

INTERNATIONAL BOUNDARY AND WATER COMMISSION (IBWC)

“CILA Pump Station Operations and Notification Protocol”

Background

The CILA Pump Station (PS-CILA) is located approximately 1,200 feet (400 m) upstream of the international boundary between the U.S. and Mexico, and it diverts the waters from the Tijuana River into the City of Tijuana, B.C. sewer system. It was built in the year 1991 in order to comply with *Recommendation #16* of IBWC Minute 283, entitled “*Conceptual Plan for the International Solution to the Border Sanitation Problem in Tijuana, Baja California- San Diego, California,*” signed between the two countries on August 8, 1990.

The implementing agreement for the construction of this pump station was the “*Joint Report of the Principal Engineers Recommending Temporary Needed Works to Divert Uncontrolled Wastewaters that Cross the International Boundary in the Tijuana River Channel,*” dated March 20, 1991. Then, the infrastructure of this Defensive System was formally turned over to the State Public Utility Commission for Tijuana (CESPT) in 1991 for it to take charge of its operation and maintenance, forming an integral part of the City of Tijuana, B.C. sanitation system.

At the time, no operations protocol was defined in the *Joint Report of Principal Engineers*, and only the diversion of flows in the river channel during the dry season was considered, leaving it up to the participating entities (the two Sections of the IBWC and the CESPT Utility Operator) to coordinate its operation with the goal of developing a technically functional procedure based on the behavior of the basin and the infrastructure built. Until recently, there was an unwritten operations protocol, which currently is being documented in this *Joint Document*. This protocol for PS-CILA includes the timely notification of the International Boundary and Water Commission, United States and Mexico (*US-MX IBWC*), the international body that paid for the construction of said infrastructure, by *CESPT* of any situation that interrupts, impedes or negatively alters the operation of the pump station.

Over the years, the pump station has undergone modifications. In the period 2009-2010, its installed capacity was increased to an additional 1,500 lps, utilizing funds from the U.S. Environmental Protection Agency (USEPA) and with joint financing from BECC and NADB. This modification to PS-CILA is referred to in the 2008 *USEPA* Environmental Assessment Study. This was in anticipation of the expected increase in projected flows during the dry season once the newly constructed “La Morita” and “Jose Arturo Herrera Solis” wastewater treatment plants became operational upstream of PS-CILA, in addition to the flows from the City of Tecate, B.C. wastewater treatment plant. At the end of 2010 these new secondary treatment plants came online. The discharge of secondary effluent to the Tijuana River in 2010-2011 averaged around 450 lps daily (approx. 10 MGD). This discharge was captured and diverted by PS -CILA downstream. Additionally, between the years 2012 and 2013, the Alamar River (tributary to the Tijuana River) was channelized and lined with concrete. It is believed that the peak flows in that portion of the canalization have increased because of less infiltration. The average flow through the Tijuana River in the dry season is now estimated to be around 600 to 700 lps (13.7 to 16.0 MGD).

Under IBWC Minute 320, one of the objectives identified by the Water Quality Binational Work Group (WQ BWG), which was proposed to the Binational Core Group (BCG), was the development of an “**Operation and Notification Protocol**” for PS-CILA, with the aim of assuring greater operational transparency and providing timely notification to the public for their security and wellbeing.

Currently, the only existing measurement for the flows that cross the border into the United States is provided by the telemetry station on the river channel in U.S. territory, near the international border, operated by the U.S. Section of the IBWC (USIBWC). The data provided by that meter is used by U.S. agencies to transfer information into the Southern California Coastal Ocean Observing System (SCCOOS), which is an online tool developed by the Scripps Institution of Oceanography that models and tracks the discharge from the Tijuana River. The information is also used by the San Diego County Environmental Health Department in California to publish the conditions of the beaches for public use. During the rainy season (the region’s winter) the beaches are usually closed from the border area with Mexico up to Imperial Beach because of the mixture of flows that potentially contain pollutants as a result of the transport of urban debris and/or the incorporation of wastewaters.

Objective

The operation of PS-CILA is intended to capture, convey and manage the sanitation of the surface flows through the Tijuana River channel (during the dry season) coming from the different upstream water sources in the basin, which are typically confined to the pilot channel of the lined canal. For this purpose, there is a “capture and diversion” structure that intercept flows and conveys them through a pipeline to a wet well located outside the concrete channel; from there the water is conveyed to Pump Station No. 1 (PS-1) through two pipelines, described below.

Description of the PS-CILA Works (Components)

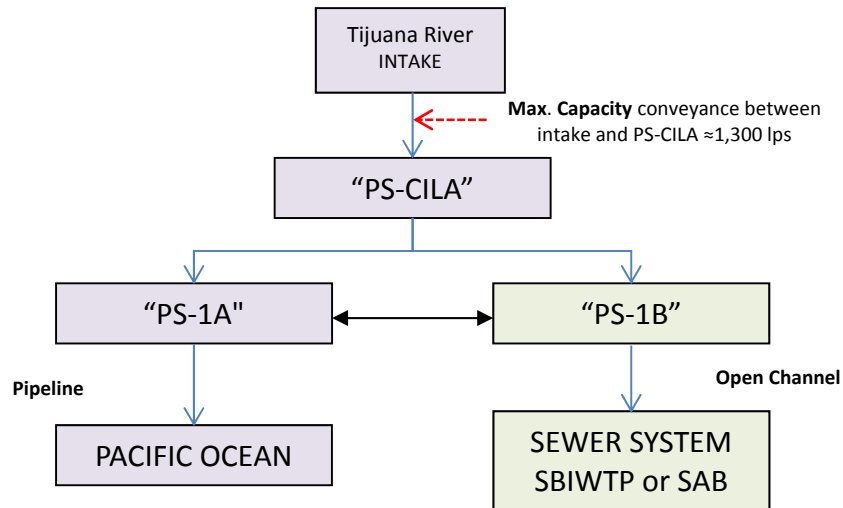
- **Settling Basins:** There are three (3) settling basins in the river pilot channel that includes the bypass structure. They are constant-level, gravimetric longitudinal canals; the first one has a length of 120 meters, the second settling basin is 150 meters, and the last one before the intake is 120 meters long. Each of the three settling basins has a width of 8 meters. The primary objective of these structures is to reduce and control the velocity, thereby facilitating the precipitation by gravity of sediment and sand. This mitigates the clogging of the station’s wet well with sediment.
- **Diversion Structure and Intake:** Made up of a reinforced concrete wall that retains and diverts flow from the low-flow pilot channel towards the Intake, which has a system of bar grates to retain large, floating debris that must be removed manually. Once the flow of water is filtered, it is conveyed by gravity to the wet well, located outside the river channel.
- **Pumping Systems:** The electromechanical equipment for PS-CILA has two sets, or pumping systems, with a total of 6 pumps.

One set consists of 3 centrifugal pumps, each of which has an installed capacity of 500 liters per second. Under normal conditions, two of the pumps operate jointly or alternating as needed. The third is used only as backup or in case of emergency. This system is known as the “*Surface Flow Disposal System*” (SAAS, in Spanish). The SAAS system is responsible for diverting the treated

wastewater coming from the “La Morita” and “Jose Arturo Herrera Solis” plants, as well as the flows from the neighboring city of Tecate. All of the flow is conveyed to PS-1A, via a force main separate from the untreated wastewater collector. (This pump set can also convey flow to PS-1B pump station.) The force main from PS-CILA to PS-1A has a diameter of 30 inches and an approximate capacity of 1000 lps. PS-1A conveys the effluent in a pipeline to discharge at the coast of the Pacific Ocean in Mexican territory.

The second pump set consist of three (3) vertical turbine pumps, each with a capacity of 500 lps. Under normal conditions, two (2) operate jointly or alternating as needed, and the third is used as a backup or in emergencies. This pump set discharges flow into a 72” diameter wastewater collector which terminates at PS-1B or the South Bay International Wastewater Treatment Plant. Capacity of the 72-inch diameter collector is approximately 75 mgd. This pump set can only deliver flow to the 72” diameter collector and from there to PS-1B. PS-1B sends the water through a force main and open channel to the San Antonio de los Buenos WWTP (*Punta Bandera*).

The systems can work simultaneously or independently to send the treated wastewater to the outlet in the Pacific Ocean.



- PS-CILA & PS-1A:** The PS-CILA defensive system and PS-1A/1B are interrelated in their operations process because the conveyance capacity of the supply line from PS-CILA to PS-1 is 1,000 lps and the conveyance capacity of the pipeline that connects the intake with the PS-CILA is around 1,300 lps. Any proposed future change to the system should consider the two pumping systems together as a whole unit (PS-CILA and PS-1).
- Backup Generator:** In the event of a potential power failure for any reason in the power line to PS-CILA, there is currently a backup power generator capable of providing power within minutes after the service interruption and it can maintain only one (1) pump in constant operation; the generator is switched on manually. It is technically viable to incorporate other backup units.

Operation in Low-water (dry) Season

Normal Conditions

Under normal conditions and during the dry season, normally considered to be May 1 to November 1, the procedure is as follows:

- ✓ Clean-out of the grate system and supervision of the pilot channel. Both are done at intervals from two (2) to three (3) hours, using a crew of two operators. The clean-out of the grates on the pilot channel is done manually, since security concerns do not allow for another type of equipment to be installed in the pilot channel. CESPT has the necessary equipment and personnel required for cleaning.
- ✓ The hours of operation of the motor pumps at PS-CILA are recorded daily. The data collected is used to estimate and keep a record of the times and volumes of water from the river that is pumped.

“Abnormal” Conditions

PS-CILA remains active, including when the runoff inside the pilot channel exceeds the operating capacity of the plant. Cases like this tend to happen when there are obstructions, collapses, breaks or failures in the city’s water distribution or sewer system, either in the municipality of Tijuana or in Tecate, BC. MXIBWC will notify USIBWC in cases where the channel capacity exceeds pump station capacity but the pump station continues to operate.

The operations procedure applied in these conditions is outlined below:

- ✓ Ongoing supervision is performed every two (2) hours, for the purpose of keeping the Intake grate (access to the defensive system) free from debris.
- ✓ Physical flow measurements are directly made in the river channel, upstream of the PS-CILA.
- ✓ In an “emergency” up to a maximum of three (3) motor pumps can be activated, using a combination of pumps from either of the two pump sets. The information from operating the equipment is used to calculate the daily usage and is communicated to the *CESPT Wastewater Control Office* in order to anticipate any potential issue with the system that could adversely impact the plant.

Operation during the rainy season

Temporary Suspension of Operations

- a) In the case of sporadic rainfall that causes minimal increase in river flow that is within the emergency capacity of the pump station, pumping is increased based on the availability of the emergency equipment but without putting PS-CILA at serious risk of sediment entering the wet well. The conditions of the grates is monitored and the regular clean-out is increased to intervals

between one (1) to two (2) hours, until it is determined that the new operations conditions should be modified. During this operational phase, partial spills of water into U.S. territory can occur due to the “peak flows” that exceed the installed pumping capacity at PS-CILA.

- b) If the frequency or intensity of the rain increases, there is an inherent risk of the infrastructure in general experiencing major damage, mainly due to the high level of sands and suspended solids transported by the river flows, which can obstruct and/or wear down the pump impellers. When this situation happens, CESPT makes the decision to close the Intake to the defensive system and operation of the Pump Station is suspended; next, CESPT informs the MXIBWC with a phone call explaining the reason for the decision. Normally, this condition occurs when the flow in the Tijuana River exceeds 1,000 lps. The MXIBWC will inform its U.S. counterpart by phone, and then will follow up with another notification via email.

Preliminary Work to Restart Service

Once the rain event has passed, the level of runoff in the Tijuana River will be monitored until it can be determined that the flow is equal to or less than 1,300 lps (daily average), which is calculated manually (area/velocity) in the pilot channel, and providing rain has not been forecast for the next three days. CESPT will make the decision to proceed with the next step called “Preliminary Work.” During this phase, CESPT personnel will frequently review the records for the Tijuana River flow meter (located in U.S. territory and operated by the USIBWC). This can be consulted through the website http://www.ibwc.gov/wad/013300_a.txt, which provides data for the estimated volume of runoff in the Tijuana River, with a 2-hour delay. If the meter is out of operation, then CESPT performs direct physical measurements of the flows in the river channel.

When the flows reach 1,300 lps or less, personnel will verify the runoff with direct physical measurements in the pilot channel using the area and velocity measurement. This makes it possible to determine the approximate instantaneous flow in the river. Once the readings are confirmed, the instruction is given to proceed with the clean-up work of the sedimentation basins in the Tijuana River channel and to remove solid debris from the wet well. Inspections of the motor pumps at both PS-CILA and PS-1A are undertaken (including the valve system, float levels and general electrical systems at the facilities). Preparatory work normally takes 1 to 2 days to complete.

Resuming Service (Start up)

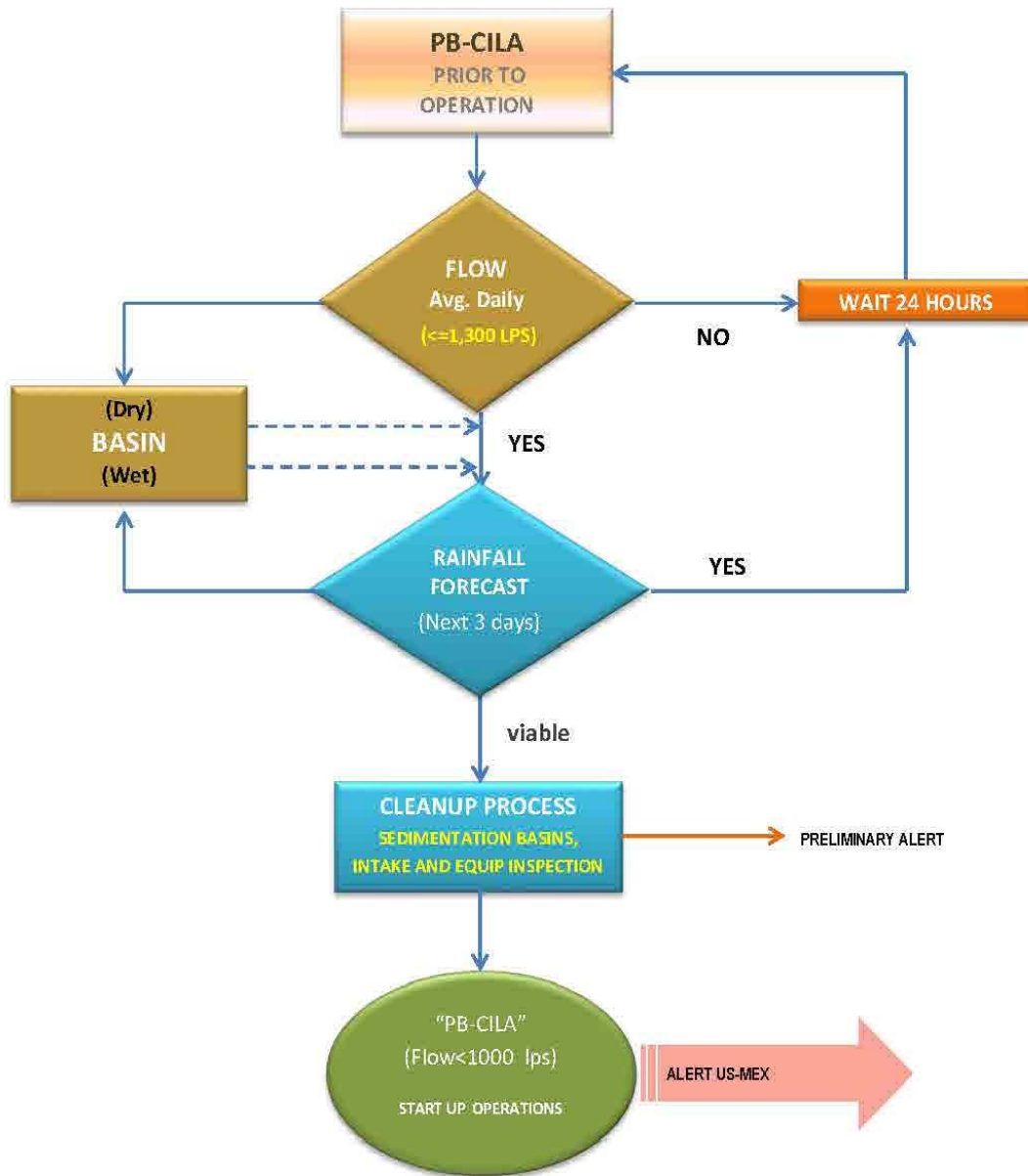
Once the flows in the river have decreased and remain below 1,000 lps, the preparatory work is finished at PS-CILA, and all the facilities are ready to begin receiving the water flows from the Tijuana River pilot channel. CESPT will notify the MXIBWC field office in Tijuana, B.C., by phone, email, or other means of the start-up of the PS-CILA defensive system. The MXIBWC then will notify its U.S. counterpart by telephone and/or email.

The procedure to reactivate the Pump Stations (PS-CILA and PB-1A) initiates with three (3) pumps in order to evacuate as soon as possible the water level; this begins the disposal of the waters of the Tijuana River towards the San Antonio de los Buenos WWTP (*Punta Bandera*) and their final discharge into the San Antonio arroyo and the Pacific Ocean.

Additional Actions

Additional safety measures taken by CESPT operators include the inspection of the air extraction (purge) valves along the wastewater force main to ensure that the force main is free of obstructions and the pumping process has been normalized.

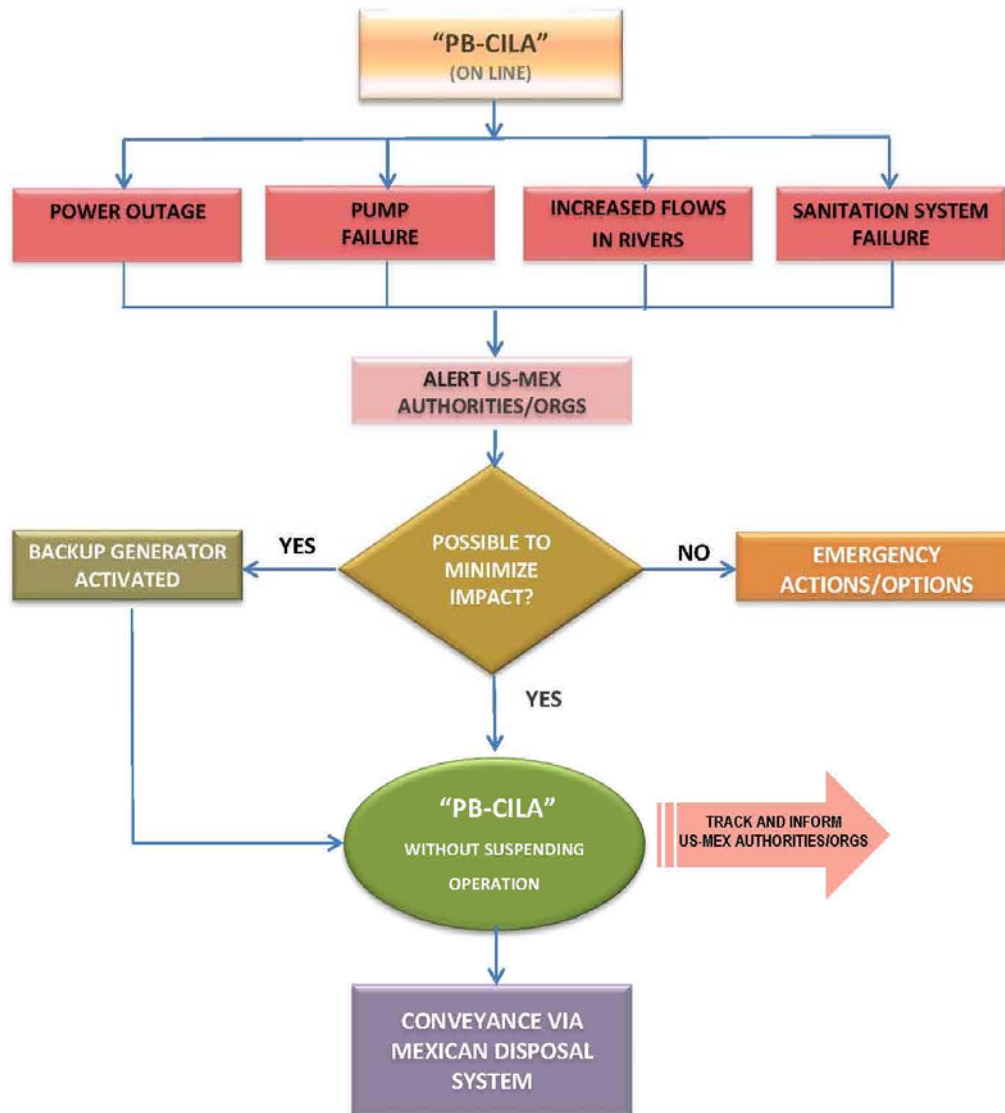
During the first days following the re-start of operations of the PS-CILA defensive system, the frequency of the inspection visits to the intake and grate structure is increased because of potential sediment and/or trash transport after a rain event.



"CILA" PUMP STATION (PB-CILA)

OPERATIONS PROTOCOL - CURRENT

(FLOW CHART)



"CILA" PUMP STATION

OPERATIONS PROTOCOL - EMERGENCIES

(FLOW CHART)