - LCP-encapsulated

pH Analyzer - Model 672P
 Supplier: U.S. Filter / Davis Process
 42030 Avenida Alvarado, Suite G
 Temecula, California 92590
 (800) 566-1568
 Local Representative: Great Lakes Instruments
 9020 West Dean Road
 Milwaukee, WI 53224
 (414) 355-3601

6. Odor Reduction ORP Controller

Number: 1
 Manufacturer: Great Lakes Instruments
 9020 West Dean Road
 Milwaukee, WI 53224
 (414) 355-3601
 Types: ORP Sensor - LCP-encapsulated
 ORP Analyzer- Model 672R
 Supplier: U.S. Filter / Davis Process
 42030 Avenida Alvarado, Suite G
 Temecula, California 92590
 (800) 566-1568
 Local Representative: Great Lakes Instruments
 9020 West Dean Road
 Milwaukee, WI 53224
 (414) 355-3601

7. Odor Reduction Recirculation Pumps

Number: 3
 Manufacturer: Serfilco, Ltd.
 1777 Shermer Road
 Northbrook, IL 60062-5360
 (847) 559-1777
 Model: HC1 x 3/4 CK 2V(M2)-C.75
 Type: Horizontal, Centrifugal
 Type of Seal: Single Mechanical, Type 21 (M2)
 Size: 3/4 inch discharge
 Capacity: 35 gpm @ 47' TDH (Max)
 Speed: 3450 rpm
 Supplier: U.S. Filter / Davis Process
 42030 Avenida Alvarado, Suite G
 Temecula, California 92590
 (800) 566-1568

Local Representative: Serfilco, Ltd.
13721 Alma Avenue
Gardena, CA 90249-2513
(310) 532-0801

8. Odor Reduction Recirculation Pump Motors

Number: 3 (one per pump)
Manufacturer: Serfilco, Ltd.
1777 Shermer Road
Northbrook, IL 60062-5360
(847) 559-1777
Model: A6C34FC27F
Type: Split phase, continuous duty
Horsepower: 3/4
RPM: 3450
Service: 1 phase, 60 hertz, 115 volts
Enclosure: TEFC
Temperature Rating: 40°C Max. Ambient
Insulation: Class B4
Service Factor: 1.15
NEMA Design: B
Supplier: U.S. Filter / Davis Process
42030 Avenida Alvarado, Suite G
Temecula, California 92590
(800) 566-1568
Local Representative: Serfilco, Ltd.
13721 Alma Avenue
Gardena, CA 90249-2513
(310) 532-0801

9. Odor Reduction Chemical Metering Pumps

Number: 2
(1-NaOH, 1-NaOCl)
Manufacturer: Gorman-Rupp Pumps
305 Bowman Street
P.O. Box 1217
Mansfield, Ohio 44901-1217
(419) 755-1011
Model: 15907-001
Type: Positive Displacement, Single Bellows
Size: 1 inch

Bellows Material:	Kel-F
Capacity:	0.792 gph
Supplier:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568
Local Representative:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568

10. Odor Reduction Chemical Storage Tanks

Number:	2 (1-NaOH, 1-NaOCl)
Manufacturer:	Snyder-Crown Industrial Products 4700 Fremont Street PO Box 4583 Lincoln, NE 68504 (402) 467-5221
Type:	Cylindrical, Closed Top, Vertical
Material:	Polyethylene
Model:	300LV XL Grey
Size:	46 inch diameter x 4 ft high (nominal)
Capacity:	300 gallons (nominal)
Supplier:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568
Local Representative:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568

11. Odor Reduction Make-Up Water System

A. Water Conditioning System - Twin Softener

Number:	1
Manufacturer:	WM R. Hague, Inc. 4343 South Hamilton Road Groveport, OH 43125
Model:	9000 Econominder, Hydro-Clean System 24

Type: Ion Exchange, Twin Softener
Size: 2 vessels of 9" diameter x 48" high
Flowrate: 13 gpm @ 15 psi pressure drop
Drain Flow (Backwash Rate): 2 gpm
Supplier: Hague Quality Water
7075 Mission Gorge Road, Suite 1
San Diego, CA 92120
(619) 286-1188
Local Representative: Hague Quality Water
7075 Mission Gorge Road, Suite 1
San Diego, CA 92120
(619) 286-1188

B. Water Conditioning System - Brine Tank

Number: 1
Manufacturer: Clack Corporation
4462 Duraform Lane
PO Box 500
Windsor, WI 53598-0500
(608) 846-3010
Materials: HDPE
Size: 1 vessel of 18" diameter x 33" high
Salt Capacity: 375 lbs
Liquid Capacity: 36 gallons
Supplier: Clack Corporation
4462 Duraform Lane
PO Box 500
Windsor, WI 53598-0500
(608) 846-3010
Local Representative: Clack Corporation
4462 Duraform Lane
PO Box 500
Windsor, WI 53598-0500
(619) 582-1808

C. 1 (800) 755-3010 Water Treatment System

Number: 1
Manufacturer: Moore Solutions, Inc.
692 Walt Carmichael Road
Newnan, GA 30263
(404) 254-0003
Model: HK-40
Type: "Hydro-Kote", Anti-Scaling Unit

Special Features:	Media Delivery Head (MDH)
Flowrate:	1-20 gpm
Capacity:	40,000 gals/cartridge
Supplier:	U.S. Filter/Davis Process 42030 Avenida Alvarado, Suite G Temecula, CA 92590 (800) 566-1568
Local Representative:	U.S. Filter/Davis Process 42030 Avenida Alvarado, Suite G Temecula, CA 92590 (800) 566-1568

6.13.3.4 Standby Generator

1. Standby Generator Set

Number:	1
Manufacturer:	Kohler Power Systems 444 Highland Drive Kohler, WI 53044-1500 (920) 457-4441
Rating with Accessories:	350 kW, 438 kVA
Gen-Set Model:	350ROZD71
Controller:	16-Light Microprocessor Controller
Supplier:	Bay City Electric Works, Inc. 3375 Hancock Street San Diego, CA 92110-4399 (619) 298-6193
Local Representative:	Bay City Electric Works, Inc. 3375 Hancock Street San Diego, CA 92110-4399 (619) 298-6193

2. Generator

Number:	1
Manufacturer:	Marathon Electric 100 East Randolph Street Wausau, WI 54402-8003 (715) 675-3311
Generator Model:	Magnamax, 4M4019
Specification Number:	PA-13520-71
RPM:	1800

Power Factor: 0.8
Service: 3 phase, 60 Hz, 277/480 v
Type: 4-pole rotating field
Construction: Single Bearing, sealed
Insulation: Class H NEMA-MG1-1.66
Enclosure: Open drip-proof self ventilation
Temperature Rise: 130°C, 150° Standby

A) Pilot Exciter
Manufacturer: Marathon Electric
Model: "Fast Response" PMG Series
Type: Brushless Permanent Magnet

B) Voltage Regulator
Manufacturer: Marathon Electric
Model: DRV2000
Type: Solid State

3. Engine

Number: 1
Manufacturer: Detroit Diesel
10645 Studebaker Road
Downey, CA 90241
(310) 929-7016
Model: 8V-92TA
Specification Number: A347096
Engine Type: Diesel Driven, Two-Cycle,
Turbocharged, after cooled
8-Valve, 736 cu. in.

A) Starting System

- 1) Batteries
Manufacturer: Alcad
Model: XHP45
Voltage: 24 VDC
Type: Nickel Cadmium
- 2) Remote-Mounted Battery Charger
Manufacturer: SENS
Model: FCA24-20-2431
Type: Automatic 20 amp Float Charger
- 3) Battery Charging Alternator

	Manufacturer:	Detroit Diesel
	Model:	Series 92
	Type:	Automatic, 65 amp
B)	Cooling System	
	Manufacturer:	Detroit Diesel
	Type:	Liquid Filled Radiator with Cooling Fan
	Fluid:	50 percent Ethylene Glycol
	Fan hp:	28 hp
	Fan Diameter:	40-inch
	Capacity:	23.3 gal.
C)	Jacket Water Heaters	
	Manufacturer:	Kim Hotstart Mfg. Co.
	Model:	CB1252XX-000
	Parameters:	2500 W, 240 V
	Water Pump Type:	Centrifugal
	Water Flow:	160 gpm
	Water Capacity:	7.3 gallons
D)	Exhaust System	
	Manufacturer:	Hapco Engine Products
	Model:	5214-SFH-8
	Type:	Hospital Critical Silencing Muffler
E)	Lubrication System	
	Manufacturer:	Detroit Diesel
	Type:	Force Fed with Gear-Type Pump, Full Pressure
F)	Fuel System	
	Manufacturer:	Detroit Diesel
	Fuel Type:	Diesel Fuel Oil No. 2
	Fuel Consumption Rate:	27 Gallons per Hour at 100 Percent Load
	Governor:	Electronic, Isochronous
G)	Diesel Fuel Storage Tank	
	Manufacturer:	BN-Manufacturing
	Model:	BN 10291-774
	Type:	Double-Walled Base Tank
	Rated Capacity:	250 Gallons

4. Automatic Transfer Switch

Number:	1
Manufacturer:	Zenith Controls, Inc. 830 West 40 th Street Chicago, IL 60609 (773) 247-6400
Model:	ZTSDL, Delayed Transition
Power Panel Size:	600 amps
Control Panel Model:	MX200
Control Panel Type:	Microprocessed
Supplier:	Bay City Electric Works, Inc. 3375 Hancock Street San Diego, CA 92110-4399 (619) 298-6193
Local Representative:	Bay City Electric Works, Inc. 3375 Hancock Street San Diego, CA 92110-4399 (619) 298-6193

6.13.4 Hollister Street Pump Station

6.13.4.1 Sewage Lift Pumps

1. Sewage Lift Pumps P-1 and P-2

Number:	2
Manufacturer:	Ebara International Corporation 1651 Cedar Line Drive Rock Hill, SC 29730 (803) 327-5005
Model:	200DSC3-E1052-1760
Type:	Submersible, centrifugal, non-clog, sewage
Size:	8-inch discharge
Type of Seal:	Mechanical tandem (cartridge type)
Capacity:	2660 gpm @ 78' TDH
Special Features:	Guide rail lifting system
Supplier:	Pacific Process Equipment 1124 N. Brand Ave., Suite 200 Glendale, CA 91202

Local Representative: (818) 500-9495
Pacific Process Equipment
1124 N. Brand Ave., Suite 200
Glendale, CA 91202
(818) 500-9495

2. Sewage Lift Pumps P-1 and P-2 Motors

Number: 2 (1 per pump)
Manufacturer: Ebara International Corporation
1651 Cedar Line Drive
Rock Hill, SC 29730
(803) 327-5005
Model: 200DSC3-E1052-1760
Type: Submersible, Induction Motor
Horsepower: 100
RPM: 1760
Special Features: Variable Frequency Drive
Service: 3 Phase/60 Hertz/460 volts
Enclosure: EXP PRF
Temperature Rating: Ambient
Insulation: Class F
Service Factor: 1.15
Supplier: Pacific Process Equipment
1124 N. Brand Ave., Suite 200
Glendale, CA 91202
(818) 500-9495
Local Representative: Pacific Process Equipment
1124 N. Brand Ave., Suite 200
Glendale, CA 91202
(818) 500-9495

3. Sewage Lift Pumps P-3 and P-4

Number: 2
Manufacturer: Ebara International Corporation
1651 Cedar Line Drive
Rock Hill, SC 29730
(803) 327-5005
Model: 400DSC3-E1553-1175
Type: Submersible, centrifugal, non-clog,
sewage
Type of Seal: Mechanical tandem (cartridge type)
Capacity: 9750 gpm @ 61' TDH
Size: 16-inch discharge

Special Features: Guide rail lifting system
Supplier: Pacific Process Equipment
1124 N. Brand Ave., Suite 200
Glendale, CA 91202
(818) 500-9495

Local Representative: California Centrifugal Pump
2023 W. Collins Ave.
Orange, CA 92667
(714) 639-7771

4. Sewage Lift Pumps P-3 and P-4 Motors

Number: 2 (1 per pump)
Manufacturer: Ebara International Corporation
1651 Cedar Line Drive
Rock Hill, SC 29730
(803) 327-5005
Model: 400DSC3-D1553-1175
Type: Submersible, Induction Motor
Horsepower: 200
RPM: 1175
Service: 3 phase/60 Hertz/460 volts
Enclosure: EXP PRF
Temperature Rating: Ambient
Insulation: Class F
Service Factor: 1.15
Supplier: Pacific Process Equipment
1124 N. Brand Ave., Suite 200
Glendale, CA 91202
(818) 500-9495
Local Representative: Pacific Process Equipment
1124 N. Brand Ave., Suite 200
Glendale, CA 91202
(818) 500-9495

5. Sump Pumps

Number: 2
Manufacturer: Ebara International Corporation
1651 Cedar Line Drive
Rock Hill, SC 29730
(803) 327-5005
Model: DVFU
Type: Submersible, Vortex, Duplex Control

Type of Seal:	Double mechanical, Type A-25
Size:	2-inch discharge
Capacity:	95 gpm @ 13.75' TDH
Special Features:	Guide rail lifting system
Speed:	1800 rpm

Supplier:	Pacific Process Equipment 1124 N. Brand Ave., Suite 200 Glendale, CA 91202 (818) 500-9495
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Local Representative:	Pacific Process Equipment 1124 N. Brand Ave., Suite 200 Glendale, CA 91202 (818) 500-9495
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6. Sump Pump Motors

Number:	2 (1 per pump)
Manufacturer:	Ebara International Corporation 1651 Cedar Line Drive Rock Hill, SC 29730 (803) 327-5005

Model:	80DVFU61.5
Type:	Air filled, Submersible
Horsepower:	2
RPM:	1740
Service:	3 Phase/60 Hertz/460 volts
Enclosure:	EXP PRF
Temperature Rating:	40°C Max. Water
Insulation:	Class F
NEMA Design:	MG1 Design B
Supplier:	Pacific Process Equipment 1124 N. Brand Ave., Suite 200 Glendale, CA 91202 (818) 500-9495

Local Representative:	Pacific Process Equipment 1124 N. Brand Ave., Suite 200 Glendale, CA 91202 (818) 500-9495
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6.13.4.2 Surge Control System

1. Surge Arrester SA-1

Application:	Surge control for 16" force main
Number:	1
Manufacturer:	Young Engineering Manufacturing, Inc. 132 W. Chestnut Ave. Monrovia, CA 91016 (626) 359-6262
Diameter:	6'-0"
Shell Length:	8'-3"
Overall Length:	11'-3"
Capacity:	280 cubic ft
Max. Flow:	3680 gpm
Design Head:	96.22 ft
Max. Allowed Pressure:	33 psig
Max. Working Pressure:	125 psi @ 200°F
Type:	Horizontal, hydropneumatic surge tank
Materials:	Carbon Steel
Inlet/Outlet Connection:	8-inches
Level Control:	Automatic (1 phase/60 Hertz/110 volt)
Supplier:	Young Engineering Manufacturing, Inc. 132 W. Chestnut Ave. Monrovia, CA 91016 (626) 359-6262
Local Representative:	Young Engineering Manufacturing, Inc. 132 W. Chestnut Ave. Monrovia, CA 91016 (626) 359-6262

2. Surge Arrester SA-2

Application:	Surge control for 30" force main
Number:	1
Manufacturer:	Young Engineering Manufacturing, Inc. 132 W. Chestnut Ave. Monrovia, CA 91016 (626) 359-6262
Diameter:	8'-6"
Shell Length:	24'-4"
Overall Length:	28'-8"
Capacity:	1500 cubic ft
Max. Flow:	16,950 gpm
Design Head:	89.13 ft
Max. Allowed Pressure:	30 psig
Max. Working Pressure:	125 psi @ 200°F
Type:	Horizontal, hydropneumatic surge tank
Materials:	Carbon Steel

Inlet/Outlet Connection: 18-inches
Level Control: Automatic (1 phase/60 Hertz/110 volt)
Supplier: Young Engineering Manufacturing, Inc.
132 W. Chestnut Ave.
Monrovia, CA 91016
(626) 359-6262

Local Representative: Young Engineering Manufacturing, Inc.
132 W. Chestnut Ave.
Monrovia, CA 91016
(626) 359-6262

3. Surge Arrester Air Compressor

Number: 1
Manufacturer: Ingersoll-Rand
800 Beaty St. #C
Davidson, NC 28036-9000
(704) 896-4100
Model: Type T30 Model 2475, Simplex
Rating: 17.1 acfm @ 125 psig
Type: Single stage, two-cylinder, splash
lubricated
Supplier: U.S. Equipment, Inc.
1810 West Venice Blvd.
Los Angeles, CA 90006
(213) 733-4733
Local Representative: U.S. Equipment, Inc.
1810 West Venice Blvd.
Los Angeles, CA 90006
(213) 733-4733

4. Surge Arrester Air Compressor Motor

Number: 1
Manufacturer: Baldor Electric
5711 Rs. Boreham Jr. St.
Fort Smith AR 72901-8394
(501) 646-4711
Horsepower: 5
RPM: 1760
Service: 3 phase, 60 hertz, 460 volt
Enclosure: TEFC
Temperature Rise: 35°C @ F.L.

Insulation: Class F
Service Factor: 1.15
NEMA Design: B
Supplier: U.S. Equipment, Inc.
1810 West Venice Blvd.
Los Angeles, CA 90006
(213) 733-4733

Local Representative: U.S. Equipment, Inc.
1810 West Venice Blvd.
Los Angeles, CA 90006
(213) 733-4733

5. Surge Arrester Air Compressor Receiver Tank

Number: 1
Manufacturer: Ingersoll-Rand
800 Beatty St., Suite C
Davidson, NC 28036-9000
(704) 896-4100
Capacity: 80 gallons
Type: Horizontal, steel construction
Min Working Pressure: 150 psi
Supplier: Young Engineering Manufacturing, Inc.
132 W. Chestnut Ave.
Monrovia, CA 91016
(626) 359-6262
Local Representative: Young Engineering Manufacturing, Inc.
132 W. Chestnut Ave.
Monrovia, CA 91016
(626) 359-6262

6.13.4.3 Odor Reduction Station

1. Odor Reduction Blower

Number: 1
Manufacturer: The New York Blower Company
171 Factory Street
La Porte, IN 46350-2699
Model: RFE-315
Type: FRP, Radial Fume Exhauster (RFE)
Size: 315 RFE

Capacity:	1000 cfm @ 8-inch static pressure
Speed:	2951 rpm
Supplier:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568
Local Representative:	Florida Blower P.O. Box 47518 St. Pete, Florida 33743 (813) 347-0934

2. Odor Reduction Blower Motor

Number:	1
Manufacturer:	Siemens 1301 Avenue of the Americas New York NY 10019-6022 (212) 258-4000
Frame:	182T
Horsepower:	3.0
RPM:	1725
Service:	3 phase, 60 hertz, 230/460 volt
Enclosure:	Explosion Proof Severe Duty
Temperature Rise:	Class B
Insulation:	Class F
Service Factor:	1.00
NEMA Design:	B
Supplier:	The New York Blower Company 171 Factory Street La Porte, IN 46350-2699
Local Representative:	The New York Blower Company 171 Factory Street La Porte, IN 46350-2699

3. Odor Reduction Scrubber

Number:	1
Manufacturer:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568
Type:	Triplex Air Scrubber, Vertical, Counter-Flow, Multi-Stage, Packed- Bed,
Material:	HDXLPE
Size:	18" x 21" x 7' High (each module)

Capacity:	1000 cfm
Inlet H ₂ S:	25 ppm
Removal Efficiency:	99%, Min.
Pressure Drop:	8-inch w.c., max.
Supplier:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568

Local Representative:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568
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4. Packing Media

Material:	Corrosion Resistant Polyethylene
Manufacturer:	Jaeger Products, Inc. 1611 Peach Leaf Houston, TX 77039 (713) 449-9500
Type:	Tri-Packs, No.1
Bed Size:	4' (each stage)
Packing Size:	2" (nominal)
Supplier:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568
Local Representative:	Jaeger Products, Inc. 1611 Peach Leaf Houston, TX 77039 (713) 449-9500

5. Odor Reduction pH Controller

Number:	1
Manufacturer:	Great Lakes Instruments 9020 West Dean Road Milwaukee, WI 53224 (414) 355-3601
Types:	pH Sensor - LCP-encapsulated pH Analyzer - Model 672P
Supplier:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G

Local Representative: Temecula, California 92590
(800) 566-1568
Great Lakes Instruments
9020 West Dean Road
Milwaukee, WI 53224
(414) 355-3601

6. Odor Reduction ORP Controller

Number: 1
Manufacturer: Great Lakes Instruments
9020 West Dean Road
Milwaukee, WI 53224
(414) 355-3601
Type: ORP Sensor - LCP-encapsulated
ORP Analyzer - Model 672R
Supplier: U.S. Filter / Davis Process
42030 Avenida Alvarado, Suite G
Temecula, California 92590
(800) 566-1568
Local Representative: Great Lakes Instruments
9020 West Dean Road
Milwaukee, WI 53224
(414) 355-3601

7. Odor Reduction Recirculation Pumps

Number: 3
Manufacturer: Serfilco, Ltd.
1777 Shermer Road
Northbrook, IL 60062-5360
(847) 559-1777
Model: HC1 x 3/4 CK 02V (M2)-C.75
Type: Horizontal, Centrifugal
Type of Seal: Single Mechanical
Size: 3/4-inch discharge
Capacity: 35 gpm @ 47' TDH (Max)
Speed: 3450 rpm
Supplier: U.S. Filter / Davis Process
42030 Avenida Alvarado, Suite G
Temecula, California 92590
(800) 566-1568

Local Representative: Serfilco, Ltd.
13721 Alma Avenue
Gardena, CA 90249-2513
(310) 532-0801

8. Odor Reduction Recirculation Pump Motors

Number: 3 (one per pump)
Manufacturer: Serfilco, Ltd.
1777 Shermer Road
Northbrook, IL 60062-5360
(847) 599-1777
Model: A6C34FC27F
Type: Split phase, continuous duty, severe-chemical duty
Horsepower: 3/4
RPM: 3450
Service: 1 phase, 60 hertz, 115 volts
Enclosure: TEFC
Temperature Rating: 40°C Max. Ambient
Insulation: Class B4
Service Factor: 1.15
NEMA Design: B
Supplier: U.S. Filter / Davis Process
42030 Avenida Alvarado, Suite G
Temecula, California 92590
(800) 566-1568
Local Representative: Serfilco, Lt.
13721 Alma Avenue
Gardena, CA 90249-2513
(310) 532-0801

9. Odor Reduction Chemical Metering Pumps

Number: 2
(1-NaOH, 1-NaOCl)
Manufacturer: Gorman-Rupp Pumps
305 Bowman Street
PO Box 1217
Mansfield, Ohio 44901-1217
(419) 755-1011
Model: 15907-001

Type:	Positive Displacement, Single Bellows
Size:	1 inch
Bellows Material:	Kel-F
Capacity:	0.792 gph
Supplier:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568
Local Representative:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568

10. Odor Reduction Chemical Storage Tanks

Number:	2 (1-NaOH, 1-NaOCl)
Manufacturer:	Snyder-Crown Industrial Products 4700 Fremont Street PO Box 4583 Lincoln, NE 68504 (402) 467-5221
Type:	Cylindrical, Closed Top, Vertical
Material:	Polyethylene
Model:	300LV
Size:	46 inch diameter x 4 ft high
Capacity:	300 gallons (nominal)
Supplier:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568
Local Representative:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568

11. Odor Reduction Make-Up Water

A. Air Gap System

Number:	1
Manufacturer:	Aurora Pump 800 Airport Road North Aurora, IL 60542-1494 (630) 859-7000

Model: 681
Type: Simplex, Water Seal Unit
Size: 23-inch diameter x 36-inch high
Receiver: 50 gallon (nominal), galvanized steel
Supplier: U.S. Filter / Davis Process
42030 Avenida Alvarado, Suite G
Temecula, California 92590
(800) 566-1568
Local Representative: U.S. Filter / Davis Process
42030 Avenida Alvarado, Suite G
Temecula, California 92590
(800) 566-1568

B. Air Gap System Pump

Number: 1
Manufacturer: Aurora Pump
800 Airport Road
North Aurora, Illinois 60542-1494
(630) 859-7000
Model: 134(F)
Type: Turbine
Size: 1 inch
Capacity: 5 gpm @ 10' TDH
Supplier: U.S. Filter / Davis Process
42030 Avenida Alvarado, Suite G
Temecula, California 92590
(800) 566-1568
Local Representative: U.S. Filter / Davis Process
42030 Avenida Alvarado, Suite G
Temecula, California 92590
(800) 566-1568

C. Air Gap System Pump Motor

Number: 1
Manufacturer: Aurora Pump
800 Airport Road
North Aurora, Illinois 60542-1494
(630) 859-7000
Model: 4VD56T17F5502DP
Type: TS
Horsepower: 1/2
RPM: 1725
Service: 3 phase/60 Hertz/460 volts

Enclosure:	TEFC
Temperature Rating:	40°C Ambient
Insulation:	Class B3
Service Factor:	1.15
NEMA Factor:	B
Supplier:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568
Local Representative:	U.S. Filter / Davis Process 42030 Avenida Alvarado, Suite G Temecula, California 92590 (800) 566-1568

D. Water Treatment System

Number:	1
Manufacturer:	Moore Solutions, Inc. 692 Walt Carmichael Road Newnan, GA 30263 (404) 254-0003
Model:	HK-40
Type:	“Hydro-Kote”, Anti-Scaling Unit
Special Features:	Media Delivery Head (MDH)
Capacity:	1-20 gpm
Water Treatment Capability:	40,000 gals/cartridge
Supplier:	U.S. Filter/Davis Process 42030 Avenida Alvarado, Suite G Temecula, CA 92590 (800) 566-1568
Local Representative:	U.S. Filter/Davis Process 42030 Avenida Alvarado, Suite G Temecula, CA 92590 (800) 566-1568

6.13.4.4 Standby Generator

1. Standby Generator Set

Number:	1
Manufacturer:	Kohler Power Systems 444 Highland Drive Kohler, WI 53044-1500 (920) 565-3381
Rating with Accessories:	600 kW, 750 kVA
Gen-Set Model:	600ROZD

Controller:	16-Light Microprocessor Controller
Supplier:	Bay City Electric Works, Inc. 3375 Hancock Street San Diego, CA 92110-4399 (619) 298-6193
Local Representative:	Bay City Electric Works, Inc. 3375 Hancock Street San Diego, CA 92110-4399 (619) 298-6193

2. Generator

Number:	1
Manufacturer:	Marathon Electric 100 East Randolph Street Wausau, WI 54402-8003 (715) 675-3311
Generator Model:	Magnamax, 5M4032
Specification Number:	PA-132547-71
RPM:	1800
Power Factor:	0.8
Service:	3 phase, 60 Hz, 277/480 v
Type:	4-pole rotating field
Construction:	Single Bearing, sealed
Insulation:	Class H NEMA-MG1-1.66
Enclosure:	Open drip-proof self ventilation
Temperature Rise:	130°C, 150° Standby

A)	Pilot Exciter	
	Manufacturer:	Marathon Electric
	Model:	“Fast Response” PMG Series
	Type:	Brushless, Permanent Magnet

B)	Voltage Regulator	
	Manufacturer:	Marathon Electric
	Model:	DRV2000
	Type:	Solid State

3. Engine

Number: 1
Manufacturer: Detroit Diesel
10645 Studebaker Road
Downey, CA 90241
(310) 929-7016
Model: 12V-92TA
Engine Type: Diesel Driven Two-Cycle,
Turbocharged, After-cooled,
12-Valve, 1104 cu. in.

A) Starting System

- 1) Batteries
Manufacturer: Alcad
Model: XHP70
Voltage: 24 VDC
Type: Nickel Cadmium (Nicad)
- 2) Remote-Mounted Battery Charger
Manufacturer: SENS
Model: FCA24-20-2431
Type: Automatic 20 amp Float Charger
- 3) Battery Charging Alternator
Manufacturer: Detroit Diesel
Model: Series 92
Type: Automatic, 65 amp

B) Cooling System

Manufacturer: Detroit Diesel
Type: Liquid Filled Radiator with Cooling
Fan
Fluid: 50 percent Ethylene Glycol
Fan hp: 39 hp
Fan Diameter: 52-inch
Capacity: 33.75 gal

- | | | |
|----|--------------------------|--|
| C) | Jacket Water Heaters | |
| | Manufacturer: | Kim Hotstart Mfg. Co. |
| | Model: | CE1402XX-000 |
| | Parameters: | 4000 W, 240 V |
| | Water Pump Type: | Centrifugal |
| | Water Flow: | 232 gpm |
| | Water Capacity: | 12.75 gallons |
| D) | Exhaust System | |
| | Manufacturer: | Hapco Engine Products |
| | Model: | 6616-SFH-8x8x12 |
| | Type: | Hospital Critical Silencing Muffler |
| E) | Lubrication System | |
| | Manufacturer: | Detroit Diesel |
| | Type: | Force Fed with Gear-Type Pump, Full Pressure |
| F) | Fuel System | |
| | Manufacturer: | Detroit Diesel |
| | Fuel Type: | Diesel Fuel Oil No. 2 |
| | Full Consumption Rate: | 48 Gallons per Hour at 100 Percent Load |
| | Governor: | Electronic, Isochronous |
| G) | Diesel Fuel Storage Tank | |
| | Manufacturer: | BN-Manufacturing |
| | Model: | BN 10292-775 |
| | Type: | Double-Walled Base Tank |
| | Rated Capacity: | 400 Gallons |

4. Automatic Transfer Switch

Number:	1
Manufacturer:	Zenith Controls, Inc. 830 West 40 th Street Chicago, IL 60609 (773) 247-6400
Model:	ZTSDL, Delayed Transition
Power Panel Size:	600 amps
Control Panel Model:	MX200
Control Panel Type:	Microprocessed
Supplier:	Bay City Electric Works, Inc. 3375 Hancock Street San Diego, CA 92110-4399

Local Representative: (619) 298-6193
Bay City Electric Works, Inc.
3375 Hancock Street
San Diego, CA 92110-4399
(619) 298-6193

Chapter 7

EMERGENCY RESPONSE AND SAFETY PROCEDURES

NOTICE AND CAUTIONS TO USERS OF THIS O&M MANUAL

This O&M Manual provides a general overview only of the South Bay International Wastewater Treatment Plant (SBIWTP).

This O&M Manual relies on information obtained from the various equipment manufactures and the Construction Contractors that were involved in construction of the SBIWTP. The information obtained from equipment manufacturers and construction Contractors was reviewed by Malcolm Pirnie only for general compliance with the submittal requirements specified in construction Contract Documents.

All USERS of this O&M Manual shall be required to consult the detailed O&M Manuals provided by the equipment manufactures and Construction Contractors and to understand and follow the directions given therein for safe operation and maintenance of all equipment and systems prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all safety manuals published and provided by their employer(s) and to understand and follow all directions given therein, including but not limited to *Personnel Protective Equipment (PPE), Electrical Lock-Out Procedures, Fall Prevention Procedures and Confined Space Entry Procedures* prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to consult all “record” drawings and to understand how equipment and systems are intended to be operated and controlled prior to operation and/or maintenance of all equipment and systems.

All USERS of this O&M Manual shall be required to understand and acknowledge that the SBIWTP contains chemicals and equipment that if not operated and/or maintained in a responsible and safe manner can result in serious injury or death.

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7.1 EMERGENCY RESPONSE PROCEDURES

7.1.1 General

From time to time, conditions will occur which will require emergency action on the part of the operator to keep the plant in effective operation. Keeping in mind that there are strict requirements for Effluent disposal, which prohibit bypassing the plant under any condition, the operator must handle all emergencies in a safe manner with the least possible loss in plant effectiveness.

Wastewater treatment plant operations consist, normally, of daily corrections and adjustments of a minor nature to make the treatment process responsive to wastewater characteristics. However, breakdowns in process facilities or equipment and unusual changes in wastewater strength do occur which require immediate and beyond normal action by personnel to keep the plant in effective operation. The more thoroughly acquainted with plant capabilities, the better the operator is prepared to deal with major operating problems or emergencies.

Should an emergency situation occur **"DO NOT PANIC,"** a clear head is very important in the handling of any emergency. The operator(s) on duty should assess the situation, decide on the course to follow, and then carry out the plans in an orderly, controlled manner and safe manner. The general information presented in the following section is presented to aid the Operator in answering emergencies; however, it should be remembered that the Operator(s) is the only one who can assess the situation as it occurs. Therefore, should the Operator feel that a change in procedure is justified due to the events as they happen, he should recommend the changes required to the Operations Supervisor before proceeding with any action.

- All users of this manual and the general information presented in this chapter are directed to "NOTICE AND CAUTIONS TO USERS OF THIS O&M MANUAL" that is included at the beginning of this manual and at the beginning of each chapter.
- All users of this manual are directed to Chapter 1, Section 1.2 for additional notes and cautions.

7.1.2 Alarms

Generally, situations that cause an alarm to occur are annunciated on the equipment Local Control Panels (LCP), at the various Local Control Centers (LCC) and at the plant wide SCADA System.

Alarms for the plant are defined in Section 4 of this O&M Manual for the various system processes. The Operator is encouraged to read and study Section 4 to gain a clear understanding of the alarms associated with the plant.

7.1.3 Emergency Conditions

Emergency conditions and the recommended responses are generally outlined below for reference and for the Operator's convenience. The general pattern for response actions for an emergency condition is as follows:

1. Receive notice of emergency or impending emergency.
2. Investigate.
3. Assess the severity of the situation (including threat to public safety, public health, water supplies, other water uses, etc.).
4. Determine response course of action and implement appropriate emergency plan after review with and approval from your supervisor.
5. Follow appropriate notification schedule depending upon type of emergency.
6. After emergency is under control, notify the appropriate agencies.

7.1.4 Power Failure

Power failure or disruption of power supply from San Diego Gas and Electric Company will be alarmed on the SCADA System and appropriate LCP's and confirmed when either all electrical driven equipment shuts down, and/or the emergency generator start.

Upon loss of utility power, the standby generators will automatically start and via the generator switchgear GDB power up plant main switchgear MS-1 which, in turn, will power up 480V switchgears and MCC's throughout the plant. See Figure 2.12-2 Plant

Partial One-Line Diagram, Figure 2.12-3 Standby Power Partial One-Line Diagram and Figure 2.12-4 Plant Power Block Diagram.

7.1.4.1 Utility Power Failure Sequence of Events

When utility power fails all equipment stops. PLC's throughout the plant block restarting of major critical equipment. When standby generated power is established on main switchgear MS-1 bus, the blocks are released in a timed sequence, enabling equipment for manual and/or automatic starting, as indicated in the following:

TIME	ACTION
0 seconds (utility power failure)	PLC timing programs shall start. PLCs shall disable the interlocked equipment. 12KV Main Circuit Breaker "A" shall remain closed. 12KV Feeder Breaker "A1" and/or "B1" shall remain closed. 12KV Generator Feeder Breakers "A6" and "B6" shall remain closed. 12KV Generator Feeder Breaker "A7" and/or "B7" shall remain closed. Open all remaining 12KV Feeder Breakers. Start Generator 1 and Generator 2.
0 seconds	Enable NPWPS-2 Lead Jockey Pump (PLC) Enable NPWPS-2 Lead Pump (PLC). Enable NPWPS-2 Lag Pump (PLC). Lag2 NPW Pumps and Standby RAS Pumps are not listed specifically, but shall be enabled at the same time as the corresponding lag units. Any equipment not specifically listed will be enabled immediately. Depending on the control logic governing that specific equipment, it shall either start running immediately based on the control logic for automatic control, or shall require a manual restart from the SCADA system.
30 seconds	Has utility power been restored? <u>If yes:</u> Restart Sequence begins in 10 seconds. <u>If no:</u> Main Circuit Breaker "A" opens. Generator Circuit Breaker G1 closes. Generator Circuit Breaker G2 closes. Generator tie breaker AGT or BGT closes (pre-selected by switch) to energize main 12KV switchgear with standby power.

40 seconds

The following previously opened 12KV Feeder Breakers close at 3 second intervals in the following order:

(Restart Sequence)

1	A4	(MSB)
(CRITICAL)		
2	B4	(MSB)
3	A2	(PST)
4	B2	(PST)
5	A3	(SP)
6	B3	(SP)
7	A5	(AST)
8	B5	(AST)

150 seconds	Enable Standby Process Air Blower (PLC-ASTN)
450 seconds	Enable Lead Secondary Channel Air Blower (PLC-ASTN)
460 seconds	Enable Lead VS RAS Pump (PLC)
465 seconds	Enable Lag VS RAS Pump (PLC)
470 seconds	Enable Lead CS RAS Pump (PLC)
475 seconds	Enable Lag CS RAS Pump (PLC)
480 seconds	Enable IMLR Pumps for AST Tanks 1 and 2 (PLC-ASTN)
485 seconds	Enable IMLR Pumps for AST Tanks 3 and 4 (PLC-ASTN)
490 seconds	Enable IMLR Pumps for AST Tanks 5 and 6 (PLC-ASTN)
495 seconds	Enable IMLR Pump for AST Tank 7 (PLC-ASTN) Enable Mixers for AST Tanks 1 and 2 (PLC-ASTN)
500 seconds	Enable Mixers for AST Tanks 3 and 4 (PLC-ASTN)
505 seconds	Enable Mixers for AST Tanks 5 and 6 (PLC-ASTN)
510 seconds	Enable Mixers for AST Tank 7 (PLC-ASTN)

535 seconds

Was utility power restored within the verification time period?

If yes: PLC's shall remove their disabling interlocks (and their timing program shall be reset) in 10 second intervals in the following order:

1. PLC-HWE
2. PLC-NaOCl
3. PLC-ORSP
4. PLC-ORUSS
5. PLC-ORPST
6. PLC-PSTE
7. PLC-SP
8. PLC-ORHW
9. PLC
10. PLC-PCC
11. PLC
12. PLC-12KV Switchgear

The generators shall continue to operate for **600 seconds** (with their circuit breakers open) and shall then begin their cool down program.

If no: Wait until the **1800 second** time setpoint for a status update.

1800 seconds

Has utility power been restored?

(Generator Minimum Run Time)

If no: Maintain interlocks until utility power is restored.

If yes: Generators shall synchronize to utility power.

Main Circuit Breaker "A" shall close.

Generator Circuit Breaker(s) shall open after the preset paralleling time period.

The generators shall begin their cool-down program.

Once standby power is no longer present and Main Circuit "A" has reclosed, PLCs shall remove their disabling interlocks (and their timing program shall be reset) in **10 second** intervals in the following order:

1. PLC-HWE
2. PLC-NaOCl
3. PLC-ORSP
4. PLC-ORUSS

5. PLC-ORPST
6. PLC-PSTE
7. PLC-SP
8. PLC-ORHW
9. PLC
10. PLC
11. PLC-12KV Switchgear
12. PLC-PCC

7.1.4.2 Primary Plant Restarting

In the primary plant all non-essential equipment and systems identified below which are not interlocked by the PLC logic will-restart or be re-enabled after the generators come on line if they were operating or enabled at the time of power outage.

- Mechanical Bar Screens 1,2,3
- Headworks Exhaust Fans EF1, EF2, EF3
- Headworks Air Supply Fan 1
- Headworks Motorized Damper 1
- Headworks Water Softener
- PST Sludge Collector Drives
- All Chemical Mixers
- All HVAC Systems
- Site Lighting
- Field Instruments
- Grit Blower GB1 and GB2
- PRI Channel Blower PCAB1, PCAB2
- PRI Sludge Grinder PSG1
- Skimmings Grinder PSKG
- Chemical Pumps SBP1, SBP2, PECLP1, PECLP2, PCLP1, PCLP2
- Hydro/Pneu. Tank Compressor HTAC1, HTAC2

Plant personnel will be required to confirm all of the equipment identified as AUTO start has started. If any equipment has not started, a standby unit shall be put into operation wherever possible.

Once all automatically started equipment has been confirmed operable, plant personnel should manually start equipment listed below by taking the following actions:

1. Start the Screenings Conveyors by performing the following:
 - a. Depress the Screenings Conveyor 1 (SC1) and Screenings Conveyor 2 (SC2) "Reset" push buttons on MCC-HWE located in HW-LCC-EAST.
 - b. Depress the SC1 and SC2 Reset push buttons on LCP-HWE located in HW-LCC-EAST.
 - c. Confirm SC1 and SC2 Hand-off-auto switches located at LCP-HWE are in the "Auto" position.
 - d. Visually confirm the selected duty screenings conveyor is operating as required by PLC Logic.
2. Start the Grit Classifiers/Separators by performing the following:
 - a. Depress the Grit Classifiers/Separators 1 (GC1), Grit Classifiers/Separators 2 (GC2), and Grit Classifiers/Separators 3 (GC3) "Reset" push button on MCC-HWE located in HW-LCC-EAST.
 - b. Depress the GC1, GC2, and GC3 Reset push buttons on LCP-HWE located in HW-LCC-EAST.
 - c. Confirm that the On/Off switches on LCP-HWE for the selected in-service grit classifier/separators are in the "On" position.
 - d. Visually confirm the selected in-service grit classifier/separators are operating.
3. Start the Grit Blower System by performing the following:
 - a. Depress the Grit Blower 1 (GB1) and Grit Blower 2 (GB2) "Reset" push buttons on MCC-PSTE located in PST-LCC-EAST.
 - b. Depress the GB1 Reset push buttons on LCP-GB located in PST-LCC-EAST.
 - c. Confirm GB1 and GB2 Hand-Off-Auto switches located at LCP-GG are in the "Auto" position.
 - d. Visually confirm the selected Duty Grit Blower located at the Grit Pump Gallery is operating as required by PLC Logic.

4. Start the Grit Pumping Station by performing the following:
 - a. Depress the Grit Pump 1 (GP1) "Reset" push button on MCC-PSTE located in PST-LCC-EAST.
 - b. Repeat for Grit Pump 2 through Grit Pump 6.
 - c. Identify which of GP1 through GP6 Hand-Off-Auto switches located at LCP-GB in PST-LCC-EAST are in the "Auto" position. Turn these switches to "Off" position and then back to "Auto" position.
 - d. Visually confirm the Grit Pumps are operating as required by PLC logic.
5. Start the Primary Channel Air Supply Fan System by performing the following:
 - a. Depress the Primary Channel Air Supply Fans (PCBSF1 and PCBSF2) "Reset" push buttons located at LCP-PCAB in PST-LCC-EAST.
 - b. Confirm PCBSF1 and PCBSF2 Hand-Off-Auto switches located at LCP-PCAB in PST-LCC-EAST are in the "Auto" position.
 - c. Visually confirm the Primary Channel Air Supply Fans are operating as required by PLC Logic.
6. Start the Primary Channel Air Blower System by performing the following:
 - a. Depress the Primary Channel Air Blowers (PCAB1 and PCAB2) "Reset" push buttons located at MCC-PSTE in PST-LCC-EAST.
 - b. Depress the PCB1 and PCB2 "Reset" push buttons located at LCP-PCAB in PST-LCC-EAST.
 - c. Confirm the Desired Duty blower PCB1 or PCB2 On-Off switch located at LCP-PCAB in PST-LCC-EAST is in the "On" position.
 - d. Confirm the desired Standby blower On-Off switch located at LCP-PCAB in PST-LCC-EAST is in the "Off" position.
 - e. Visually confirm the desired Primary Channel Air Blower is operating.
7. Confirm the desired Ferric Chloride mixing tank mixer is operating

8. Start the desired Ferric Chloride Transfer Pump by performing the following:
 - a. Depress the desired Primary Ferric Chloride Transfer Pump (PFTP1 or PFTP2) "Reset" push button located at LCP-PSTFER in PST-LCC-EAST.
 - b. Confirm the desired pump (PFTP1 or PFTP2) Hand-off-auto switch located at LCP-PSTFER in PST-LCC-EAST is in the "Auto" position.
 - c. Visually confirm the desired pump is operating as required by PLC Logic.
9. Start the Ferric Chloride Addition Pumps by performing the following:
 - a. Depress the desired Primary Ferric Chloride Addition Pump (PFAP1 through PFAP5) "Reset" push buttons located at LCP-PSTFER in PST-LCC-EAST.
 - b. Confirm the desired pumps On/Off switches located at LCP-PSTFER in PST-LCC-EAST are in the "On" position.
 - c. Visually confirm the desired pumps are operating.
10. Confirm the desired Polymer mixing tank mixer is operating
11. Start the desired Polymer Transfer Pump by performing the following:
 - a. Depress the desired Primary Polymer Transfer Pump (PPTP1 or PPTP2) "Reset" push button located at LCP-PSTPOL at PST-LCC-EAST.
 - b. Confirm the desired pump (PPTP1 or PPTP2) Hand-off-auto switch located at LCP-PSTPOL at PST-LCC-EAST is in the "Auto" position.
 - c. Visually confirm the desired pump is operating as required by PLC Logic.
12. Start the Polymer Addition Pumps by performing the following:
 - a. Depress the Desired Primary Polymer Addition Pump (PPAP1 through PPAP5) "Reset" push button located at LCP-PSTPOL in PST-LCC-EAST.

- b. Confirm the desired pumps On/Off switches located at LCP-PSTPOL in PST-LCC-EAST are in the "On" position.
 - c. Visually confirm the Primary Polymer Addition Pumps are operating.
- 13. Start the Primary Sludge Grinder by performing the following:
 - a. Depress the "Reset" push button located at Vendor Panel LCP-PSPG in the Primary Sedimentation Gallery.
 - b. Confirm the grinder is operating as required by PLC Logic.
- 14. Start the Primary Sludge Pumps by performing the following:
 - a. Depress the Primary Sludge Pumps (PSP1 through PSP3) "Reset" push buttons located at MCC-PSTE in PST-LCC-EAST.
 - b. Confirm the pumps (PSP1 through PSP3) Hand-Off-Auto switches are in the "AUTO" position.
 - c. Reset the Sludge Pumping Program via PLC-STE operator interface workstation.
 - d. Visually confirm the pumps are operating as required by PLC Logic.
- 15. Confirm all desired collectors (PSC1 through PSC5) are operating
- 16. Start the Primary Skimmings Grinder by performing the following:
 - a. Depress the "Reset" push button located at Vendor Panel LCP-PSKG in the Primary Skimmings Dry well.
 - b. Confirm the grinder is operating as required by PLC Logic.
- 17. Start the Primary Skimmings Pumps by performing the following:
 - a. Depress the Primary Skimmings Pumps (PSKP1 and PSKP2) "Reset" push buttons located at MCC-PSTE in PST-LCC-EAST.
 - b. Confirm the pumps (PSKP1 and PSKP2) Hand-Off-Auto switches are in the "Auto" position at LCP-PSKPS located in the Primary Skimmings Dry Well.

- c. Reset the Primary Skimmings Pumping Program by depressing the dedicated Primary Skimmings Logic “Reset” button at LCP-PSTE in PST-LCC-EAST and via PLC-PSKPS operator interface workstation.
 - d. Visually confirm the pumps are operating as required by PLC Logic.
- 18. Start the primary Chlorination Dilution Water Pump (PCDWP) by performing the following:
 - a. Depress the PCDWP rest push button located at the LCP-PEB.
 - b. Confirm the PCDWP On-Off switch located at the LCP-PEB in the “On” position.
 - c. Visually confirm the PCDWP is operating.
- 19. Start the Primary Effluent Residual Sample Pump (PERSP) by performing the following:
 - a. Depress the PERSP rest push button located at the LCP-PEB.
 - b. Confirm PERSP On-Off switch located at the LCP-PEB in the “On” position.
 - c. Visually confirm that the PERSP is operating.
- 20. Start the Primary Effluent Chlorination Pumps by performing the following:
 - a. Depress the Primary Effluent Chlorination NaOC1 Pumps 1 and 2 (PECLP1 and PECLP2) “Reset” push buttons located at LCP-NaOC1 in NaOC1-LCC.
 - b. Confirm PECLO1 and PECLP2 Hand-Off-Auto switches located at LCP-NaOC1-LCC located at LCP-NaOC1-LCC.
 - c. Visually confirm the Primary Effluent Chlorination Pumps are operating as required by PLC Logic.
- 21. Start the Primary Bisulfite Dilution Water Pump (PBDWP) by performing the following:
 - a. Depress the PBDWP rest push button located at the LCP-ES.

- b. Confirm the PBDWP On-Off switch located at the LCP-ES in the “On” position.
 - c. Visually confirm that the PBDWP is operating.
- 22. Start the Plant Effluent Residual Sample Pump (PLERSP) by performing the following:
 - a. Depress the PLERSP reset push button located at the LCP-ES.
 - b. Confirm the PLERSP On-Off switch located at the LCP-ES in the “On” position.
 - c. Visually confirm that the PLERSP is operating.
- 23. Start the Sodium Bisulfite Pumps by performing the following:
 - a. Depress the NaHSO₃ Metering Pumps (SBP1 and SBP2) “Reset” push buttons located at LCP-NaOC1 in NaOC1-LCC.
 - b. Confirm SBP1 and SBP2 Hand-Off-Auto switches located at LCP-NaOC1 in NaOC1-LCC are in the “Auto” position.
 - c. Visually confirm the Sodium Bisulfite Pumps are operating as required by PLC Logic.
- 24. Reset all automatic wastewater samplers (ISW1, ISW2, IWS3, PES) by depressing the respective sample resume push buttons at the sampler controllers.
- 25. Start the USST Sludge Mixing Pumps by performing the following:
 - a. Depress the Unstabilized Sludge Mixing Pumps (SMP1A, SMP1B, SMP1C, SMP2A, SMP2B, SMP2C) “Reset” push buttons located at MCC-USST in SP-LCC.
 - b. Depress all the “Reset” push buttons located at LCP-USS in SP-LCC.
 - c. Confirm that all the desired pumps On-Off switches are in the “On” position.
 - d. Confirm that all the desired pumps are operating.

The Unstabilized Sludge Storage Tanks are to be utilized for sludge storage during the event of a power outage and the failures of the solids processing train.

Until power to the plant is restored, sludge conveyance from the Unstabilized Sludge Storage Tanks to the Sludge Dewatering Facilities should be stopped and the Solids Processing Facilities should remain out of operation.

The sludge mixing pumps are to remain in operation to provide circulation and mixing of sludge in the storage tank.

The Unstabilized Sludge Odor Reduction Station, Primary Sedimentation Odor Reduction Station, and Solids processing Odor Reduction Station with all support equipment will be interlocked to remain out of operation.

Start-up and shutdown procedures relative to the standby power generators at the Goat Canyon Pump Station and at the Hollister Street Pump Station are presented in Sections 4.13.3.2.2, 4.13.3.3.2, 4.13.4.2.2, and 4.13.4.3.2.

7.1.4.3 Secondary Plant Restarting

In the Secondary Plant all equipment with the exception of the Channel Air Blowers will be manually restarted at the Control Console as allowed by the timing out of the enabling sequence. Restarting of the Channel Air Blowers will require depressing the “Reset” push button at PLC-ASTN.

7.1.5 Flooding

The South Bay IWTP is constructed on approximately 10 ft. to 15 ft. of compacted fill within the floodplain of the Tijuana River. The levee elevation along the north edge of the plant site is at the 333 year flood elevation of the Tijuana River with 3 foot of freeboard. The levee is armored with riprap to protect the site from scouring that is anticipated during the 333 year flood event.

The elevation of the plant site within the levee is at the 100 year flood elevation or higher. The curb inlets located at the low points along the perimeter of the site are at the 100 year flood elevation with the ground surface sloping upward towards the plant facilities. Some localized ponding can be anticipated at the low points of the site during a

greater than 100 year magnitude flood in the Tijuana River. The need for special flood protection measures onsite is not anticipated.

Access to the plant site is typically from the north across the Tijuana River at Dairy Mart Road or Hollister Street. Currently these access roads are at an elevation which is significantly lower than the design elevation of the SBIWTP site and can be expected to be washed out during significant flooding. Should this occur, access to the plant can only be obtained through the truck access road from Mexico via the San Ysidro Border Crossing.

The possibility of flooding is quite remote due to the construction of the levee as described above. However, a rupture in any piping system or tank structure is always a strong possibility. In the event of a pipeline rupture or tank wall failure resulting in local flooding or spillage, the operator should proceed as follows:

1. Notify all operating personnel.
2. The affected area should be isolated by closing the appropriate valves or shutting down the proper pump.
3. Contain the flow to the greatest extent possible, using existing by-passes or parallel processes and portable pumping equipment.
4. Initiate manual chlorination of discharge, if necessary, to protect public health and receiving waters.
5. Dewater the flooded area and perform the necessary maintenance as soon as possible to protect any equipment. Use portable submersible pumps.
6. In the event of an accidental discharge, contact the next in the chain of command, and inform appropriate agencies.

It should be recognized that even if the plant site is not impacted from flooding, the valley might disrupt power, and increase ground water infiltration to the sewer system. Therefore, other emergency operating plans such as operating with a power failure, operating with reduced labor, operating consecutive shifts, force, etc., may have to be used.

7.1.6 Fire

In the event of a fire, the operator on duty shall assess the severity and type (i.e. electrical, chemical, etc.) of fire. The local fire department should then be notified immediately. See 7.1.14 - EMERGENCY PHONE NUMBERS.

Firefighting equipment is provided throughout each station for extinguishing fires, if possible, or preventing the spread of fires. In the event a fire cannot be extinguished by plant personnel the following general procedures should be followed to prevent further spread of the fire and damage to the equipment:

1. Remove any combustible material from the vicinity of the fire (a fire cannot burn without fuel).
2. If the fire is electrical in nature, cut the power to the affected area by pulling the appropriate circuit breaker.
3. Remove any equipment which can be removed from the area.

7.1.7 Explosion

The possibility of explosion is remote; however, after the explosion has occurred the operator should proceed as follows:

1. Notify and check for all operating personnel.
2. Turn off any power to equipment in the affected area.
3. Follow all Safety Rules.
4. Notify the proper authorities i.e. fire, police, etc. under 7.1.14 - EMERGENCY PHONE NUMBERS.
5. Follow the general procedures under 7.1.6 - FIRE.
6. Follow the general procedures under 7.1.8 - EARTHQUAKE inspection.

7.1.8 Earthquake

In the event of an occurrence of this type, there is nothing the operator can do while the quake is happening except protect themselves from injury:

1. If you are indoors - stay there! Get under a desk or table and hang on to it. Stay clear of windows, heavy furniture or equipment. Don't rush outside. You may be injured by falling glass or building parts. DO NOT try using the stairs while the building or the plant structures are shaking or while there is danger of being hit by falling glass or debris.
2. If you are outside, get into the OPEN area, away from building and power lines.

3. Once the quake has subsided check for injuries following the general procedures under 7.1.14 - PERSONAL INJURY.

Damage to structures, equipment, pipelines, tanks, etc., should be evaluated immediately and a shutdown or run decision made as soon as possible. The Plant Manager, Operations Supervisor and Maintenance Supervisor are to be contacted for any emergency decision.

7.1.9 Contamination of Potable Water

A malfunction of the backflow preventer(s) is an extremely unlikely prospect but deserves attention regardless. If potable water becomes discolored or starts to smell or taste strange, then all use of potable water for persons washing or human consumption should be discontinued until water samples can be obtained, and both the San Diego County Department of Health Services and the City of San Diego Engineering Department should be notified immediately. If potable water is shown by the samples to be contaminated, the backflow preventer should be repaired or replaced as needed and all lines flushed thoroughly until samples indicate drinking water quality has been restored.

7.1.10 Windstorm

During periods of high winds, the following precautions should be taken:

1. Pilot lights may be blown out - check for operation after the storm has subsided.
2. Place strips of tape on all glass doors and windows in case of debris flying into the glass during wind storms.

7.1.11 Freezing

The San Diego climate includes very few severe freezes, yet occasionally a frost is experienced and preparations are necessary to avoid plant upsets.

Power outages due to frost shorting out or breaking San Diego Gas and Electric lines may cause temporary problems. Engine generators should be kept in top condition during winter months as they may be needed more than in summer months.

If temperatures of 32 degrees F or below are forecast, all outside instruments containing water should be insulated; all exposed potable and non-potable water lines protected; all "end of the header" valves should be opened slightly to allow water to trickle out.

7.1.12 Alarm System Failure

In the event of an alarm system failure, extra manpower must be directed to carry out routine checks of equipment and processes no longer being monitored. A list of all alarms not functioning should be drawn up and areas assigned to specific personnel to make appropriate determination of the status of affected equipment.

7.1.13 Personnel Injury

Personnel injury is always a possibility in a treatment plant; however, this does not mean that an injury must happen. Some general principles are suggested below to help keep the incidence of accidents to a minimum:

1. Follow the Safety Rules found in Section 7.2 and avoid risks by never taking a chance. If there is any doubt, discuss the situation with fellow operators before proceeding.
2. Use the safety equipment provided for the job and always take the time to be safe. Taking the time to obtain the proper safety equipment, inspecting the equipment, and doing the job in a safe manner is time well spent.

7.1.14 Emergency Phone Numbers

The phone numbers of the following services must be readily available:

South Bay IWTP	619-662-7687
Plant Manager	619-849-8735
Operations Supervisor	619-944-4326
Maintenance Supervisor	760-948-3783
On-Call Supervisor	760-815-3761

Night Supervisor	760-815-3761
Fire Department/Ambulance/Police	911
Hospital - Sharp Chula Vista Community	(619) 482-5800
San Diego Gas & Electric (Emergency - 911)	(800) 611-7343
County Health Services Hazardous Materials	(619) 338-2211
Hazardous Response Team	(619) 338-2454
State Office of Emergency Services Chemical Response	(800) 852-7550
Chemtrec (Chemical Information)	(800) 424-9300
National Response Center	(800) 424-8802
Coast Guard (Pollution of Waterways)	(619) 683-6470
Department of Fish & Game	(858) 467-4201
State Water Resource Control Board	(858) 467-2952
Poison Control Center (Toxic Information)	(619) 543-6000
CAL/OSHA	(619) 637-5534
Border Patrol (Imperial Beach Station) 24-Hours	(619) 662-7057
International Plant - Mexico	011 52 664 687 24 56
Sacramento - CA Water Resources Control Board	(916) 341-5455

7.1.15 System Failures/Alarms and Emergency Response Procedures

The system failures/alarms listed in Table 7.1-1 represent plant conditions that were seen as major system failures/alarms requiring immediate emergency response procedures that should be implemented to minimize the impacts on plant system performance.

TABLE 7.1-1
SYSTEM FAILURES/ALARMS AND EMERGENCY RESPONSE PROCEDURES

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
<i>HEADWORKS</i> 1. HW-LCC-EAST PLC Failure	a. Check LCP-HWE located at HW-LCC. b. Verify that the standby PLC has started. c. If the standby PLC has not started, place equipment in the manual mode. d. Notify Supervisor.
2. Headworks Mechanical Screen Failure	a. Check LCP-HWE located at HW-LCC. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start up the standby unit manually. d. Notify Supervisor.
3. Screenings Area Combustible Gas Detection	a. Notify Supervisor. Observe safety procedures. b. Secure entrances to the Screenings Area. c. Verify that the Headworks Odor Control System is in operation.
4. Storage Bin Area Hydrogen Sulfide Detection	a. Notify Supervisor. Observe safety procedures. b. Secure entrances to the Storage Bin Area. c. Verify that the Headworks Odor Control System is in operation.
5. Headworks Influent Channel High High Level Alarm	a. Notify Supervisor. b. Check operational status of influent screens and influent pumps. Place standby screen or manual screens in operation as necessary. c. Determine the cause of the alarm.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
6. Influent Pump Station Seal Water Failure	<ul style="list-style-type: none"> a. Check Influent Pump Station Seal Water Supply Station. b. Determine cause of alarm. c. Open all isolation valves on seal water lines. Adjust flow/pressure as needed. d. Notify Supervisor.
7. Grit Pump Failure	<ul style="list-style-type: none"> a. Check LCP-PSTE located at PST-LCC-EAST. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start up the standby unit manually. d. Notify Supervisor.
8. Grit Classifier/Separator Failure	<ul style="list-style-type: none"> a. Check LCP-HWE located at HW-LCC. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start up the standby unit manually. d. Notify Supervisor.
9. ORHW Sodium Hypochlorite Sump High Level	<ul style="list-style-type: none"> a. Immediately check ORHW Sodium Hypochlorite Storage Area Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.
10. Recirculation Pumps Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower station. b. Follow established First Aid procedures. c. Assist the person using the eyewash/shower to the nearest First Aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
11. Influent Channel pH High/Low	a. Notify Supervisor.
12. Headworks Screenings Conveyor Failure	a. Check LCP-HWE located at HW-LCC. b. Determine cause of alarm. c. If the conveyor cannot be re-started in a timely fashion, shut down the Mechanical Bar Screen(s) associated with this conveyor and close the inlet slide gate to the Dewatered Screenings Channel. Continue to operate the other Screenings Channel as necessary. d. If the in-service Mechanical Bar Screen is unable to perform under increased hydraulic loadings, then put Manual Bar Screen(s) in service as required. e. Notify Supervisor.
13. Screening Area Hydrogen Sulfide Detection	a. Notify Supervisor. Observe safety procedures. b. Secure entrances to the Screening Area. c. Verify that the Headworks Odor Control System is in operation.
14. Influent Pump Station Failure	a. Check LCP-HWE located at HW-LCC. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start up the standby unit manually. d. Notify Supervisor.
15. Grit Blower Failure	a. Check LCP-PSTE located at PST-LCC-EAST. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start up the standby unit manually. d. Notify Supervisor.
16. Grit Dewatering Area Combustible Gas Detection	a. Notify Supervisor. Observe safety rules. b. Secure entrances to the Grit Dewatering Area. c. Verify that the Headworks Odor Control System is in operation.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
17. Headworks Odor Reduction Station Failure	<ul style="list-style-type: none"> a. Check LCP-ORHW located at Headworks Odor Reduction Area. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start up the standby unit manually. d. Notify Supervisor.
18. Sodium Hypochlorite Storage Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
19. Fill Panel Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
20. BCP-HW Common Alarm	<ul style="list-style-type: none"> a. Check BCP-HW located outside the Bin Storage Area. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.
21. Headworks Conveyor Tagline	<ul style="list-style-type: none"> a. Immediately check Headworks Screenings Conveyor. b. Determine cause of alarm. c. Follow established First Aid Procedures. d. If personnel are injured, provide assistance to the nearest first aid station, if the situation warrants. e. Contact the Emergency Medical Services, if the situation warrants. f. If needed, start-up standby equipment. g. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
22. Storage Bin Area Combustible Gas Detection	<ul style="list-style-type: none"> a. Notify Supervisor. b. Secure entrances to the Storage Bin Area. c. Verify that Headworks Odor Control System is in operation.
23. Influent Pump Station Bubbler Failure	<ul style="list-style-type: none"> a. Check the Influent Pump Station Bubbler Control Panels (BCP1-IPS and BCP2-IPS) located near the Influent Pump Station. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.
24. Grit Pump Seal Water Failure	<ul style="list-style-type: none"> a. Check Grit Pump Seal Water Supply Station. b. Determine cause of alarm. c. Open all isolation valves on seal water lines. Adjust flow/pressure as needed. d. Notify Supervisor.
25. Grit Dewatering Area Hydrogen Sulfide Detection	<ul style="list-style-type: none"> a. Notify Supervisor. Observe safety procedures. b. Secure entrances to the Grit Dewatering Area. c. Verify that the Headworks Odor Control System is in operation.
26. ORHW Caustic Containment Sump High Level	<ul style="list-style-type: none"> a. Immediately check ORHW Caustic Storage Area Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
27. Caustic Storage Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services if the situation warrants. e. Notify Supervisor.
<i>PRIMARY SEDIMENTATION AREA</i>	
1. Rapid Mix Station Failure	<ul style="list-style-type: none"> a. Check LCP-PSTE located at PSTE-LCC-EAST. b. Determine cause of alarm. c. Isolate Rapid Mix Chamber for the failed pump. d. Shut down chemical feed pumps to the isolated Rapid Mix Chamber. e. If unable to correct situation soon, switch to stand-by PST (if possible). f. Notify Supervisor.
2. Primary Sludge Pump Station Failure	<ul style="list-style-type: none"> a. Check LCP-PSTE located at PST-LCC-EAST. b. Determine cause of alarm. c. Shut down the PST(s) which has the failure. d. Switch to standby PST (if possible). e. Notify Supervisor.
3. Primary Skimmings Pump Station Failure	<ul style="list-style-type: none"> a. Check LCP-PSKPS located at Skimmings Dry Well. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. If it is not possible to run the pump(s), shut down skimmers from LCP-PSK (part of the LCP-PSTE) located at PST-LCC-EAST. e. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
4. PSTE Ferric Chloride Containment Sump High Level	a. Immediately check PSTE Ferric Chloride Containment Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.
5. Polymer Addition East Safety Shower Alarm	a. Immediately check location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
6. PST-LCC-EAST PLC Failure	a. Check LCP-PSTE located at PST-LCC-EAST. b. Verify that the standby PLC has started. c. If the standby PLC has not started, place equipment in the manual mode. d. Notify Supervisor.
7. ORPST Caustic Containment Sump High Level	a. Immediately check PST Odor Reduction Station Caustic Containment Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
8. Caustic Storage Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
9. Primary Sedimentation Tank Collector Failure	<ul style="list-style-type: none"> a. Check LCP-PSTE located at PST-LCC-EAST. b. Determine which collector failed. c. Shut down the respective PST. d. Switch to standby PST (if possible). e. Notify Supervisor.
10. PSTE Ferric Chloride Addition System Failure	<ul style="list-style-type: none"> a. Check LCP-PSTE located at PST-LCC-EAST. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.
11. PSTE Polymer Addition System Failure	<ul style="list-style-type: none"> a. Check LCP-PSTE located at PST-LCC-EAST. b. Determine cause of alarm. c. If the failed unit is provided with a stand-by unit, verify that the stand-by unit has started or start-up the stand-by unit manually. d. Notify Supervisor.
12. Primary Skimmings Drywell Sump High Level	<ul style="list-style-type: none"> a. Check the Skimmings Drywell Sump. b. Determine type of liquid in the sump (water or skimmings products). c. If needed, stop the leak or reason for the excess liquid. d. Verify that the sump pump has started, or manually start-up the sump pump(s). e. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
13. Ferric Chloride Addition East Safety Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
14. PST Gallery Sump High Level	<ul style="list-style-type: none"> a. Check the PST Gallery Sump. b. Determine type of liquid in the sump (water or sludge). c. If needed, stop the leak or reason for the excess liquid. d. Verify that the sump pump has started, or manually start-up the sump pump(s). e. Notify Supervisor.
15. ORPST Sodium Hypochlorite Sump High Level	<ul style="list-style-type: none"> a. Immediately check the PST Odor Reduction Station Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.
16. Recirculation Pumps Area Shower	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
17. Primary Sedimentation Tank Skimmer Failure	<ul style="list-style-type: none"> a. Check LCP-PSTE located at PST-LCC-EAST. b. Determine cause of alarm and which skimmer has failed. c. Correct the condition, or shut down the PST and switch to a standby PST (if possible). d. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
18. USST Ferric Chloride Addition System Failure	<ul style="list-style-type: none"> a. Check LCP-PSTE located at PST-LCC-EAST. b. Determine cause of alarm. c. Switch to stand-by unit (if possible). d. Notify Supervisor.
19. PSTE Ferric Chloride Containment Sump High Level	<ul style="list-style-type: none"> a. Immediately check PSTE Ferric Chloride Containment Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.
20. Polymer Mixing Area Sump High Level	<ul style="list-style-type: none"> a. Immediately check the PSTE Polymer Containment Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.
21. Channel Air System Failure	<ul style="list-style-type: none"> a. Check the LCP-PSTE located at the PST-LCC-EAST. b. Determine cause of alarm. c. Verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.
22. PST Odor Reduction Station Failure	<ul style="list-style-type: none"> a. Check LCP-ORPST located at PST Odor Reduction Station. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
23. Sodium Hypochlorite Storage Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
24. Fill Panel Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
<i>ADVANCED PRIMARY CHLORINATION AREA</i>	
1. NaOC1 System Failure	<ul style="list-style-type: none"> a. Check LCP-NaOC1 located at NaOC1-LCC b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.
2. PLC-NaOC1 Failure	<ul style="list-style-type: none"> a. Check LCP-NaOC1 located at the NaOC1-LCC. b. Verify that the back-up PLC has started. c. If the standby PLC has not started, place equipment in the manual mode. d. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
3. NaHSO ₃ Containment Sump High Level	<ul style="list-style-type: none"> a. Immediately check the sodium Bisulfite Storage Area Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.
4. Primary Effluent Bypass System Failure	<ul style="list-style-type: none"> a. Check LCP-PEB located at PEBS. b. Determine cause of alarm. c. If the alarm is the result of high water level, notify Supervisor, and obtain assistance in tracking down the source of the problem.
5. Effluent Structure System Failure	<ul style="list-style-type: none"> a. Check LCP-ES located at Effluent Metering Structure. b. Determine cause of alarm. c. Notify Supervisor, and obtain assistance in tracking down the source of the problem
6. NaHSO ₃ System Failure	<ul style="list-style-type: none"> a. Check LCP-NaHSO₃ located at NaOCl-LCC b. Determine cause of alarm . c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
7. NPW Wetwell Low Level	<ul style="list-style-type: none"> a. Check NPW Pump Station No. 1. b. Open the wetwell hatch and verify the level in the wetwell. c. If the level is in fact low, verify that the wetwell motor operated inlet valve and float valve are both operational, and are both open. d. If both valves are operational and open, and no water (or insufficient water) is entering the wetwell, notify Supervisor, and obtain assistance in tracking down the source of the problem. e. <u>WARNING:</u> The NPW Pump Station provides water for the plant seal water system. Lack of seal water can cause serious damage to pumping units. Should the NPW Pump Station be on the verge of shutting down, the Operations Supervisor should shut off the belt filter press belt washwater, the plant irrigation system, and other non-essential plant uses.
8. NPW System Failure	<ul style="list-style-type: none"> a. Check LCP-NPW1 located at NaOCl-LCC. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.
9. NaOCl Area Safety Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
10. NaOCl Containment Sump High Level	<ul style="list-style-type: none"> a. Immediately check the Sodium Hypochlorite Storage Area Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.
11. NaHSO ₃ Area Safety Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
12. Effluent Distribution System Failure	<ul style="list-style-type: none"> a. Check Effluent Distribution Structure. b. Determine cause of alarm. c. Notify Supervisor.
13. Generator 1 Fail	<ul style="list-style-type: none"> a. Check MCP-GEN and LCP-G1 at GEN-LCC. b. Determine cause of the alarm. c. Notify Supervisor.
14. Generator 2 Fail	<ul style="list-style-type: none"> a. Check MCP-GEN and LCP-G2 at GEN-LCC. b. Determine cause of the alarm. c. Notify Supervisor.
<i>ACTIVATED SLUDGE AREAS</i> 1. RIO-ASTN Failure	<ul style="list-style-type: none"> a. Check LCP-ASTN located at the AST-LCC-N. b. Verify that the standby PLC has started. c. If the standby PLC has not started, place equipment in the manual code. d. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
<p>2. Activated Sludge Tank Mixers Failure Mixer 1A, 1B, 1C, 1D, 1E, 1F. Mixer 2A, 2B, 2C, 2D, 2E, 2F. Mixer 3A, 3B, 3C, 3D, 3E, 3F. Mixer 4A, 4B, 4C, 4D, 4E, 4F. Mixer 5A, 5B, 5C, 5D, 5E, 5F. Mixer 6A, 6B, 6C, 6D, 6E, 6F. Mixer 7A, 7B, 7C, 7D, 7E, 7F.</p>	<p>a. Check LCP-ASTN located at the AST-LCC-N. b. Determine cause of alarm and which mixer has failed. c. Correct the condition. d. Notify Supervisor.</p>
<p>3. Process Air Control Valve Failure PACV 1A, 1B, 1C. PACV 2A, 2B, 2C. PACV 3A, 3B, 3C. PACV 4A, 4B, 4C. PACV 5A, 5B, 5C. PACV 6A, 6B, 6C. PACV 7A, 7B, 7C.</p>	<p>a. Check LCP-ASTN located at the AST-LCC-N. b. Determine cause of alarm and which air control valve has failed. c. Correct the condition. d. Notify Supervisor.</p>
<p>4. Intermediate Mixed Liquor Pump Failure IMLRP-1 IMLRP-2 IMLRP-3 IMLRP-4 IMLRP-5 IMLRP-6 IMLRP-7</p>	<p>a. Check LCP-ASTN located at the AST-LCC-N. b. Determine cause of alarm and which intermediate mixed liquor pump has failed. c. Correct the condition. d. Notify Supervisor.</p>

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
<p>5. Intermediate Mixed Liquor Pump Motor Moisture Alarm</p> <p>IMLRP-1</p> <p>IMLRP-2</p> <p>IMLRP-3</p> <p>IMLRP-4</p> <p>IMLRP-5</p> <p>IMLRP-6</p> <p>IMLRP-7</p>	<p>a. Check LCP-ASTN located at the AST-LCC-N.</p> <p>b. Determine cause of alarm and which intermediate mixed liquor pump has the motor moisture alarm.</p> <p>c. Correct the condition.</p> <p>d. Notify Supervisor.</p>
<p>6. AST Gallery Sump High</p>	<p>a. Check the PST Gallery Sump.</p> <p>b. Determine type of liquid in the sump (water or sludge).</p> <p>c. If needed, stop the leak or reason for the excess liquid.</p> <p>d. Verify that the sump pump has started, or manually start-up the sump pump(s).</p> <p>e. Notify Supervisor.</p>
<p>7. AST Drainage Pump Failure</p>	<p>a. Check LCP-ASTN located at the AST-LCC-N.</p> <p>b. Determine cause of alarm.</p> <p>c. Correct the condition, or shut down the draining.</p> <p>d. Notify Supervisor.</p>
<p>8. Blowers LCP-BSC Failure</p>	<p>a. Check LCP-BSC located in the electrical room.</p> <p>b. Verify that the back-up PLC has started.</p> <p>c. If the standby PLC has not started, place equipment in the manual mode.</p> <p>d. Notify Supervisor.</p>
<p>9. AST Blower 1 System Failure</p>	<p>a. Check LCP-BSC located in the electrical room.</p> <p>b. Check LCP-B1.</p> <p>c. Determine cause of an alarm.</p> <p>d. Verify that the standby unit has started, or start-up the standby unit manually.</p> <p>e. Notify Supervisor.</p>

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
10. AST Blower 2 System Failure	<ul style="list-style-type: none"> a. Check LCP-BSC located in the electrical room. b. Check LCP-B2. c. Determine cause of an alarm. d. Verify that the standby unit has started, or start-up the standby unit manually. e. Notify Supervisor.
11. AST Blower 3 System Failure	<ul style="list-style-type: none"> a. Check LCP-BSC located in the electrical room. b. Check LCP-B3. c. Determine cause of an alarm. d. Verify that the standby unit has started, or start-up the standby unit manually. e. Notify Supervisor.
12. AST Blowers Inlet Filter Differential Pressure High PAB-1 PAB-2 PAB-3	<ul style="list-style-type: none"> a. Check LCP-BSC located in the electrical room. b. Check LCP-B1, or LCP-B2, or LCP-B3. c. Determine cause of an alarm. d. Verify that the standby unit has started, or start-up the standby unit manually. e. Notify Supervisor.
13. AST Blowers Discharge Air Pressure High PAB-1 PAB-2 PAB-3	<ul style="list-style-type: none"> a. Check LCP-BSC located in the electrical room. b. Check LCP-B1, or LCP-B2, or LCP-B3. c. Determine cause of an alarm. d. Verify that the standby unit has started, or start-up the standby unit manually. e. Notify Supervisor.
14. AST Blowers Discharge Air Pressure Low PAB-1 PAB-2 PAB-3	<ul style="list-style-type: none"> a. Check LCP-BSC located in the electrical room. b. Check LCP-B1, or LCP-B2, or LCP-B3. c. Determine cause of an alarm. d. Verify that the standby unit has started, or start-up the standby unit manually. e. Notify Supervisor.
15. AST Blowers Discharge Air Temperature High PAB-1 PAB-2 PAB-3	<ul style="list-style-type: none"> a. Check LCP-BSC located in the electrical room. b. Check LCP-B1, or LCP-B2, or LCP-B3. c. Determine cause of an alarm. d. Verify that the standby unit has started, or start-up the standby unit manually. e. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
16. Channel Aeration Blowers Inlet Filter Differential Pressure High CA Blower 1 CA Blower 2 CA Blower 3	a. Check MCC-ASTN-2 in LCP-ASTN. b. Determine cause of an alarm. c. Verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.
17. Channel Aeration Blowers Discharge Air Pressure High CA Blower 1 CA Blower 2 CA Blower 3	a. Check MCC-ASTN-2 in LCP-ASTN. b. Determine cause of an alarm. c. Verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.
18. Channel Aeration Blowers Discharge Air Pressure Low CA Blower 1 CA Blower 2 CA Blower 3	a. Check MCC-ASTN-2 in LCP-ASTN. b. Determine cause of an alarm. c. Verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.
<i>SECONDARY SEDIMENTATION AREA</i> 1. RIO-SST1 Failure	a. Check LCP-SST1 located at SST-LCC-1. b. Verify that the standby PLC has started. c. If the standby PLC has not started, place equipment in the manual mode. d. Notify Supervisor.
2. Secondary Sedimentation Tank Collector Failure (SST1 through SST10)	a. Check LCP-SST1 located at SST-LCC-1. b. Determine which collector failed. c. Shut down the respective SST. d. Switch to standby SST (if possible). e. Notify Supervisor.
3. Secondary Sedimentation Tank Rotary Skimmer Failure (SST1 through SST10)	a. Check LCP-SST1 located at SST-LCC-1. b. Determine cause of alarm and which skimmer has failed. c. Correct the condition, or shut down the SST and switch to a standby SST (if possible). d. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
4. Return Activated Sludge (RAS) Pump Station Failure (RASP1 through RASP6)	<ul style="list-style-type: none"> a. Check LCP-SST1 located at SST-LCC-1. b. Determine cause of alarm. c. Shut down the SST(s) which has the failure. d. Switch to standby SST (if possible). e. Notify Supervisor.
5. Waste Activated Sludge (WAS) Pump Station Failure (WAS Pp1 and WASP2)	<ul style="list-style-type: none"> a. Check LCP-SST1 located at SST-LCC-1. b. Determine cause of alarm. c. Shut down the SST(s) which has the failure. d. Switch to standby SST (if possible). e. Notify Supervisor.
6. Secondary Skimmings Wet Well Level Low Alarm	<ul style="list-style-type: none"> a. Check Secondary Skimming Pump Station No. 1. b. Open the wetwell hatch and verify the level in the wetwell. c. If the level is in fact low, verify that the wetwell motor operated inlet valve and float valve are both operational, and are both open. d. If both valves are operational and open, and no flow (or insufficient inflow) is entering the wetwell, notify Supervisor, and obtain assistance in tracking down the source of the problem.
7. Secondary Skimmings Pump Station Failure	<ul style="list-style-type: none"> a. Check LCP-SSKPS1 located at Skimmings Dry Well. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. If it is not possible to run the pump(s), shut down skimmers from LCP-SST1 located at SST-LCC-1. e. Notify Supervisor.
8. Secondary Skimmings Drywell Sump High High	<ul style="list-style-type: none"> a. Check the Skimmings Drywell Sump. b. Determine type of liquid in the sump (water or skimmings products). c. If needed, stop the leak or reason for the excess liquid. d. Verify that the sump pump has started, or manually start-up the sump pump(s). e. Notify supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
9. SST Gallery Sump High High	<ul style="list-style-type: none"> a. Check the SST gallery Sump. b. Determine type of liquid in the sump (water or skimmings products). c. If needed, stop the leak or reason for the excess liquid. d. Verify that the sump pump has started, or manually start-up the sump pump(s). e. Notify supervisor.
10. SST Drain Pump Failure	<ul style="list-style-type: none"> a. Check LCP-SST1 located at SST-LCC-1. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify supervisor.
11. SST Gallery Exhaust Fan Failure	<ul style="list-style-type: none"> a. Check LCP-SST1 located at SST-LCC-1. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify supervisor.
12. NPW Wetwell No.2 Low Level	<ul style="list-style-type: none"> a. Check NPW Pump Station No. 2. b. Open the wetwell hatch and verify the level in the wetwell. c. If the level is in fact low, verify that the wetwell motor operated inlet valve and float valve are both operational, and are both open. d. If both valves are operational and open, and no water (or insufficient water) is entering the wetwell, notify Supervisor, and obtain assistance in tracking down the source of the problem. e. <u>WARNING:</u> The NPW Pump Station provides water for the plant seal water system. Lack of seal water can cause serious damage to pumping units. Should the NPW Pump Station be on the verge of shutting down, the Operations Supervisor should shut off the belt filter press belt washwater, the plant irrigation system, and other non-essential plant uses.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
13. NPW No.2 System Failure	<ul style="list-style-type: none"> a. Check LCP-NPW1 located at NaOCI-LCC. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify supervisor.
<i>WASTED ACTIVATED SLUDGE THICKENING AREA</i> 1. RIO-DAF Failure	<ul style="list-style-type: none"> a. Check LCP-DAF located at DAF-LCC. b. Verify that the standby PLC has started. c. If the standby PLC has not started, place equipment in the manual mode. d. Notify supervisor.
2. Dissolved Air Floatation (DAF) Tanks Sludge Collector Failure	<ul style="list-style-type: none"> a. Check LCP-DAF1 located at DAF-LCC. b. Determine which collector failed. c. Shut down the respective DAF. d. Switch to standby DAF (if possible). e. Notify supervisor.
3. Dissolved Air Floatation (DAF) Tanks Sludge Collector Drive Torque High/Low Alarm	<ul style="list-style-type: none"> a. Check LCP-DAF1 located at DAF-LCC. b. Determine which collector drive caused the alarm. c. Determine cause of the alarm. d. Shut down the respective DAF if necessary (a continued signal of either high/low shall shutdown the DAF drive unit). e. Switch to standby DAF (if possible). f. Notify supervisor.
4. Float Box Bubbler BCP-DAF Common Alarm	<ul style="list-style-type: none"> a. Check LCP-DAF located at DAF-LCC. b. Determine cause of the alarm. c. Shut down the respective DAF if necessary. d. Switch to standby DAF (if possible). e. Notify supervisor.
5. DAF Pressurization Tank Level Alarm	<ul style="list-style-type: none"> a. Check LCP-DAF located at DAF-LCC. b. Determine cause of the alarm c. Shut down the respective DAF if necessary. d. Notify supervisor

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
6. DAF Pressurization Tank Pressure Alarm	<ul style="list-style-type: none"> a. Check LCP-DAF located at DAF-LCC. b. Determine cause of the alarm c. Shut down the respective DAF if necessary. d. Notify supervisor
7. DAF Pressurization Pump Failure	<ul style="list-style-type: none"> a. Check LCP-DAF located at DAF-LCC. b. Shut down the respective DAF if necessary. c. Determine cause of the alarm. d. Notify supervisor.
8. DAF Polymer Addition System Failure	<ul style="list-style-type: none"> a. Check LCP-DAF located at DAF-LCC. b. Determine cause of alarm. c. If the failed unit is provided with a stand-by unit, verify that the stand-by unit has started or start-up the stand-by unit manually. d. Notify Supervisor.
9. DAF Polymer Area Sump High Level	<ul style="list-style-type: none"> a. Immediately check the DAF Polymer Containment Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.
10. Polymer Addition East Safety Shower Alarm	<ul style="list-style-type: none"> a. Immediately check location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
<i>UNSTABILIZED SLUDGE STORAGE AREA</i> 1. USS System 1 Failure USS System 2 Failure	a. Check LCP-USS located at the SP-LCC. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.
2. USS Odor Reduction Station Failure	a. Check LCP-USS located at the USS Odor Reduction Station. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.
3. Sodium Hypochlorite Storage Area Shower Alarm	a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
4. Fill Panel Area Shower Alarm	a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
5. HIGH HIGH USST 1 Level HIGH HIGH USST 2 Level	a. Check LCP-USS located at SP-LCC. b. Verify sludge draw off valves are open. c. Stop feeding the USST by stopping the primary sludge pumps and closing the isolation inlet valves. d. Flush sludge draw off lines with NPW. e. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
6. ORUSS Caustic Containment Sump High Level	<ul style="list-style-type: none"> a. Immediately check the Sodium Hypochlorite Storage Area Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.
7. Caustic Storage Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established first Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
8. USST 1 HIGH CG USST 2 HIGH CG	<ul style="list-style-type: none"> a. Notify Supervisor. Observe safety procedures. b. Verify Odor Control Station is operating and performing to normal operating standards. c. If tank combustible gas concentration is still high with Odor Reduction Station operating, then do the following: <ul style="list-style-type: none"> - Stop feed to the USST. - Continue mixing sludge within the tank. - Increase sludge draw off rate. - Continuously monitor combustible gas concentration in the tank.
9. ORUSS Sodium Hypochlorite Sump High Level	<ul style="list-style-type: none"> a. Immediately check the Sodium Hypochlorite Storage Area Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
10. Recirculation Pumps Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
<i>SOLIDS PROCESSING AREA</i> 1. Solids Processing System Failure	<ul style="list-style-type: none"> a. Check LCP-SP located at SP-LCC. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.
2. Bulk Polymer Safety Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Air Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
3. BFP No. 2 Emergency Stop	<ul style="list-style-type: none"> a. Immediately check BFP No. 2 located at the Sludge Dewatering Building. b. Determine cause of alarm. c. Follow established First Aid Procedures. d. If personnel are injured, provide assistance to the nearest first aid station, if the situation warrants. e. Contact the Emergency Medical Services, if the situation warrants. f. If needed, start-up standby equipment. g. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
4. Belt Filter Press Conveyor No. 1A Tagline	<ul style="list-style-type: none"> a. Immediately check Belt Filter Press Conveyor No. 1A. b. Determine cause of alarm. c. Follow established First Aid Procedures. d. If personnel are injured, provide assistance to the nearest first aid station, if the situation warrants. e. Contact the Emergency Medical Services, if the situation warrants. f. If needed, start-up standby equipment. g. Notify Supervisor.
5. Belt Filter Press Conveyor No. 2B Tagline	<ul style="list-style-type: none"> a. Immediately check Belt Filter Press Conveyor No. 2B. b. Determine cause of alarm. c. Follow established First Aid Procedures. d. If personnel are injured, provide assistance to the nearest first aid station, if the situation warrants. e. Contact the Emergency Medical Services, if the situation warrants. f. If needed, start-up standby equipment. g. Notify Supervisor.
6. LS No. 1 Emergency Stop	<ul style="list-style-type: none"> a. Immediately check Lime Stabilization System No. 1 Area. b. Determine cause of alarm. c. Follow established First Aid Procedures. d. If personnel are injured, provide assistance to the nearest first aid station, if the situation warrants. e. Contact the Emergency Medical Services, if the situation warrants. f. If needed, start-up standby equipment. g. Notify Supervisor.
7. TLC No. 2 Tagline	<ul style="list-style-type: none"> a. Immediately check Truck Loading Conveyor No. 2 Area. b. Determine cause of alarm. c. Follow established First Aid Procedures. d. If personnel are injured, provide assistance to the nearest first aid station, if the situation warrants. e. Contact the Emergency Medical Services, if the situation warrants. f. If needed, start-up standby equipment. g. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
8. Caustic Sump High Level	<ul style="list-style-type: none"> a. Immediately check the Sodium Hydroxide Storage Area Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.
9. Recirculation Pumps 7 & 8 Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
10. Caustic Fill Panel Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
11. PLC-SP Failure	<ul style="list-style-type: none"> a. Check LCP-SP located at SP-LCC. b. Verify that the standby PLC has started. c. If the standby PLC has not started, place equipment in the manual mode. d. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
12. Polymer Addition Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
13. BFP No. 3 Emergency Stop	<ul style="list-style-type: none"> a. Immediately check Belt Filter Press No. 3 located at the Sludge Dewatering Building. b. Determine cause of alarm. c. Follow established First Aid Procedures. d. If personnel are injured, provide assistance to the nearest first aid station, if the situation warrants. e. Contact the Emergency Medical Services, if the situation warrants. f. If needed, start-up standby equipment. g. Notify Supervisor.
14. Belt Filter Press Conveyor No. 1B Tagline	<ul style="list-style-type: none"> a. Immediately check Belt Filter Press Conveyor No. 1B. b. Determine cause of alarm. c. Follow established First Aid Procedures. d. If personnel are injured, provide assistance to the nearest first aid station, if the situation warrants. e. Contact the Emergency Medical Services, if the situation warrants. f. If needed, start-up standby equipment. g. Notify Supervisor.
15. North Lime Safety Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
16. LS No. 2 Emergency Stop	<ul style="list-style-type: none"> a. Immediately check Lime Stabilization System No. 2 Area. b. Determine cause of alarm. c. Follow established First Aid Procedures. d. If personnel are injured, provide assistance to the nearest first aid station, if the situation warrants. e. Contact the Emergency Medical Services, if the situation warrants. f. If needed, start-up standby equipment. g. Notify Supervisor.
17. Solids Processing Odor Reduction Station Failure	<ul style="list-style-type: none"> a. Check LCP-ORSP located at the Solids Processing Odor Reduction Area. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started, or start-up the standby unit manually. d. Notify Supervisor.
18. Sodium Hypochlorite Sump High Level	<ul style="list-style-type: none"> a. Immediately check the Sodium Hypochlorite Storage Area Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.
19. Caustic Storage Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
20. Sulfuric Acid Fill Panel Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
21. Solids Processing High Level Containment Area	<ul style="list-style-type: none"> a. Immediately check the Solids Processing Polymer Containment Area Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety rules and wait for assistance.
22. BFP NO. 1 Emergency Stop	<ul style="list-style-type: none"> a. Immediately check Belt Filter Press No. 1 located at the Sludge Dewatering Building. b. Determine cause of alarm. c. Follow established First Aid Procedures. d. If personnel are injured, provide assistance to the nearest first aid station, if the situation warrants. e. Contact the Emergency Medical Services, if the situation warrants. f. If needed, start-up standby equipment. g. Notify Supervisor.
23. BFP No. 4 Emergency Stop	<ul style="list-style-type: none"> a. Immediately check Belt Filter Press No. 4 located at the Sludge Dewatering Building. b. Determine cause of alarm. c. Follow established First Aid Procedures. d. If personnel are injured, provide assistance to the nearest first aid station, if the situation warrants. e. Contact the Emergency Medical Services, if the situation warrants. f. If needed, start-up standby equipment. g. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
24. Belt Filter Press Conveyor No. 2A Tagline	<ul style="list-style-type: none"> a. Immediately check Belt Filter Press Conveyor No. 2A. b. Determine cause of alarm. c. Follow established First Aid Procedures. d. If personnel are injured, provide assistance to the nearest first aid station, if the situation warrants. e. Contact the Emergency Medical Services, if the situation warrants. f. If needed, start-up standby equipment. g. Notify Supervisor.
25. South Lime Safety Shower Alarm	<ul style="list-style-type: none"> a. Immediately go to the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
26. TLC No. 1 Tagline	<ul style="list-style-type: none"> a. Immediately check Truck Loading Conveyor No. 1 Area. b. Determine cause of alarm. c. Follow established First Aid Procedures. d. If personnel are injured, provide assistance to the nearest first aid station, if the situation warrants. e. Contact the Emergency Medical Services, if the situation warrants. f. If needed, start-up standby equipment. g. Notify Supervisor.
27. Sulfuric Acid Sump High Level	<ul style="list-style-type: none"> a. Immediately check the Sulfuric Acid Storage Area Sump. b. Determine type of liquid in the sump (water or chemical). c. If the liquid is water, open the isolation valve to the tank drain and start-up the sump pump. d. If the liquid is chemical, notify Supervisor and arrange for a hazardous waste truck to be called to the site. e. Observe safety procedures and wait for assistance.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
28. Recirculation Pumps 9 & 10 Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
29. Sodium Hypochlorite Storage Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately go to the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
30. Sulfuric Acid Storage Area Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
<i>GOAT CANYON PUMP STATION</i>	
1. Goat Canyon Pump Station System Failure	<ul style="list-style-type: none"> a. Check LCP-GCPS located at the MCC Room of the GCPS. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started or start up the standby unit manually. d. Notify Supervisor.

<u>SYSTEMS ALARMS</u>	<u>OPERATOR'S RESPONSE</u>
2. Goat Canyon Pump Station Safety Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
3. Goat Canyon Pump Station Fire Alarm	<ul style="list-style-type: none"> a. Follow procedures described in Section 7.1.6. b. Notify local fire department immediately. c. Notify Supervisor.
<i>HOLLISTER STREET PUMP STATION</i>	
1. Hollister Street Pump Station System Failure	<ul style="list-style-type: none"> a. Check LCP-HSPS located at the MCC Room of the HSPS. b. Determine cause of alarm. c. If the failed unit is provided with a standby unit, verify that the standby unit has started or start up the standby unit manually. d. Notify Supervisor.
2. Hollister Street Pump Station Safety Shower Alarm	<ul style="list-style-type: none"> a. Immediately check the location of the safety eyewash/shower. b. Follow established First Aid Procedures. c. Assist the person using the eyewash/shower to the nearest first aid station, if the situation warrants. d. Contact Emergency Medical Services, if the situation warrants. e. Notify Supervisor.
3. Hollister Street Pump Station Fire Alarm	<ul style="list-style-type: none"> a. Follow procedures described in Section 7.1.6. b. Notify local fire department immediately. c. Notify Supervisor.

7.2 GENERAL SAFETY GUIDELINES/PROCEDURES

The General Safety Guidelines/Procedures identified herein are organized into two main sections. The first section discusses general and process specific general safety guidelines and procedures. The second section identifies potential life-threatening emergencies different process locations at the South Bay IWTP but this identification may not be all inclusive. *It is the responsibility of every operator to learn about and know the intended operation and maintenance requirements for all equipment and systems at the plant, and to learn about and know the hazards and the safety procedures in place by the Operating Firm before conducting any work on and/or operating any equipment and/or systems at the plant.*

7.2.1 General and Process Specific Safety Guidelines/Procedures

The Safety Guidelines/Procedures are organized into two main sections. The first section discusses general and process specific safety guidelines and procedures. The second section identifies life-threatening emergencies at each of the different process locations.

7.2.1.1 Introduction

The safety hazards associated with municipal wastewater systems are many and varied. They include but are not limited to the dangers of handling chemicals (such as sulfuric acid, sodium hypochlorite, ferric chloride); the potential of contracting water borne diseases; confined space entry; the potential to be electrocuted; and the potential of harm or death from falling or slipping.

As a treatment facility operator, you should be aware of these hazards. You may be exposed to:

1. Physical Injuries or Death
2. Infections and Infectious Diseases
3. Oxygen Deficiency
4. Toxic or Suffocating Gases or Vapors
5. Explosive Gas Mixtures
6. Chemical Burns
7. Fire

8. Electrical Shock
9. Noise

The general safety procedures and precautions outlined herein are designed to highlight to you potential dangers at the SBIWTP and to highlight to you the need to be aware of these potential dangers and your personal responsibility to proceed with all of your work activities in a cautious, responsible and safe manner at all times.

Remember, accidents and injury may be prevented by using good common sense, applying a few basic rules, by acquiring a good knowledge of the facilities and the hazards peculiar to your job and facility.

You shall be required to know and follow all safety and health procedures established by your employer for your protection. You shall also obey all occupational safety and health standards, rules, regulations and orders issued according to the law. You shall not remove, displace or tamper with any safety devices, safeguards, notices or warnings.

BE INFORMED ABOUT HEALTH AND SAFETY AT YOUR WORKSITE

Because the South Bay IWTP is owned by the federal government, the worker health and safety requirements are administered and enforced by the U.S. Army Corps of Engineers. Refer to the most recent version of the Safety and Health Requirements Manual EM 385-1-1 published by the U.S. Army Corps of Engineers.

7.2.1.2 Safety Program

The purpose of a safety program is to increase operator knowledge and awareness and improve the working environment to make it as safe as possible. The South Bay IWTP has been constructed to be as safe as practicable and this section on safety has been prepared to give the operator general guidelines and recommended procedures to help ensure his/her well being.

It is responsibility of the Operating Firm's management to furnish a safe place to work; to provide safety training; to provide protective equipment where operation demands it; to provide adequate and safe tools and equipment to perform the operation; to instruct personnel in the proper and safe manner to operate and maintain the plant; and to provide Material Safety Data Sheets for all materials and chemicals used and/or stored at the plant.

It is the operator's responsibility to study and understand equipment manufactures detailed O&M manuals that are on file with the IBWC prior to any operation and/or maintenance activities; to know the potential hazards associated with all equipment, structures and chemicals on the plant site; to make sure he/she is properly trained by the Operating Firm's management prior to performing any activities on the site(s); to follow all general safety guidelines presented herein; to follow all specific safety procedures established by the Operating Firm's management; and to always proceed in a safe and responsible manner prevent personal injuries to himself/herself and/or to others on the site(s).

The Operating Firm's safety program should consist of the following items:

1. Regularly scheduled meetings should be established to allow operators to express their views on plant safety and should include films or speakers who can address topics related to safe operation.
2. Post conspicuously on your bulletin board the location and types of safety equipment available at your plant (such as first aid kit, breathing apparatus, confined space entry equipment, explosion meters fall prevention equipment and PPE). You, as the plant operator, shall be thoroughly familiar with the operation and maintenance of each piece of equipment. You shall review these at fixed intervals to be certain that you can safely use the piece of equipment as well as to be sure that it is in safe operating condition.
3. Contacts should be made with your local emergency response departments (see Section 7.1.15), fire and police departments to acquaint them with hazards at your plant, as well as to inform them of the safety equipment that is necessary to cope with problems that may arise. Arrange a joint training session with these people in the use of safety equipment and the handling of emergencies. They also should know access routes to and around the treatment plant.
4. If you have any specific problems of a safety nature, do not hesitate to contact notify your supervisor and/or officials in your state safety agency. They can be of great assistance to you. And do not forget your equipment manufacturers; their familiarity with your equipment will be of great value to you.
5. Also posted in conspicuous places in your plant should be such information as the phone numbers of your fire and police departments, ambulance service, and the nearest doctor who has agreed to be available on call. Having these immediately available at telephone sites may save your or a fellow worker's life. Check and make sure these numbers are listed at your plant. If they are not listed, **ADD THEM NOW.**

6. Prepare an emergency medical information sheet for each operator. Keep all of these sheets together in one binder. Send the binder with the ambulance that takes an injured operator to the hospital.
7. Maintain up-to-date Material Safety Data Sheets on file at the plant and provide up dated copies to all employees working at the plant.

7.2.1.3 Reporting and Investigating Accidents and Illness

Accident and Illness Prevention Program

Every employer is required by law to establish and maintain an accident and illness prevention program. This program must be prepared by the Operating Firm and must include as a minimum the following:

1. **Training for workers in general safe work practices** - the kinds of work procedures that most workers would use during the course of their work. Examples are: correct lifting procedures, use of personal protective equipment, knowledge of exits and emergency procedures, good housekeeping practices, fire protection procedures, evacuation, and safe handling of chemicals and flammable and toxic materials.
2. **Specific instruction for workers with regard to hazards unique to any job assignment.** Examples are but are not limited to use of self-contained breathing apparatus; requirements and procedures for locking or blocking out machinery; proper use and adjustment of machine guards; requirements and procedures for use of personal protective equipment; requirements and procedures for handling of hazardous substances and chemicals; fall prevention requirements and procedures; and electrical lock-out requirements and procedures.
 - a. If you are not receiving, or have not received, these general and specific safety training, ask your supervisor or your employer for it- don't take any chances, you may be endangering your life or the life of others.
3. **Scheduled periodic inspections of the worksite to identify and correct unsafe conditions or work practices.** How often these inspections are scheduled should be based on consideration of the types of hazards involved, skill and experience of workers, equipment or process changes, injury and illness rates and requirements of health and safety standards.

Procedures for Actual Accidents and Illness

The following steps should be taken after an actual accident, injury, or illness occurs at the plant:

1. Report and Record:
 - a. Report an accident or injury immediately to your supervisor.
 - b. In addition, you or your supervisor should fill out an accident report when you incur an accident, illness or injury while on the job. The report should include personnel information, date and time of incident, activity, type of accident/incident, result of accident/incident, nature of injury/illness, severity, parts of body affected, source of injury and human and physical factors involved.
 - c. Should the injury result in time away from the job, the additional forms should be filled out and submitted through normal channels.
2. Investigating:
 - a. Following this initial report of an accident, injury or illness, the plant supervisor should conduct an investigation into the incident, determine cause(s), take appropriate corrective action, and issue specific recommendations to plant staff as warranted to avoid a reoccurrence.
3. Conclusions and Recommendations:
 - a. Remember, accidents and injuries can be prevented. As a treatment plant operator, you have the responsibility of protecting yourself and other plant personnel or visitors by establishing safety procedures for your plant and seeing that they are followed. Learn to recognize potentially hazardous actions or conditions. When you recognize a hazard, take immediate steps to eliminate by corrective action. If correction is not possible, guard against the hazard by proper use of warning signs and devices and by establishing and maintaining safety procedures.

7.2.1.4 Employee Responsibilities

The following safety guidelines should be observed and strictly followed:

1. All written and oral safety rules shall be observed and particular job related hazards recognized such as presence of hazardous materials, noxious gases and vapors, presence of water-borne diseases, hazards of chemicals, etc.
2. No task shall be started until the proper instructions and procedures are understood.

3. Any hazardous conditions, unsafe equipment or unsafe working practice shall be reported to and rectified by your supervisor immediately.
4. All injuries or accidents shall be reported.
5. Smoking or use of open flames at any time in the headworks area, the unstabilized sludge storage area, the belt filter press area, and in all galleries is absolutely forbidden.
6. Do not operate any equipment without proper knowledge of its operation.
7. All safety devices and guards must be properly installed before operating any equipment.
8. Proper protective equipment should be used for particular job conditions.
9. Wearing loose clothing should be avoided because it may get caught in moving equipment.
10. Good housekeeping should be practiced at all times.
11. The rules of personal hygiene should be observed to avoid infection.
12. Wear a hard hat for overhead work.
13. Review the log book for any new procedures or comments from previous shifts.
14. Record all events, alarms or actions taken during your shift in the log book. This will maximize the safety of the operators in the shifts following yours.
15. Under no circumstances shall safety be sacrificed for speed.
16. No job shall be considered finished until the safety of the next person to use the equipment or facility has been maximized.
17. Be familiar with the general safety procedures and guidelines outlined in Sections 7.2.1 and 7.2.2, and of your employer's specific safety requirements.
18. Be familiar with all general Emergency Procedures outlined in Section 7.1, and all of your employer's specific requirements.
19. Know the location of the nearest fire extinguisher at all times.
20. Know the location of all flotation devices at all times.

21. Do not stand on handrails.

7.2.1.5 Personal Hygiene

The following general safety guides for personal hygiene should be observed whenever working around wastewater and its by-products:

1. Hands and fingers should be kept out of the nose, mouth, eyes and ears.
2. Rubber gloves should be worn when cleaning pumps, handling wastewater, screenings, grit or sludge or for any work in which you may come in direct contact with wastewater or its byproducts.
3. Gloves should be worn when hands are chapped or burned or when the skin is broken for any reason.
4. Hands should be washed thoroughly with soap and hot water before eating or smoking.
5. Fingernails should be kept short and foreign material should be removed from the nails with a stiff soapy brush.
6. Fresh work clothes and "street" clothes should not be stored in a locker with used work clothes. If possible, two lockers should be assigned each operator.
7. All cuts and scratches should receive first aid treatment.
8. A shower should be taken after each work day before leaving the treatment plant site. Work clothes should not be worn home.

7.2.1.6 Good Housekeeping

One of the most frequent causes of accidents or fires in a treatment plant is poor housekeeping. Therefore, it is essential that a routine program and schedule for housekeeping be established and strictly followed.

Some general guidelines for good housekeeping practices are as follows:

1. The treatment plant site should generally be kept clean and orderly and in a sanitary condition.
2. All identification and safety signs shall be in place and kept clean.

3. All trash, rubbish and loose debris should be picked up and placed in the proper receptacle.
4. The floors of all work areas should be kept clean and dry.
5. Walkways and staircases should be kept free of grease, sludge and oil.
6. Splash guards and drip pans should be used wherever possible to keep grease from machinery and pumps off the floor.
7. Solvent soaked rags and combustible wastes should be disposed of in air tight metal receptacles and removed daily from the plant.
8. All equipment and tools should be stored in their proper place.
9. Good housekeeping should be scheduled on a periodic basis, including floor drains and traps.

7.2.1.7 Protective and Safety Equipment

The following protective and safety equipment have been provided at the plant. The operator should know the location of each piece of equipment and how to use it. Furthermore, each piece should be periodically inspected or tested to assure it is present and in good working order.

1. Portable air blower and large diameter flexible hose for ventilation of confined space areas.
2. Atmospheric testing equipment to identify oxygen deficiencies and explosive, toxic, or combustible gases.
3. Hydrogen sulfide detectors.
4. Carbon monoxide detectors.
5. Self contained air breathing apparatus.
6. First aid kits.
7. Fire extinguishers.
8. Emergency shower/eyewash stations.
9. Explosion proof portable lights.

10. Protective clothing including safety goggles, face shields, hard hats, gloves, rubber boots and rain gear, and PPE.
11. Fall prevention equipment.

7.2.1.8 Identification Signs

The South Bay IWTP is provided with identification signs which include: self luminous exit signs, fire extinguisher location signs, chemical area and process area safety signs, hazardous materials fire/safety placards, and right-to-know labels and tags.

Self Luminous Exit Signs

Self luminous exit signs are provided throughout the plant. The signs have green lettering color, are capable of lasting 15 years, and conform to all relevant code requirements.

Fire Extinguisher Location Signs

Each surface mounted fire extinguisher at the plant is identified by a 15-inch by 15-inch sign located at the extinguisher. The sign reads "FIRE EXTINGUISHER" and has a directional arrow pointing to the extinguisher. The signs have a red background color and white lettering.

Chemical Areas and Process Areas Safety Signs

Safety signs are provided for chemical areas and process areas at the plant. These signs provide caution warnings and information of the hazards associated with the specific areas. These signs must be heeded to ensure your safety and the safety of the people around you. The background color and lettering color of the signs is dependent of the type of warning. The safety signs are described in the following table should be in-place at all times.

**TABLE 7.2-1
CHEMICAL AREAS AND PROCESS AREAS SAFETY SIGNS**

TEXT	AREA/ LOCATION	BACKGROUND COLOR	LETTER COLOR
"Caution Sulfuric Acid Protective Clothing Required Avoid Skin Contact Avoid Fumes"	Sulfuric Acid Bulk Storage Area Sulfuric Acid Fill Station	Yellow	Black

TEXT	AREA/ LOCATION	BACKGROUND COLOR	LETTER COLOR
"Caution Sodium Hypochlorite Protective Clothing Required Avoid Skin Contact Avoid Fumes"	Sodium Hypochlorite Bulk Storage Areas Sodium Hypochlorite Fill Stations	Yellow	Black
"Caution Sodium Bisulfite Protective Clothing Required Avoid Skin Contact Avoid Fumes"	Sodium Bisulfite Bulk Storage Area Sodium Bisulfite Fill Station	Yellow	Black
"Caution Caustic Soda (Sodium Hydrox- ide) Protective Clothing Required Avoid Skin Contact Avoid Fumes"	Sodium Hydroxide Bulk Storage Areas Sodium Hydroxide Fill Stations	Yellow	Black
"Caution Ferric Chloride Protective Clothing Required Avoid Skin Contact Avoid Fumes"	Ferric Chloride Bulk Storage Areas Ferric Chloride Fill Station	Yellow	Black
"Caution Polymer"	Bulk Polymer Storage Areas Polymer Mixing/Addition Areas Polymer Fill Stations	Yellow	Black
"Caution No Smoking Within 50 Feet"	Headworks Area Influent Pumping Station Grit Removal Area Primary Sedimentation Tanks and Galleries Unstabilized Sludge Storage Area Sludge Dewatering Building Truck Loading Building Lime Stabilization Facilities Chemical Storage Areas	White	Black
"Safety Shower/Eyewash"	At each shower/eyewash location, see section 7.2.2	Green	White
"Caution Hearing Protection Required"	Channel Aeration Blower Room Grit Pump Gallery, Blower Building	White	Black
"Caution Slippery When Wet"	Bulk Polymer Storage Areas Polymer Mixing/Addition Areas	Yellow	Black
"Caution High Voltage"	Main Switchgear Building Doors High Voltage and Medium Voltage Switchgears, MCCs All Doors of Electrical Substations	White	Black/Red

TEXT	AREA/ LOCATION	BACKGROUND COLOR	LETTER COLOR
"Caution 480 Volts"	Control Room Doors 480 Volt Switchgears Individually standing 480 volt Electrical Panels and Motor Con- trol Centers	White	Black/Red
"Caution Quicklime Dust"	Doors of Lime Storage Silos	Yellow	Black
"Caution Non-potable Water Do Not Drink"	All non-potable water hose bibs Sink in Primary Sedimentation Tank Gallery Sink in Secondary Effluent Gallery	White	Black
"Caution Automatic Equipment May Start at Anytime"	All equipment that can start automatically and/or remotely	White	Black

Hazardous Materials Safety and Fire Protection Placards

Safety and fire protection placards are provided to identify hazardous materials at the plant. Each placard is 12 inches square diamond shaped and is located adjacent to the chemical handling areas.

The safety placard provides recognition information by the color, symbol, United Nations (UN) hazard class number, and a hazard class warning or identification number. The hazardous materials safety placards for the plant are described below:

**TABLE 7.2-2
HAZARDOUS MATERIALS SAFETY PLACARDS**

PLACARD WORDING	UN CLASS NO.	PLACARD SYMBOL	BACKGROUND COLOR	LETTER/ SYMBOL COLOR	AREA/ LOCATION
Corrosive	8	Test Tube/ Hand/Metal	White (top half) Black (bottom half)	Black/White	Sodium Hypochlorite Bulk Storage Area

Corrosive	8	Test Tube/ Hand/Metal	White (top half) Black (bottom half)	Black/ White	Sulfuric Acid Bulk Storage Area Ferric Chloride Bulk Storage Area Ferric Chloride Mixing Area Sodium Hydroxide Bulk Storage Areas Sodium Bisulfite Bulk Storage Area Polymer Bulk Storage Areas Polymer Mixing/Addition Areas Lime Storage Areas
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The fire protection placards consist of a rating of the health, flammability, reactivity and special hazards for the specific chemical in an area. The number inside each hazard describes the chemical's degree of fire hazard. The degree of fire hazard ranges from 0 to 4 with the greatest degree being 4 and minimal degree being 0. The fire protection placards located at the plant are described below:

**TABLE 7.2-3
HAZARDOUS MATERIAL FIRE PROTECTION PLACARDS**

MATERIAL	HEALTH	FLAMMABILITY	REACTIVITY	SYMBOL
Caustic Soda (Sodium Hydroxide)	3	0	1	Test Tube/ Hand/Metal
Sulfuric Acid	3	0	2	W
Sodium Hypochlorite	3	0	1	Test Tube/ Hand/Metal
Sodium Bisulfite	3	0	1	Test Tube/ Hand/Metal
Ferric Chloride	3	0	1	Test Tube/ Hand/Metal
Quicklime	3	0	1	W

Right-to-know Labels and Tags

Right-to-know labels for each chemical storage tank and right-to-know tags along chemical bulk transfer pipelines and fill pipes are provided at the plant.

The right-to-know labels for storage tanks have adhesive backs and are provided with stick-on numbers/symbols and legends. Labels provide information such as chemical name and/or Chemical Abstracts Service (CAS) number, fire and health hazard, reactivity, personal protection and target organ legends.

The right-to-know tags for the chemical bulk transfer pipelines and fill lines are located at 25 feet maximum center to center distance within range on each side of through-wall pipe penetrations. Tags are constructed of laminated plastic and furnished with nylon tie fasteners.

7.2.1.9 General and Process Specific Mechanical Equipment Hazards and Safety Procedures

7.2.1.9.1 General Equipment Safety

The operator shall follow all procedures listed in the equipment manufacturer's Operation and Maintenance Manuals and all general precautions listed in this Operation and Maintenance Manual. However, some general safe practices to be considered when working on the plant equipment are as follows:

1. Never work on the mechanical or electrical parts of the units without first locking out the unit at either ROT switch or the main circuit breaker of the Motor Control Center or Distribution Panel or at the local disconnect switch. **Throughout the O&M Manual the term "Lock the respective ROT switch" is used. This entails**
 - 1) turning the switch to the "Off" position, and
 - 2) placing lock on switch or locking out electrical disconnect switches.

Be certain the breaker is properly tagged and locked out.

2. Good housekeeping is essential in all areas. Keep areas clean and free of slime, oil, greases, etc and properly store all equipment and tools. See that the guards and gratings are kept in place around the drives, cables, cutters, hoists and gears. If it is necessary to remove grating or guards, be certain to install temporary barriers and/or guards and be certain they are reinstalled prior to restarting the unit.

3. Always be aware of the possibility of toxic, explosive or flammable gases. A properly operating ventilation system is essential, particularly in the PST all galleries and the USSTs. Refer to Section 7.2.1.13 of this Part for the procedures of entry to a confined space.
4. Fire extinguishers should be provided in the equipment stations, properly located and maintained. They should be of a type that may be used on electrical equipment, as well as on solid material and/or power overload-type fires. The use of liquid-type fire extinguisher should be avoided. All-purpose A-B-C Chemical-type fire extinguisher are recommended.
5. Disconnect power before doing any work, and avoid bypassing or rendering inoperative any safety or protective devices.
6. Do not touch electrical systems or controls unless you are an expert. Even if you are qualified and authorized, use caution when operating and maintaining electrical controls, circuits and equipment. Operate only those switches and electrical controls installed for the purpose of your job. Do not open or work inside electrical cabinets or switch boxes unless you are authorized and a qualified electrician is at the area of work at all times.
7. Be aware of moving equipment, especially reciprocating equipment and rotating shafts. Guards over couplings and shafts should be provided and should be in place at all times. Do not wear loose clothing, rings and other jewelry around machinery. Long hair must be secured. Wear gloves when cleaning pump casings to protect your hands from dangerous sharp objects.
8. When starting rotating equipment after a shutdown, everyone should stand away from rotating shafts. Dust and oil or loose metal may be thrown from shafts and couplings, especially during start-up of equipment.
9. Always start equipment locally, if possible, so that you can shut it down quickly if it is operating unsafely.
10. Do not touch the shaft of rotating equipment to see if it is running. Avoid all moving parts, if possible.
11. Never disconnect piping with equipment in operation. It may cause serious injury from liquid or gas leaks.
12. Avoid extended exposure in close proximity to machinery with high intensity noise levels. Wear ear protection equipment.
13. Report any unusual sounding or unsafe equipment to the Supervisor.

14. If in doubt, don't use or operate a piece of equipment and notify your Supervisor immediately.

7.2.1.9.2 Material Handling

Material handling equipment includes the influent screens, pumps, blowers, compressors, sludge collectors, mixers, conveyors, etc. The operational hazards associated with these include but may not be limited to the following:

1. When manually cleaning the influent bar screens, be certain that you have a clean, firm surface to stand upon. Remove all slimes, rags, greases or other material that may cause you to slip. Good housekeeping in this area is absolutely necessary.
2. When raking the influent screen, leave plenty of room for the length of your rake handle so you won't be thrown off balance if the handle strikes the wall, railing or ceiling. Wear gloves to avoid slivers and scrapes. Injury may allow an infection to enter your body. Place all material in a container that may be easily removed from the area. Do not allow material to build up on the working surface.
3. Hot surfaces or casings caused by rotating machinery heat up.
4. Internal and external rotating parts may cause physical injury.
5. Power wiring may be hot if not securely disconnected and locked out.
6. Disconnected piping with equipment in operation may cause serious injury from liquid or gas leaks.
7. Pressure relief or vacuum relief valves may cause blast or suction effect which may cause personal injury.
8. Machinery may cause hearing damage. Avoid close proximity to machinery.
9. Exposed belts, sheaves, shafts and other rotating parts should clearly be avoided.
10. Never start a positive displacement pump against a closed head.
11. Never drain sediment traps from the bottom of the sight glass - always use the drip traps.

12. If adjustments of the collector must be made while the unit is in motion, stay clear of any situation where your body or any tools you are using may get caught under the flight, in the chain, or under a scraper.
13. Guards should be installed around or over all sludge collector gears, chains, sprockets, belts, or other moving parts. Keep these in place whenever the unit is in operation. Hand rails should always be in place and secured. Before using railing for support, be sure it is safely secured around the walkway.
14. In sign of danger while working with or around the screening conveyors, belt filter presses, sludge conveyors, lime conveyors, and lime stabilization equipment, pull the emergency tagline located around the equipment.
15. Never operate blowers with piping disconnected.
16. Blower casing pressure must not exceed the pressures identified in equipment manufacturer O&M manuals. Do not pressurize vented cavities from an external source, nor restrict the vents.
17. Do not use air blowers on explosive or hazardous gases.
18. Never open a drain line or sight glass drains without first consulting with your Supervisor.
19. Other potential hazards to safety may also be associated with operation of this equipment. All personnel working in or passing through the area should be warned by signs and trained to exercise adequate general safety precautions.

Other potential hazards associated with material handling equipment may include the operation of electrical motors, gear boxes, belts, pulleys, clutches, and chains. As with other rotating equipment, rotating parts should be shielded or guarded when equipment is running. Other personnel safety precautions, such as wearing safety glasses, gloves, and hearing protection shall be observed at all times.

7.2.1.9.3 Tanks

Tanks at the South Bay IWTTP include the Headworks channels and wetwells, Grit Chamber, Primary Sedimentation Tanks and channels, Unstabilized Sludge Storage Tanks, chemical storage and mixing tanks, Activated Sludge Tanks, Secondary Sedimentation

Tanks, and effluent distribution structures. The hazards associated with tanks include the following:

1. The greatest hazard involved in working on or in tanks is slipping or falling into the tank. Maintain a good non-skid surface on all stairs, ladders, catwalks and grating at all times.
2. Never enter a tank alone. There shall always be at least two persons on top of the tank for every person inside the tank. Follow confined space entry requirements (See Section 7.2.1.13). Always use a fall prevention safety harness equipped with a safety line at all times.
3. Your housekeeping program should include the brushing or cleaning of effluent weirs and launders (troughs). Be cautious when working inside or on the bottom of a tank.
4. Guardrails should be installed on the tank side of usual work areas or walkways. Handrails should always be in place and secured. Never use railings for support. An operator should never go into an unguarded area alone. When working around unguarded areas where work is done infrequently, at least two people should do the work. Approved life preservers (rated at minimum of 10+ lbs of buoyancy) with permanently attached hand lines should be accessible at strategic locations around the tanks. You shall wear a safety harness with a life line when servicing the tanks.
5. When applying protective coatings or cleaning with solvents in any tank, sump or pit, whether enclosed or open topped, use protective equipment to prevent skin burns from vapors and from inhaling vapors. This may involve the use of protect clothing as well as protective creams to be applied to exposed skin areas. An air supply must be used when painting or coating inside closed vessels or in open, deep tanks. Many paint fumes are heavier than air; therefore, ventilation must be from the bottom upward. Check with your paint supplier for any hazards involved in using their products.

7.2.1.9.4 Emergency Power Generator

1. Keep your electrical generating sets and the surrounding area clean and free from obstructions.
2. Provide appropriate fire extinguishers and install them in convenient locations. Consult your local fire department for the correct type of extinguisher to use. Do not use foam extinguishers on electrical fires. Use extinguishers rated ABC by NAPA.

3. Make sure that the fasteners on the generator sets are secure. Tighten supports and clamps, Keep guards in position over faces, belts, etc.
4. Do not wear loose clothing in the vicinity of moving parts, or jackets while working on electrical equipment.
5. Use extreme caution when working around hot or moving parts while the unit is running. Do not work on equipment when you are fatigued. Do not open a radiator or heat exchanger pressure cap while the engine is running.
6. Keep your hands away from moving parts. Before starting work on the generator set, disconnect the batteries to protect against accidental starting.
7. Do not fill fuel tank while engine is running. Do not smoke or use open flame in the vicinity of the engine or fuel tank. Fuel lines must be adequately secured and free from leaks. Piping at the engine must be approved flexible line (do not use copper). Be sure all fuel supplies have a positive shutoff valve.
8. Remove electrical power before removing protective shields or touching electrical equipment. Use rubber insulation mats placed on dry wood platforms over floor when working around the electrical equipment. Do not work with damp clothing or wet hands.
9. Do not smoke while servicing batteries. Lead acid batteries emit a highly explosive hydrogen gas that can be ignited by electrical arcing or spark sources.
10. Provide for an adequate exhaust system to discharge exhaust gases. Be sure that system is well ventilated and the exhaust system is leak free.
11. The lack of coolant in the engine may cause overheating without warnings from the cutoff switch. Do not use anti-freeze with an anti-lock formula, as this will clog the coolant system components cause from scaling of corrosion resistors.
12. Never use galvanized fuel lines or fittings with diesel fuel, as this galvanizing will react and contaminate the fuel.
13. Observe gen-set and load phase wiring. Gen-sets typically rotate counter-clockwise while utilities typically rotate clockwise, thus reversing phases. Reverser phases will prevent synchronizing gen-sets and cause circuit breakers to trip.

7.2.1.9.5 Welding

1. Piping and fittings shall comply with ANSI B31.1 Code 1983, or be at least of Schedule 40. Service piping should be protected by pressure relief devices set to function at not more than the design pressure of the system and discharging to a safe location. Piping should be maintained in a safe operating condition.
2. Only cylinders with approximately equal gas pressure should be manifolded. Welding hose, torch, regulators, flame arresters and gages used should be of the approved type.
3. Mixtures of fuel gases and air or oxygen may be explosive and should be guarded against. Avoid mixture of air or oxygen with combustible gases except at the burner, or in a standard torch or blowpipe.
4. Acetylene should not be utilized at a pressure above 15 psig. The use of liquid acetylene is prohibited.
5. Oil or grease should not be allowed to contact the oxygen cylinders, valves, or other fittings. Do not allow oxygen gas of cylinders to come in contact with oil or grease.
6. Fuel gas should not be used from cylinder without a suitable regulator. Cylinders should always be placed with valve end up.
7. Leaking cylinders or devices on cylinders should be taken outside, tagged, and emptied. The supplier should be notified of leaking cylinders.
8. Never tamper with safety devices, always open valves slowly. Check torches, hoses, cutoff valves, and other equipment daily for wear or leaks.
9. Cylinders should be kept far away from the welding operation so sparks cannot reach them.
10. Perform cutting and welding only in authorized areas; designate an individual for authorizing operation in other areas.
11. Cutters and welders should be trained in the safe operation of the equipment. Beware of hazardous locations and advise others of these.
12. Observe areas for flammable, combustible or explosive atmosphere potential and avoid working in these areas if at all possible. Where the area cannot be

made fire safe, readily ignitable combustibles shall be removed or protected from ignition sources.

13. Cylinders shall be properly secured at all times.

7.2.1.9.6 Small Hand Tools

1. Each operator should be responsible for the safe condition of tools and equipment they use. All tools should be inspected regularly prior to use; unsafe hand tools shall not be used.
2. All hand tools should be restricted to the use for which they are intended.

7.2.1.9.7 Air (Pneumatic) Powered Tools

1. Safety clips or retainers shall be installed on pneumatic impact tools to prevent dies and tools from being accidentally expelled from the barrel.
2. All hand-held powered tools used for nails, staples, and similar fasteners which operate at 100 psig or more pressure, shall have a safety device at the muzzle to prevent the tool from discharging until the muzzle is in contact with a solid surface.

7.2.1.9.8 Power Activated Tools

1. All hand-held powered circular saws, power drills, tappers, fasteners drives, disc sanders, belt sanders and chain saws shall be equipped with a constant pressure throttle control that will shut off the power when the pressure is released.
2. The operating control on hand-held power tools shall be so located as to minimize the possibility of its accidental operation.
3. Stationary grinding machines shall be safely secured and mounted on substantial bench or floor structure.
4. Abrasive wheels should be provided with protection hoods or safety guards to protect the employee from flying fragments.
5. Operators should always wear approved safety glasses or goggles whenever operating these tools. Gloves should be worn if practicable.

6. The operator shall use extreme care in protecting the power cord from damage. Care must also be taken to protect other personnel from flying fragments, shards or other hazards.

7.2.1.10 Electrical Hazards and Safety Procedures

7.2.1.10.1 General Electrical Safety

Most of the equipment in the treatment plant uses electricity as the power source. Maintenance of the equipment requires the operator to be exposed to electrical hazards that may result in shock or death if proper procedures are not followed.

The operator should never have to come in contact with any of the electrical equipment since all electrical work should be conducted only by qualified and authorized electricians. However, some general safe practices to be considered when working on or around the electrical gear/motors/equipment are as follows:

1. Use the remote-off-test switches and/or disconnect switches provided at all times. Resetting a circuit breaker at the motor control center can automatically start some motors in the plant. Therefore, the local lockout of the remote-off-test switches should be set before resetting any circuit breaker or motor overloads.
2. Electrical equipment and lines shall always be considered energized until it is positively confirmed to be properly de-energized (circuit breaker opened).
3. Do not use metal ladders or metal tape measures around electrical equipment.
4. Never open an electrical control panel without being accompanied by a qualified electrician.
5. No electrical safety device shall be made inoperative or by-passed.
6. All tools should have insulated handles. Electric tools should be grounded or double insulated.
7. Metal cased flashlights should never be used.
8. Jewelry should not be worn when working on or near electric circuitry.
9. Rubber mats should be used at control centers and electric panels.

10. All electric motors, switches and control boxes should be kept clean at all times.
11. In the event of accidental electrocution, respond as follows:
 - a. Do not touch victim until power is confirmed OFF. You may be electrocuted by touching the victim if power is still on. Keep bystanders clear of area.
 - b. Notify Supervisor immediately and call for emergency medical services (911).
 - c. First aid should be administered by an individual certified by the American Red Cross.
 - d. Electric shock carries a strong possibility of cardiac arrest. Administer CPR if required, until EMS arrives.
 - e. Check for more than one burn site on the victim, often electric current will burn tissue on entry and exit from the victim.
 - f. Cover all burns with loose dry dressings and then bandage.
 - g. Watch for signs of shock and treat as required in accordance with Red Cross recommended procedures.

7.2.1.10.2 General Rules for Working on Electrical Systems

Before starting work on any electrical system, safety precautions shall be observed. Before turning off any electrical service, be sure the wastewater process and systems will not be adversely affected.

Additional precautions must be observed whenever you intend to work on or remove instruments and controls directly attached to live or operating process.

Be sure that others are advised of your intended scope of work and that you obtain the approval of your Supervisor before proceeding with the work. They must be notified or warned of what you are going to do, when you are going to do it, how long it will take, and what will be affected. Like other pieces of equipment, instruments, control panels and other electrical devices being worked on shall be “tagged out”. This will advise others that an electrical device is out of service and must not be used.

The tagged out instruments and controls or other devices must be “logged” in the shift or daily operating log book. The operator must note alarm functions that are out of service, so that other means may be used to determine control limits.

Electric shock frequently causes serious injury. Do not attempt to repair electrical equipment unless you know what you are doing.

Only qualified and authorized persons shall work on electrical equipment or devices.

WARNING

High voltage and rotating parts can cause serious or fatal injury. The use of electric machinery, like all other utilization of concentrated power and rotating equipment, can be hazardous. Installation, operation, and maintenance of electric machinery should be performed by qualified personnel. Familiarization with NEMA Publication MG₂, Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators, the National Electrical Code, and sound local practices is recommended.

It is important to observe safety precautions to protect personnel from possible injury. Among the many considerations, personnel should be instructed to:

1. Avoid contact with energized circuits or rotating parts.
2. Avoid by-passing or rendering inoperative any safeguards or protective devices.
3. Avoid extended exposure in close proximity to machinery with high noise levels.
4. Use proper care and procedures in handling, lifting, installing, operating and maintaining the equipment.

Safe maintenance practices with qualified personnel are imperative. Before initiating maintenance procedures, be sure that all power sources are disconnected from the machine and accessories to avoid electric shock.

Failure to properly ground the frame of machinery may cause serious injury to personnel. Grounding should be in accordance with the National Electric Code and consistent with sound local practice.

7.2.1.10.3 Working in Pairs on Energized Equipment

For safety and in the event of accidents, it is extremely important to work in pairs on energized equipment and a qualified electrician shall do the work. Work shall not be performed on exposed energized parts of equipment or systems until the following conditions are met:

1. Responsible supervision has determined that the work is to be performed while the equipment or systems are energized.
2. Involved personnel have received instructions on the work techniques and hazards involved in working on energized equipment.
3. Suitable personal protective equipment has been provided and is used. Suitable insulated gloves shall be worn for voltages in excess of 300 volts, phase to phase.
4. Suitable eye protection has been provided and is used.
5. Where required, suitable barriers, barricades, tags, or signs are in place for personnel protection.

After the required work on an energized system or equipment has been completed, an authorized person shall be responsible for removing from the work area any temporary personal protective equipment and properly reinstalling all barriers or covers.

During the time that work is being done on any exposed conductor or exposed parts of equipment connected to high-voltage systems, a qualified electrical worker, or an employee in training, shall be in close proximity at each work location to:

1. Act primarily as an observer for the purpose of preventing an accident, and
2. Render immediate assistance in the event of an accident.

7.2.1.10.4 Grounding Lines and Buses

If the system is to be grounded, a grounding connection shall be made to the system neutral if available. This connection shall be made at or on the source side of the service entrance equipment.

Grounding connections shall be arranged to prevent objectionable current in the equipment grounding conductor during normal system operation.

Grounding connections shall be clamp type, pressure type, welder, or other approved type. Connections and electrodes shall be corrosion resistant and of adequate size, number, and location to effectively ground the system.

Local piping systems, well casings, building frames, and the like shall not be used as system grounding electrodes unless their resistance to ground is low enough to insure effective grounding. A system neutral derived from an adequately rated grounding transformer may be used for grounding a high-voltage system.

Where high-voltage equipment and associated metal enclosures or structures are intentionally isolated from ground, provisions shall be made to prevent any person who can make contact with ground from contacting the isolated equipment and associated metal enclosures or structures when such equipment is energized. Intentional grounds shall be applied after such equipment is de-energized and before access is permitted, in accordance with safe work procedures.

Suitable covers shall be installed on all boxes, fittings, and enclosures to prevent accidental contact with live parts or physical damage to parts or insulation.

Wiring, equipment installations, and metal enclosed buses shall be grounded in accordance with Article 6, Section 364-22 of Title 24 of California Administrative Code, State Electrical Code, and as described herein.

7.2.1.10.5 Back-feed

Each branch circuit or system control panel contains a 208 v, 3 phase to 120 v, 1 phase control transformer. Rewiring a control panel or supplying 120 v, 1 phase power from outside these panels may result in current back-feed through the transformer. This could result in a system power failure or circuit overload, breaking the circuit.

To avoid back-feed, you shall avoid introducing outside power to the control panel. Rewiring circuits within the panel should also be avoided unless careful planning is done to ensure circuit integrity prior to the work.

7.2.1.10.6 Grounding of Portable Electronic Tools

Plug-connected equipment such as portable, hand-held, motor-operated tools and utilization equipment such as drills, hedge clippers, lawn movers, wet scrubbers, sanders and saws shall be grounded.

The connection for grounding shall be made by one of these methods:

1. By means of the metal enclosure of the conductors supplying such equipment if grounding-type attachment plug with one fixed grounding contact is used for grounding the metal enclosures, and if conductor enclosure is secured to the attachment plug and to equipment by connector.
2. By means of a grounding conductor run with the power supply conductors in a cord assembly properly terminated in a grounding type attachment plug with one fixed grounding contact.

7.2.1.10.7 Live Buses and Specialized Locations

Exposed energized parts on one side and conducting surfaces on the opposite side of the workspace shall not be less than 3 ft. apart. Non-shielded insulated conductor shall be considered as energized parts.

Exposed energized parts on one side and grounded surfaces on the opposite side workspace shall not be less than 4 ft. apart. Concrete, brick, plaster or tile walls are considered grounded surfaced.

Exposed energized parts on both sides of the workspace shall not be less than 5 ft. apart.

Where energized parts are exposed, the minimum clear workspace shall not be less than 6-1/2 ft. high or less than 3 ft. wide, and shall permit a 90 degree opening of doors, or panels.

Exposed energized parts above areas where persons normally walk should be maintained at above an elevation of 8-1/2 ft.

When work is being conducted in passageways and open spaces, barriers or other means should be provided to percent usage when energized electrical equipment is exposed.

7.2.1.10.8 Metallic Objects in Work Area

No employee shall be permitted to approach or take objects without an approved insulating handle or without acceptable insulation closer than 2 ft. to the exposed energized parts.

Conductive ladders live line tools, conductive measuring tape, hand tools, pneumatic tools, and other metallic objects shall not be used near live exposed electrical equipment unless the objects are suitably insulated or the worker is suitably protected.

7.2.1.11 Laboratory Safety

The analyses to be done in the laboratory are limited to those necessary to measure parameters affecting operational efficiency. Consequently, the hazards associated with working in the laboratory are reduced. However, there are some general guidelines that should be followed whenever work is being done in the laboratory.

1. All chipped and cracked glassware should be discarded in a specific container marked for disposal of broken glass.
2. Chemicals should not be handled with the bare hands.
3. An emergency eye wash and shower are located for use in case of a spill.
4. Suction bulbs should be used on all pipettes.
5. Rubber aprons and gloves should be worn when working with corrosive chemicals.
6. A face shield or chemical type goggles should be used when working with corrosive chemicals.
7. A fume hood should be used when working with chemicals, acids, or samples which have toxic fumes.
8. Add acid to water, but never the reverse.
9. In case of a spill where acid gets on your clothes or skin, immediately wash it off with copious quantities of water. Report the accident and, if needed, call the paramedics or go to the hospital for proper care.
10. All chemicals should be clearly labeled. Never permit unlabeled or undated containers to accumulate in the lab.

11. Gloves should be worn when rubber-to-glass connections are to be made.
12. Smoking and eating in the laboratory are prohibited.
13. Tongs and asbestos gloves should be used to remove samples from hot plates, ovens or furnaces, etc.
14. Electrical equipment should be properly grounded.
15. Operators should thoroughly wash their hands with soap and hot water before eating or smoking.
16. A container of absorbent, inert material, such as sand, should be available for use in acid or base spills.
17. Locate and know how to operate the fire extinguisher provided in the laboratory.

7.2.1.12 Sample Collection

1. Whenever possible, wear rubber gloves when your hands may come in direct contact with wastewater or sludge. When you have finished sampling, always wash the gloves thoroughly, using a disinfectant type soap or lotion.
2. Never collect any samples with your bare hands if you have any broken skin areas such as cuts or scratches.
3. Do not climb over or go beyond guardrails or chains when collecting samples. Use sample poles, ropes and other devices as necessary to collect samples.

7.2.1.13 Hazardous Materials and Personal Safety

Know the potential hazards of the materials or chemicals you work with. Ask your supervisor for this information, or ask to see the Material Safety Data Sheet which manufacturer's supply with their products.

1. Read Material Safety Data Sheets for the materials you use at work; a Material Safety Data Sheet describes the potential hazards of exposure to a particular material, precautions to use in handling the material and personal protective equipment necessary and emergency procedures to use in case you are exposed to the material. Material Safety Data Sheets for the major chemicals used in the treatment process at the South Bay IWTP should be

provided by your supervisor, and should be on file and made readily available by your supervisor and/or the Operating Firm's management group. Material Safety Data Sheets should be provided for the following types of materials.

- Process chemicals
- Calibration gases for monitoring meters
- Maintenance lubricants
- Solvents and paints
- Diesel fuel

See your supervisor for Material Safety Data Sheets for specific chemicals and products used at the plant.

2. The operator **must know** the location and operation of all the shower/eyewash stations around the plant.
3. In the event of a spill or splashing of chemical onto a person's body or face, go to the nearest shower/eyewash station, and initiate the shower/eyewash by pulling the handle or using the foot pedal. The activation of the shower/eyewash station will annunciate at the respective local control panel and the PCC. See Section 7.2.2 for description of alarms.
4. The operator must read Material Safety Data Sheets and must know the recommendations contained therein in the event of bodily contact for each material stored and/or used on site especially acids used and/or stored onsite.

Every chemical storage area contains a sump, permanent submersible sump pump, and level controls. The level controls are connected to the respective LCP and to SCADA to annunciate on high liquid level locally and on the plant wide SCADA system. When a sump high level alarm occurs, the operator must perform the following procedures:

1. Assess what type of liquid is in the sump (water or chemical).
2. If water, the operator must do the following:
 - a. Open the appropriate isolation valves to the tank drainage system. Know what each valve does before opening any valves.
 - b. Manually start the sump pump as outlined in the respective Step by Step Start-Up Procedures in Chapter 4.
3. If chemical, the operator must do the following:
 - a. Notify your supervisor
 - b. Contact a licensed hazardous waste trucking/hauling company to obtain a truck.

- c. Have the licensed waste trucking/hauling company connect the truck piping to the quick-connect at the sump. All PPE requirements shall be adhered to and met by all persons working to clean-up the spill.
- d. Manually start the sump pump as outlined in the respective Step by Step Start-Up Procedures in Chapter 4.
- e. Wash down the chemical containment area and the sump pump. Ensure the sump pump is operational.

Know that exposure limits are set by CAL/OSHA for certain toxic substances (see the California Administrative Code, Title 8- Section 5155 and other sections).

In addition to the exposure limits specified by General Industry Safety Order 5155, the following carcinogens (cancer-causing substances) are strictly regulated by CAL/OSHA standards:

TABLE 7.2-4 REGULATED CARCINOGENS	
CHEMICAL NAME	COMMON OR TRADE NAME
2-acetylaminofluorene	2-AAF
4-aminodiphenyl	4-ADP
Benzidine and its salts	Benzidine
Bis (chloromethyl) ether	BCME
3,3'-Dichlorobenzidine and its salts	DCB
4-Dimethylaminoazobenzene	Methyl Yellow
beta-Naphthylamine	2-NA
4-Nitrobiphenyl	4-NBP
N-Nitrosodimethylamine	Diomethylamine
beta-Propiolactone	Betaprone
Methyl chloromethyl ether	CMME
alpha-Naphthylamine	1-NA
4,4'-Methylenebis (2-Chloroaniline)	MBOCA
Ethyleneimine	El
1,2 Dibromo-3-Chloropropane	DBCP
Asbestos	
Vinyl Chloride	
Coke Oven Emissions	

TABLE 7.2-4 REGULATED CARCINOGENS	
CHEMICAL NAME	COMMON OR TRADE NAME
Acrylonitrile	AN
Inorganic Arsenic	As
Ethylene Dibromide	EDB
Formaldehyde	
Benzene	
Ethylene Oxide	EtO

In the future, as other chemicals and materials are identified as carcinogens, CAL/OSHA standards regulating their use, handling and storage will be developed. You can get this information from the nearest office of the Division of Occupational Safety and Health.

Carefully read and follow the directions on the label of any material or chemical you use.

Follow the manufacturer's instructions for use, maintenance and repair of any equipment, machinery or personal protective equipment you use.

If you have questions about how to do your job safely or how to safely handle the materials you are required to use, ask your supervisor.

Attend information meetings or seminars about occupational safety or health given for your industry or job by your union, CAL/OSHA, state or local agencies or consultants.

7.2.1.14 Confined Space Entry

The National Institute for Occupational Safety and Health (NIOSH) estimates that millions of workers may be exposed to hazards in confined spaces each year. The Institute's investigations of confined space injuries and fatalities indicate that workers usually do not recognize that they are working in a confined space and that they may encounter unforeseen hazards. In most cases testing and monitoring of the atmosphere is not performed and rescue procedures are seldom planned.

NIOSH's definition of a confined space is "a space which by design has limited openings for entry and exit; unfavorable natural ventilation which could contain or produce dangerous air contaminants and which is not intended for continuous employee occupancy."

1. Some Confined Spaces Are Easy To Recognize: Manholes, sewers, tunnels, pipelines, storage tanks and underground vaults can be classified as confined spaces.
2. Some May Not Be So Easy To Recognize: Open-topped water tanks, open pits, and enclosures with bottom access are also confined spaces. They prohibit natural ventilation, are potential sources of gas generation and can keep gases from escaping, causing a potentially hazardous atmosphere.
3. When In Doubt Expect The Worst: The most serious threat to the health and safety of the worker concerns the atmosphere of the confined space. The unfavorable ventilation of a confined space can cause the atmosphere to be life threatening instead of life supporting. Explosive and toxic gases (hydrogen sulfide and carbon monoxide are two of the most common toxic gases found in confined spaces) and lack of oxygen cause the majority of confined space injuries and fatalities. More than 60% of the fatalities occur among would-be rescuers of initial victims.
4. The entrants, attendants, and supervisors who perform or assist in confined space entry work must be properly trained.
5. Develop confined space entry check list. Consider as a minimum the following items:
 - a. Atmospheric Testing & Monitoring
 - b. Procedures
 - Initial Plan
 - Standby Person
 - Communications/Observation
 - Rescue
 - Work
 - c. Preparation
 - Isolate/Lockout/Tag
 - Purge and Ventilate
 - Cleaning Processes
 - Requirements for Special equipment/tools
 - Labeling & Posting
 - d. Safety Equipment and Clothing
 - Head Protection
 - Hearing Protection
 - Hand Protection

- Foot Protection
 - Body Protection
 - Respiratory Protection
 - Safety Belts
 - Lifelines, Harness
- e. Rescue Equipment
6. Proper methods of testing air in confined spaces should be practiced at all times.
7. Pre-Entry Items. Consider as a minimum the following:
- a. Entry Permits Required.
 - b. Open all access ways, hatches, and pathways.
 - c. Close off tag and lock all lines terminating in the space.
 - d. Ventilate the space with an explosion proof blower for at least one hour before contemplated entry.
 - e. Test the space with a gas detector to check for explosive atmosphere, hydrogen sulfide (H₂S), and lack of oxygen (O₂). Test the space in several places to insure that hazardous conditions do not exist.
 - f. If the test shows safe conditions, entry is permissible without use of a self-contained breathing apparatus. Continued ventilation and continuous use of the gas detector is required, however. Any detection of a hazardous condition should lead to immediate exit from the space.
 - g. If the test shows that a hazardous condition exists, the confined space cannot be entered until a self-contained breathing apparatus is worn or continued ventilation clears the area of a hazardous gas condition.
8. Equipment Required for Entry. Consider as a minimum the following:
- a. A safety harness and a life line for each person entering the space.
 - b. A hoist or other approved means of lifting a man out of the space.
 - c. A gas detector.
 - d. A self-contained breathing apparatus.
 - e. At least two people outside of the space for each person entering the space
 - f. All tools needed to do the job and a means to lower them into the space.
9. Entry. Consider as a minimum the following:
- a. The employees entering the space must wear a gas detector at all times while in the space.
 - b. The standby employees outside the space must wear the breathing apparatus (SCBA) and have it ready for immediate use. The mask need not be worn unless entry is required.
 - c. The area should be evacuated immediately upon detection by the gas detector of an unsafe condition.

10. Post-Entry. Consider as a minimum the following:
 - a. Record entry date, details of sealing off and ventilating the space, gas detector findings, names of personnel entering the space and any other relevant information into the safety log.
11. Listed below are references for further information on confined space entry:
 - a. A Guide to Safety in Confined Spaces, (NIOSH Publication Number 87-113).
 - b. Working in Confined Spaces, (NIOSH Publication Number 80-106) December, 1979.
 - c. ALERT: Request for Assistance in Preventing Occupational Fatalities in Confined Spaces, (NIOSH Publication Number 86-100) January, 1986.

7.2.1.15 Oxygen Deficiency

1. Air normally contains by volume about 21 percent oxygen and 79 percent nitrogen and traces of other gases. Any atmosphere containing less than 21 % oxygen is called oxygen deficient. When the oxygen level drops below 12 percent, it may be fatal. Oxygen deficiency is believed to be the leading cause of death in sewers.
2. Basically, oxygen deficiency is the result of poor ventilation. It may occur by the displacement of air by some other gas or because of the consumption, adsorption or biochemical depletion of available oxygen as the result of the decomposition of organic matter.
3. **Exposure to atmospheres containing 12% or less oxygen can bring about unconsciousness without warning and so quickly that the individual cannot help or protect him/herself.**

The following table shows the effects and symptoms of low oxygen content atmosphere.

TABLE 7.2-5 POTENTIAL EFFECTS OF OXYGEN-DEFICIENT ATMOSPHERES	
Oxygen Content (% by Volume)	Effects and Symptoms (At Atmospheric Pressure)
19.5%	Minimum permissible oxygen level.

TABLE 7.2-5 POTENTIAL EFFECTS OF OXYGEN-DEFICIENT ATMOSPHERES	
Oxygen Content (% by Volume)	Effects and Symptoms (At Atmospheric Pressure)
15-19%	Decreased ability to work strenuously. May impair coordination and may induce early symptoms in persons with coronary, pulmonary or circulatory problems.
12-14%	Respiration increases in exertion, pulse up, impaired coordination, perception, judgment.
10-12%	Respiration further increases in rate and depth, poor judgment, lips blue.
8-10%	Mental failure, fainting, unconsciousness, ashen face, blueness of lips, nausea, and vomiting.
6-8%	8 minutes, 100% fatal, 6 minutes 50% fatal; 4-5 minutes, recovery with treatment.
4-6%	Coma in 40 seconds, convulsions, respiration ceases, death.
These values are approximate and vary as to the individual's state of health and his physical activities.	

7.2.1.16 Noxious Gases and Vapors

A noxious gas or vapor is one directly or indirectly injurious to the health or life of human beings. It may present a hazard by causing burns, explosions, asphyxiations or poisoning. The operator should be thoroughly familiar with the characteristics, sources and means of testing for the common gases associated with treatment plant facilities.

The operator should always be aware of the possibility of the presence of any of these gases and provide adequate ventilation or utilize the self contained air breathing apparatus provided whenever working in any confined space in the treatment plant site.

Some key points to consider regarding noxious gases and vapors are listed below:

1. Certain concentrations of combustible gases can be life threatening. When fuel, oxygen and a source of ignition are present at the same time and in the right mixture, serious explosion or fire is the result.

2. All combustible gases and vapors have a different explosive range.
3. Proper gas monitoring equipment should be used at all times.
4. Leaking gases and liquids can create a hazardous atmosphere in a confined space. Leaking materials from storage tanks, natural gas lines, underground storage tanks, process flanges and valves, etc. can find their way into confined spaces.
5. Decomposing organic matter can create a hazardous atmosphere in a confined space. Decomposing organic matter, such as domestic waste and plant life, can produce Methane, Carbon Monoxide, Carbon Dioxide and Hydrogen Sulfide, and can consume existing oxygen.
6. Combustion or oxidation can create a hazardous atmosphere in a confined space.
7. Cleaning processes can create a hazardous atmosphere in a confined space. Even after an empty tank has been purged, gases can desorb from porous walls or be liberated from sludge during cleaning.
8. Oxygen enrichment can create a hazardous atmosphere in a confined space. Do not purge confined spaces with oxygen in place of air improper blanking off of oxygen lines can produce oxygen enrichment.
9. Absorption of oxygen can create a hazardous atmosphere in a confined space.
10. Combustible dust concentrations can create a hazardous atmosphere in a confined space.
11. **EVERY POSSIBLE ATMOSPHERIC HAZARD WHICH MAY BE ENCOUNTERED IN A CONFINED SPACE CANNOT BE LISTED**

Health effects and symptoms for some of the gases more commonly found in treatment plants are listed below. For additional information, call NIOSH (1-800-356-4674).

1. The effects of **hydrogen sulfide** are life threatening: Below is a table showing the potential effects of hydrogen sulfide exposure.

TABLE 7.2-6 POTENTIAL EFFECTS OF HYDROGEN SULFIDE EXPOSURE		
PPM*	Effects and Symptoms	Time
10	Permissible Exposure Level	8 Hours
50-100	Mild Eye Irritation, Mild Respiratory Irritation	1 Hour
200-300	Marked Eye Irritation, Marked Respiratory Irritation	
500-700	Unconsciousness, Death	½-1 Hour
1000 or More	Unconsciousness, Death	Minutes
* These values are approximate and vary as to the individual's state of health and his physical activity.		

In high concentrations of hydrogen sulfide, a worker may collapse with little or no warning.

2. The effects of **carbon monoxide** are life threatening: Carbon monoxide is an odorless, colorless gas that may build up in a confined space. Below is a table that shows the potential effects of carbon monoxide exposure.

**TABLE 7.2-7
POTENTIAL EFFECTS OF
CARBON MONOXIDE EXPOSURE**

PPM	Effects and Symptoms	Time
50	Permissible Exposure Level	8 Hours
200	Slight Headache, Discomfort	3 Hours
400	Headache, Discomfort	2 Hours
600	Headache, Discomfort	1 Hour
1000- 2000	Confusion, Headache, Nausea	2 Hours
1000- 2000	Tendency to Stagger	1½ Hours
1000- 2000	Slight Palpitation of the Heart	30 Min.
2000- 2500	Unconsciousness	30 Min.
4000	Fatal	Less Than 1 Hour
These values are approximate and vary as to the individual's state of health and his physical activity.		

7.2.2 Identification of Life-Threatening Conditions

In the event of any of the following alarms, immediately respond to the specific area, call EMS, and report to your immediate supervisor.

7.2.2.1 Headworks

The headworks consist of the screening area, influent pump station, aerated grit chamber, and a dedicated Odor Reduction Station.

Screening Conveyors Emergency Taglines

The screening conveyors (1 and 2) tagline switches allows the operator to stop conveyor operation from anywhere along the run of the conveyors and are equipped with a positive safety lock to prevent accidental reset of the switch. For the screening conveyor taglines, the LCP-HWE and the PCC will annunciate hard-wired alarms and SCADA alarms as follows:

<u>Alarm Name</u>	<u>Display Location</u>
Screening Conveyor No. 1 Tag-Line Alarm	LCP-HWE and SCADA
Screening Conveyor No. 2 Tag-Line Alarm	LCP-HWE and SCADA

Combustible Gas and Hydrogen Sulfide Gas Sensors

The Influent Channel, Storage Bin Area, Influent Pump Station, and the Grit Dewatering Area are provided with Combustible Gas (CG) sensors which perform continuous monitoring, indication and analyses of the concentration of the CG and comparing this concentration against the lower explosive limit (LEL). Each CG sensor transmits a hard-wired signal, corresponding to the CG detected, to the local control panel of the Headworks Gas Detection Monitoring Systems located at the HW-LCC. The local control panel is provided with “WARNING” condition at 2.5% LEL, “ALARM” condition at 3.5% LEL, and “FAILURE”. The Warning % LEL and the Alarm % LEL setpoints are adjustable. Any of the three local conditions are hard-wired to annunciate a general alarm at LCP-HWE and SCADA alarms.

Influent Channel, Storage Bin Area, Influent Pump Station, and the Grit Dewatering Area H₂S sensors are provided to continuously monitor the concentration of odorous gases and to transmit a signal corresponding to the H₂S detected to the Headworks Gas Detection Monitoring System and is indicated at the HW-LCC. Sensor “FAILURE”, “WARNING” condition at 8 ppm, and “ALARM” at 10 ppm are displayed at the local panels. The

Warning H₂S concentration and the Alarm H₂S concentration setpoints are adjustable. Any of the three local conditions are hard-wired to annunciate a general alarm at LCP-HWE and at the PCC:

<u>Alarm Name</u>	<u>Display Location</u>
Headworks Influent Channel Combustible Gas High Level Alarm	LCP-HWE and SCADA
Headworks Influent Channel H ₂ S Gas High Level Alarm	LCP-HWE and SCADA
Storage Bin Area Combustible Gas High Level Alarm	LCP-HWE and SCADA
Storage Bin Area H ₂ S Gas High Level Alarm	LCP-HWE and SCADA
Influent Pump Station Combustible Gas High Level Alarm	LCP-HWE and SCADA
Influent Pump Station H ₂ S Gas High Level Alarm	LCP-HWE and SCADA
Grit Dewatering Area Combustible Gas High Level Alarm	LCP-HWE and SCADA
Grit Dewatering Area H ₂ S Gas High Level Alarm	LCP-HWE and SCADA

Shower/Eyewash Stations at the Headworks Odor Reduction Station

The Odor Reduction Station at the headworks uses 50% sodium hydroxide solution (also called caustic or NaOH) and 12.5% sodium hypochlorite solution (NaOCl) to remove odors from the air at the headworks area. The chemical solutions are stored in tanks within containment areas at the Odor Reduction Station. In the event of a spill or splashing of these chemicals onto a person's body or face, four shower/eyewash stations are provided around the Odor Reduction Station.

Each shower/eyewash station is equipped with a flow switch to detect flow due to activation of the shower/eyewash. The station is locally provided with a rotating red beacon to illuminate when flow is detected. Activation of the shower/eyewash station sends hard-wired signals to annunciate alarms at the LCP-ORHW and on SCADA:

<u>Alarm Name</u>	<u>Display Location</u>
Recirculation Pumps Area Shower	LCP-ORHW and SCADA
Fill Panel Area Shower	LCP-ORHW and SCADA
Sodium Hypochlorite Storage Area Shower	LCP-ORHW and SCADA
Caustic Storage Area Shower	LCP-ORHW and SCADA

7.2.2.2 Primary Sedimentation Facilities

The Primary Sedimentation Facilities consist of primary sedimentation tanks, channel aeration system, rapid mix facilities, sludge collection and pumping, primary skimmings processing facilities, PST chemical addition facilities, and a dedicated Odor Reduction Station.

Shower/Eyewash Stations at the PST Chemical Addition Facilities

The Chemical Addition Facilities (East) at the Primary Sedimentation Facilities stores 43 - 45% ferric chloride solution and 6% polymer solution in the bulk storage tanks within containment areas. The bulk chemicals are diluted with non-potable water in respective mixing tanks before being added to the primary influent stream. In the event of a spill or splashing of these chemicals onto a person's body or face, two shower/eyewash stations are provided around the Chemical Addition Facilities.

Each station is equipped with a flow switch to detect flow due to activation of the shower/eyewash. The station is locally provided with a rotating red beacon to illuminate when flow is detected. Activation of the shower/eyewash station sends hard-wired signals to annunciate alarms at the LCP-PSTE and on SCADA:

<u>Alarm Name</u>	<u>Display Location</u>
Polymer Addition East Safety Shower	LCP-PSTE and SCADA
Ferric Chloride Addition East Safety Shower	LCP-PSTE and SCADA

Shower/Eyewash Stations at the PST Odor Reduction Station

The Odor Reduction Station at the Primary Sedimentation Facilities uses 50% sodium hydroxide solution (also called caustic or NaOH) and 12.5% sodium hypochlorite solution (NaOCl) to remove odors from the air at the Primary Sedimentation Facilities. The chemical solutions are stored in tanks within containment areas at the Odor Reduction Station. In the event of a spill or splashing of these chemicals onto a person's body or face, four shower/eyewash stations are provided around the Odor Reduction Station.

Each station is equipped with a flow switch to detect flow due to activation of the shower/eyewash. The station is locally provided with a rotating red beacon to illuminate when flow is detected. Activation of the shower/eyewash station sends hard-wired signals to annunciate alarms at the LCP-ORPST and on SCADA:

<u>Alarm Name</u>	<u>Display Location</u>
Recirculation Pumps Area Shower	LCP-ORPST and SCADA
Fill Panel Area Shower	LCP-ORPST and SCADA
Sodium Hypochlorite Storage Area Shower	LCP-ORPST and SCADA
Caustic Storage Area Shower	LCP-ORPST and SCADA

7.2.2.3 Activated Sludge Facilities

The Activated Sludge System consists of the Activated Sludge Tanks (AST), and the process air blowers and electrical systems at the North Blower Structure. There are no conveyors, no tag-lines, no chemical storage/addition facilities and no combustible gas detectors associated with the Activated Sludge Facilities.

7.2.2.4 Secondary Sedimentation Facilities

The Secondary Sedimentation Facilities generally consist of the Secondary Sedimentation Tanks; and the RAS/WAS wet well and pumps, NPW Pump Stations and electrical systems associated therewith. There are no conveyors, no tag-lines, no chemical storage/addition facilities and no combustible gas detectors associated with the Secondary Sedimentation Facilities.

7.2.2.5 Chlorination, De-Chlorination, and Non-Potable Water Facilities

The Chlorination Facilities consist of sodium hypochlorite metering pumps, containment area sump pumps, and sodium hypochlorite storage tanks with level controls, which provide chlorination to the primary effluent, primary sludge and Headworks. The De-chlorination Facilities consist of sodium bisulfite metering pumps, containment area sump pumps, and sodium bisulfite storage tanks with level controls, which provided dechlorination to the primary effluent after the chlorination process. The Non-Potable Water Facilities consist of a hydro-pneumatic tank, compressors, non-potable valve, pumps, and wet well with level controls at NPWPS 1 and pumps and wet well level controls at NPWPS 2.

Shower/Eyewash Stations at the Chlorination and De-chlorination Chemical Storage Area

The Chlorination and De-chlorination Facilities store 12.5% sodium hypochlorite solution (NaOCl) and 25% sodium bisulfite solution (NaHSO₃) in the bulk storage tanks within a containment area. In the event of a spill or splashing of chemical onto a person's body or face, two shower/eyewash stations are provided around the Advanced Primary Chlorination and Dechlorination Facilities.

Each station is equipped with a flow switch to detect flow due to activation of the shower/eyewash. The station is locally provided with a rotating red beacon to illuminate when flow is detected. Activation of the shower/eyewash station sends hard-wired signals to annunciate alarms at the LCP-NaOCl and the PCC:

<u>Alarm Name</u>	<u>Display Location</u>
NaOCl Area Safety Shower	LCP-NaOCl and SCADA
NaHSO ₃ Area Safety Shower	LCP-NaOCl and SCADA

7.2.2.6 WAS Thickening Facilities

The WAS Thickening Facilities consist of dissolved air flotation (DAF) units, pumps, compressors and a polymer bulk storage tank, mixing tank and polymer transfer and addition pumps. The polymer storage and polymer pump area is equipped with a shower/eyewash station with a flow switch to detect flow when the station is activated. Activation of the shower/eyewash station sends a signal to SCADA.

<u>Alarm Name</u>	<u>Display Location</u>
DAF Area Safety Shower	SCADA

7.2.2.7 Unstabilized Sludge Storage Facilities

The Unstabilized Sludge Storage Facilities consist of storage tanks, mixing pumps, and a dedicated Odor Reduction Station.

Combustible Gas Sensors

Continuous monitoring, indication and analyses of the tank atmosphere to detect the presence of combustible gases or vapors to the lower explosive limit (LEL) is provided with a combustible gas sensor/analyzer. A high combustible gas level (25% LEL) is hard-wired annunciated at LCP-USS and to SCADA.

<u>Alarm Name</u>	<u>Display Location</u>
USST No. 1 and USST No. 2 Combustible Gas High Level Alarms	LCP-USST and SCADA

Shower/Eyewash Stations at the USST Odor Reduction Station

The Odor Reduction Station at the Unstabilized Sludge Storage Tank (USST) Facilities uses 50% sodium hydroxide solution (also called caustic or NaOH) and 12.5% sodium hypochlorite solution (NaOCl) to remove odors from the air at the Unstabilized Sludge Storage Facilities. The chemical solutions are stored in tanks within containment areas at the Odor Reduction Station. In the event of a spill or splashing of these chemicals onto a person's body or face, four shower/eyewash stations are provided around the Odor Reduction Station.

Each station is equipped with a flow switch to detect flow due to activation of the shower/eyewash. The station is locally provided with a rotating red beacon to illuminate when flow is detected. Activation of the shower/eyewash station sends hard-wired signals to annunciate alarms at the LCP-ORUSS and to SCADA:

<u>Alarm Name</u>	<u>Display Location</u>
Recirculation Pumps Area Shower	LCP-ORUSS and SCADA
Fill Panel Area Shower	LCP-ORUSS and SCADA
Sodium Hypochlorite Storage Area Shower	LCP-ORUSS and SCADA
Caustic Storage Area Shower	LCP-ORUSS and SCADA

7.2.2.8 Sludge Dewatering Facilities

The Sludge Dewatering Facilities consist of pumping facilities, polymer conditioning, belt filter presses, and a dedicated Odor Reduction Station.

Belt Filter Presses Emergency Taglines and Emergency Stops

Each belt filter presses are provided with taglines at two elevations (first and second floor of the Sludge Dewatering Building, two belt filter press emergency stop pushbuttons located on either side of the press, and one emergency stop pushbutton located at the respective LCP-BFP. For belt filter presses taglines or emergency stop pushbuttons, the LCP-BFPs will annunciate a general hard-wired "Emergency Stop" alarm as follows:

<u>Alarm Name</u>	<u>Display Location</u>
Emergency Stop	LCP-BFP1
Emergency Stop	LCP-BFP2
Emergency Stop	LCP-BFP3
Emergency Stop	LCP-BFP4

For belt filter presses taglines and emergency stop pushbuttons, the LCP-SP and the SCADA will annunciate similar hard-wired alarms as follows:

<u>Alarm Name</u>	<u>Display Location</u>
Belt Filter Press No. 1 Tag-Line Alarm	LCP-SP and SCADA
Belt Filter Press No. 2 Tag-Line Alarm	LCP-SP and SCADA
Belt Filter Press No. 3 Tag-Line Alarm	LCP-SP and SCADA
Belt Filter Press No. 4 Tag-Line Alarm	LCP-SP and SCADA
Belt Filter Press No. 1 Emergency Stop	LCP-SP and SCADA
Belt Filter Press No. 2 Emergency Stop	LCP-SP and SCADA
Belt Filter Press No. 3 Emergency Stop	LCP-SP and SCADA
Belt Filter Press No. 4 Emergency Stop	LCP-SP and SCADA

Shower/Eyewash Stations at the Solids Processing Polymer Conditioning Facilities

The Solids Processing Polymer Conditioning Facilities near the Sludge Dewatering Building store 6% polymer solution in the bulk storage tanks within a containment area. The bulk polymer is diluted with non-potable water in a mixing tank before being added to the sludge to be dewatered. In the event of a spill or splashing of polymer onto a person's body or face, two shower/eyewash stations are provided around the Polymer Condition Facilities.

Each shower/eyewash station is equipped with a flow switch to detect flow due to activation of the shower/eyewash. The station is locally provided with a rotating red beacon to illuminate when flow is detected. Activation of the shower/eyewash station sends hard-wired signals to annunciate alarms at the LCP-SP and to SCADA:

<u>Alarm Name</u>	<u>Display Location</u>
Bulk Polymer Safety Shower	LCP-SP and SCADA
Polymer Addition Area Shower	LCP-SP and SCADA

Shower/Eyewash Stations at the Solids Processing Odor Reduction Station

The Odor Reduction Station at the Solids Processing Facilities uses 50% sodium hydroxide solution (also called caustic or NaOH), 12.5% sodium hypochlorite solution (NaOCl), and 93% sulfuric acid (H₂SO₄) to remove odors from the air at the Solids Processing Facilities. The chemical solutions are stored in tanks within containment areas at the Odor Reduction Station. In the event of a spill or splashing of these chemicals onto a person's body or face, seven shower/eyewash stations are provided around the Odor Reduction Station.

Each shower/eyewash station is equipped with a flow switch to detect flow due to activation of the shower/eyewash. The station is locally provided with a rotating red beacon to illuminate when flow is detected. Activation of the shower/eyewash station sends hard-wired signals to annunciate alarms at the LCP-ORSP and to SCADA:

<u>Alarm Name</u>	<u>Display Location</u>
Recirc. Pumps 7 & 8 Area Shower	LCP-ORSP and SCADA
Recirc. Pumps 9 & 10 Area Shower	LCP-ORSP and SCADA
Sodium Hypochlorite Storage Area Shower	LCP-ORSP and SCADA
Caustic Storage Area Shower	LCP-ORSP and SCADA
Caustic Fill Panel Area Shower	LCP-ORSP and SCADA
Sulfuric Acid Storage Area Shower	LCP-ORSP and SCADA
Sulfuric Acid Fill Panel Area Shower	LCP-ORSP and SCADA

7.2.2.9 Sludge Conveyance and Lime Stabilization Facilities

The Lime Stabilization Facilities consist of sludge conveyance system, lime storage and conveyance, lime/sludge mixing, and stabilized sludge conveyance/truck loading system.

Sludge Conveyance Emergency Taglines

Each belt filter press conveyor (1A, 1B 2A, and 2B) is provided with taglines along both sides of each conveyor. For BFP conveyor taglines, the LCP-AE, LCP-SP and to SCADA will annunciate hard-wired alarms as follows:

<u>Alarm Name</u>	<u>Display Location</u>
BFP Conveyor No. 1A Tagline	LCP-AE, LCP-SP, and SCADA
BFP Conveyor No. 1B Tagline	LCP-AE, LCP-SP, and SCADA
BFP Conveyor No. 2A Tagline	LCP-AE, LCP-SP, and SCADA
BFP Conveyor No. 2B Tagline	LCP-AE, LCP-SP, and SCADA

Each truck loading conveyor is provided with taglines along both sides of each conveyor. For truck loading conveyor taglines, the LCP-AE, LCP-SP and to SCADA will annunciate hard-wired alarms as follows:

<u>Alarm Name</u>	<u>Display Location</u>
Truck Loading Conveyor (TLC) No. 1 Tag-Line	LCP-AE, LCP-SP, and SDADA
Truck Loading Conveyor (TLC) No. 2 Tag-Line	LCP-AE, LCP-SP, and SCADA

Lime Stabilization Emergency Taglines and Emergency Stops

Each lime transfer conveyor (1 and 2) is provided with taglines along both sides of each conveyor and with an emergency stop pushbutton located near the discharge end of the conveyor.

Each sludge/lime mixer (1 and 2) is provided with taglines along both sides of each conveyor and with two (one for each side) field mounted emergency stop buttons for an emergency shutdown of the unit.

The emergency taglines and the emergency stop pushbuttons of the lime transfer conveyors are interlocked with the tagline switches and emergency stop pushbuttons of the respective sludge/lime mixer. For any lime transfer conveyor or sludge/lime mixer taglines and emergency stops, the LCP-LS1 or LCP-LS2, LCP-SP and to SCADA will annunciate hard-wired alarms as follows:

<u>Alarm Name</u>	<u>Display Location</u>
Emergency Stop	LCP-LS1
Emergency Stop	LCP-LS2
Lime Stabilization (LS) No. 1 Emergency Stop	LCP-SP and SCADA
Lime Stabilization (LS) No. 2 Emergency Stop	LCP-SP and SCADA

Shower/Eyewash Stations at the Lime Storage Area

The Lime Stabilization Facilities uses lime (CaO) at the Solids Processing Facilities. The lime is stored in silos within containment areas. In the event of dusting or spills onto a person's body or face, two shower/eyewash stations are provided around the Lime Stabilization Facilities.

Each station is equipped with a flow switch to detect flow due to activation of the shower/eyewash. The station is locally provided with a rotating red beacon to illuminate when flow is detected. Activation of the shower/eyewash station sends hard-wired signals to annunciate alarms at the LCP-SP and to SCADA:

<u>Alarm Name</u>	<u>Display Location</u>
North Lime Safety Shower	LCP-SP and SCADA
South Lime Safety Shower	LCP-SP and SCADA

7.2.2.10 Primary Effluent Structures

The Primary Effluent Structures consist of the primary effluent channel and bypass structure, the bypass metering structure and the bypass junction structure. There are no conveyors, no tag-lines, no chemical storage/addition facilities and no combustible gas detectors associated with the Primary Effluent Structures.

7.2.2.11 Final Effluent Structures

The Final Effluent Structures consist of the effluent blending structure, effluent metering structure and canyon collector meter vault. There are no conveyors, no tag-lines, no chemical storage/addition facilities and no combustible gas detectors associated with the Final Effluent Structures.

7.2.2.12 Standby Power Generation Facilities

The Standby Power Generation Facilities consist of two (2) mobile standby generators, diesel fuel storage and diesel fuel transfer pump station. There is no identification of life threatening conditions at the Standby Power Generation Facilities.

7.2.2.13 Collection and Conveyance Facilities

The collection and conveyance facilities consist of five diversion structures, Goat Canyon Pump Station (GCPS) and Hollister Street Pump Stations (HSPS). Each pump station contains a wetwell, lift pumps, non-potable water system, odor reduction station, and a standby generator.

Combustible Gas Sensors

The GCPS wet well and HSPS wet well are provided with Combustible Gas (CG) sensor/analyzers which perform continuous monitoring, indication and analyses of the concentration of CG and compare this concentration to the lower explosive limit (LEL). The analyzers are furnished with a switch set for 25% LEL which is hard-wired to annunciate a general alarm at LCP-GCPS or LCP-HSPS (See Table below).

<u>Alarm Name</u>	<u>Display Location</u>
GCPS Wetwell Combustible Gas High Level Alarm	LCP-GCPS
HSPS Wetwell Combustible Gas High Level Alarm	LCP-HSPS

Shower/Eyewash Stations at the GCPS and HSPS Odor Reduction Stations

The Odor Reduction Stations at the remote pump stations uses 25% sodium hydroxide solution (also called caustic or NaOH) and 12.5% sodium hypochlorite solution (NaOCl) to remove odors from the air at the wetwells. The chemical solutions are stored in tanks within containment areas at the Odor Reduction Station. In the event of a spill or splashing of these chemicals onto a person's body or face, two shower/eyewash stations are provided around each of the Odor Reduction Stations.

Each shower/eyewash station is equipped with either a flow switch to detect flow due to activation of the shower/eyewash, or a panic pushbutton. Activation of a flow switch or panic button sends a hard-wired signal to annunciate alarms at the respective LCP-GCPS or LCP-HSPS. The alarm is also conveyed over telephone lines to the treatment plant

<u>Alarm Name</u>	<u>Display Location</u>
GCPS Safety Shower	LCP-GCPS and SCADA
HSPS Safety Shower	LCP-HSPS and SCADA

Fire Alarm

At each of the remote pump stations, the MCC Room/Generator Area is equipped with a fire alarm system. Activation of the fire alarm sends a hard-wired signal to annunciate alarms at the respective LCP-GCPS or LCP-HSPS. The alarm is also conveyed over telephone lines to PCC at the treatment plant.

<u>Alarm Name</u>	<u>Display Location</u>
GCPS Fire Alarm	LCP-GCPS and SCADA
HSPS Fire Alarm	LCP-HSPS and SCADA