HISTORY OF SAN DIEGO & TIJUANA SEWAGE SYSTEMS

Web Sources:
http://www.sewagehistory.com/index.html
http://www.sewagehistory.com/tijuana.html

SAN DIEGO SEWERAGE

Today the City of San Diego’s Metro Wastewater systems provide sewerage service to over 2 million people over 550 square miles and processing a flow of about 190 million gallons a day.

Collection System
1. Over 2,800 miles of pipes collect sewage
2. 84 collection system pump stations
3. 6 major “Metro” pump stations
4. 28 miles of interceptor pipes
5. 15 connecting agencies (Cities and municipalities) that utilize the Metro system for sewage disposal

Treatment System
1. Point Loma Treatment Plant (Advanced Primary treatment) 240 MGD Capacity.
2. North City Water Reclamation Plant, 30 MGD
3. South Bay Water Reclamation Plant, 15 MGD
4. San Pasqual Aqua Culture Plant, 1 MGD
5. Metro Biosolids Center. (Biosolids/Sludge processing)

Metro Operations

Over 1000 persons are employed by the city to keep the Metro system operating.

SAN DIEGO AREA SEWERAGE HISTORY

- **1935:** San Diego is now discharging nine million gallons of raw sewage through 22 outfalls. Nine of these empty into San Diego Bay.
- **1943:** The City of San Diego installs its first primary treatment plant at 32nd Street and Harbor Drive with a capacity of 14 million gallons a day (MGD).
- **1950:** Original 32nd Street expanded to 40 MGD capacity. Pollution in San Diego Bay continues as numerous other cities, industries and the U.S. Navy discharge their wastes into the bay.
- **1960:** Water pollution in San Diego caused by sewage worst ever seen. San Diego Bay is under a continuous quarantine and Mission Bay is heavily polluted. San Diego moves forward with approval and construction of a new, regional “Metro” system. Santee to the east is operating a state of the art reclamation plant.
- **1963:** After three years of construction, Metro system is put into operation in
August. The new system has 27.5 miles of interceptors, 2 main pump stations and one primary treatment plant at Point Loma with a capacity of 88 MGD. Treated wastewater is now discharged 3 miles offshore into the Pacific Ocean. Nine participating agencies connect into the Metro System for treatment of sewage (Imperial Beach, Chula Vista, National City, La Mesa, Lemon Grove, El Cajon, Montgomery, Spring Valley and the US Navy).

- 1972: Northern areas of the city (Sorrento Valley, Poway and Del Mar) connect into the Metro system with the completion of the Penesquitos Trunk Sewer. Clean Water Act is passed requiring San Diego to covert to secondary treatment by 1975.
- 1976: After studies for proposed secondary treatment and determining that primary treatment was effective, San Diego pursued a waiver for secondary treatment.
- 1984: Waiver application still in process. San Diego studies natural waste treatment and completes the “Accelerated Projects” which was an expansion and improvement of the wastewater system to compensate for increased growth. Otay Water District opens a new water reclamation plant.
- 1988: Clean Water Program established to help guide San Diego through the waiver process, secondary treatment options and subsequent lawsuits by the State and EPA.
- 1995: Lengthy court battle regarding secondary treatment is concluded. San Diego applies for and receives a waiver for secondary treatment. Point Loma will continue to treat sewage at the advanced primary level. New reclamation plants and major system improvements being designed and constructed. Treated effluent is discharged 5 miles offshore in 350 feet below the surface.
- 1998: Over 1 billion dollars in improvements to San Diego’s system completed. North City Reclamation Plant and Metro Biosolids Center put into operation. Point Loma Treatment Plant capacity increased to 240 MGD.

TIJUANA AREA SEWERAGE HISTORY

Today:
Even with the International Treatment Plant operating pollution continues as raw sewage from system failures and un-sewered portions of Tijuana flow into the river valley. Various options and ideas are still being proposed for future resolve. Available concept known as Bajauga proposes to construct and operate a treatment plant in eastern Tijuana and use the effluent as reclaimed water.

- 1848: Treaty of Guadalupe Hidalgo signed establishing International Border between United States and Mexico.
- 1920: City of Tijuana established, first public sewer system installed in the Downtown area.
- 1938: Tijuana is now discharging raw sewage into the Tijuana River Valley causing
contamination of crops and water supplies. US Government steps in and constructs the International Outfall pipe to dispose of Tijuana’s sewage offshore near Imperial Beach.

- **1955:** Tijuana experiences tremendous growth and is now home to over 150,000 people. Original sewerage system is overloaded and about 3 million gallons of raw sewage is discharged daily into the Tijuana River Valley. Un-sewered canyon areas of Tijuana also contribute to the sewage flow. The City of San Diego proposes constructing a joint treatment plant.

- **1961:** Tijuana upgrades sewerage system, collection system expanded and two new pump stations are built to push sewage over the mesa to a treatment plant. Plant construction was postponed due to lack of funding and raw sewage is discharged into the surf of the Pacific Ocean, four miles south of the border.

- **1965:** City of San Diego constructs an emergency connection pipe to Tijuana to collect up to 13 million gallons of sewage to prevent pollution of the Tijuana River Valley. Tijuana’s new pump stations are prone to failures.

- **1970’s:** Pollution problem in the Tijuana River Valley continues at an alarming rate, Tijuana’s population continues to grow and portions of the city remain without adequate sewerage service. Up to 10 million gallons of sewage are discharged into the river valley daily and results in the almost continuous quarantine of beaches in Imperial Beach and at time north toward Coronado.

- **1983:** International Boundary and Water Commission steps in and constructs a collection system for the canyon areas in the Tijuana River Valley and a holding pond for sewage draining from Tijuana’s main pump station.

- **1987:** Tijuana completes construction of an improved sewerage system, which includes a new single pump station, and treatment plant with a capacity of 17 million gallons a day. Even with new system in place raw sewage continues to pour into the river valley from un-sewered communities.

- **1990:** Failures of Tijuana’s new sewerage system results in up to 20 million gallons of raw sewage being discharged back into the Tijuana River Valley. New plans sought for a treatment plant on the US side of the border.

- **1997:** After extensive planning and dialog from community activist groups, International Boundary and Water Commission puts into operation the International Treatment Plant with a capacity to treat 25 million gallons a day of Tijuana’s sewage. Effluent is now discharged down the South Bay Ocean Outfall distributing treated wastewater 3 miles offshore in 90 feet of water.

**INTERNATIONAL WASTEWATER TREATMENT PLANT**  
(International Boundary and Water Commission)

**SOUTH BAY WATER RECLAMATION PLANT**  
(City of San Diego Metropolitan Wastewater Division)

**WEBSITES/SOURCES:**  
http://www.ibwc.state.gov/html/historical_flow_data.html  
STATUS OF IWTP AS of 2001

BACKGROUND

The San Diego-Tijuana border region's wastewater infrastructure has not kept pace with the area's rapid growth. Tijuana, Mexico is situated on elevated terrain compared to the area immediately adjacent to it in southern San Diego County, California. The Tijuana River drains north into this portion of San Diego and then west to the ocean. Since the infrastructure does not exist to treat all of the sewage generated in the Tijuana area, untreated or partially treated sewage emanates from Tijuana and flows into the U.S., leading to serious public health, safety, and environmental concerns.

In the Water Quality Act of 1987, Congress authorized the construction of a wastewater treatment facility in San Diego to provide primary or more advanced treatment of municipal sewage and industrial waste from Mexico, including the city of Tijuana. For the United States, the secondary treatment requirements of the Clean Water Act are defined in federal regulations as a numeric effluent quality attainable through treatment that requires greater removal of certain pollutants than primary or advanced primary treatment.
In 1990, the bi-national International Boundary and Water Commission entered into an international treaty agreement, called Minute 283, that directed the U.S. and Mexican governments to cooperate on the construction and operation of a secondary treatment facility in the United States with an approximate capacity of 25 million gallons per day.

In carrying out the directive of Minute 283, and in order to achieve some treatment of Mexican wastes as quickly as possible, EPA and the U.S. Section of the International Boundary and Water Commission (Commission) agreed to construct the San Diego treatment facility in stages--by first building advanced primary treatment facilities followed later by secondary treatment facilities. The first stage, the South Bay International Wastewater Treatment Plant (IWTP) became operational in 1998, but treats only to advanced primary standards. Effluent from the IWTP is discharged three and a half miles off the coast of San Diego through the South Bay Ocean Outfall. However, the Commission remains subject to the legal requirements of the Clean Water Act to treat effluent to at least secondary treatment standards and has been sued by both the State of California and the Surfrider Foundation, for failure to meet these standards.

In order to meet its obligations under the Clean Water Act and Minute 283, the Commission has examined several secondary treatment options. The U.S. Section of the Commission originally planned to construct facilities to provide secondary treatment
using activated sludge. However, members of the environmental community sued the Commission, objecting to use of this technology in this circumstance. Under the settlement of that lawsuit, the Commission and EPA agreed to look at other technologies. In December 1999, EPA and the Commission signed a Record of Decision recommending the construction of secondary treatment ponds at a site adjacent to the current IWTP facility as the preferred treatment alternative to achieve secondary treatment.

Some members of the community in the San Diego region objected to the construction of the ponds, due to aesthetic concerns. Moreover, additional funding authorization would be necessary to proceed with these initial ponds because, in the FY 1993 VA/HUD Appropriations Bill, Congress set a statutory cap that EPA could spend no more than $239.4 million on both primary and secondary treatment at the IWTP. According to EPA, it has less than $5 million remaining under this cap, yet construction of the ponds to achieve the secondary treatment level would cost approximately $45 million.

In addition, the ponds, if constructed, could not provide a comprehensive solution to the problem of sewage treatment in the San Diego-Tijuana border region. Currently, approximately 60 to 65 million gallons per day of sewage is generated in Tijuana. Twenty-five million gallons per day goes to the IWTP and receives advanced primary treatment. The remainder is sent to a facility in Mexico, where some is treated, but most is discharged untreated into the ocean, and carried by currents onto U.S. beaches. In the space available at the IWTP, ponds could be constructed that could provide secondary treatment only for 25 million gallons per day of effluent. There is no room to expand the capacity of the plant. The existing Mexican facility is currently being upgraded and expanded, but will still not be able to meet the current need for sewage treatment in Tijuana, nor the increased need expected from future growth in the area.

To provide additional sewage treatment capacity, private investors have submitted a proposal, called the "Bajagua proposal," to construct, operate, maintain and own a secondary treatment facility in Mexico. Under this proposal, a facility with a capacity of not more than 50 million gallons per day (with potential future expansion) would be constructed in Mexico through private investments. The 25 million gallons per day of "advanced primary" effluent currently being treated at the IWTP would be pumped to the private facility in Mexico, combined with 25 million gallons per day of the wastewater that now goes untreated, and all of it would be brought up to secondary treatment standards. With the other Mexican facilities available for treatment and which are scheduled for upgrade, there would be approximately 75 million gallons per day capacity to treat Tijuana’s discharge. This would cover existing demand and some growth. However additional capacity would have to be developed for most future growth.

Pursuant to this private sector plan, the owner of the facility in Mexico could reclaim (through additional facilities it constructs) any of the 50 million gallons per day of water it treats to secondary standards and make the reclaimed water available for industrial use. Any reclaimed water that is not reused would move by gravity back to the IWTP for discharge through the South Bay Ocean Outfall.
THE SEWAGE TREATMENT PROCESS

The South Bay International Wastewater Treatment Plant (SBIWTP) is a 25 million gallon per day advanced primary treatment plant located in San Diego County, California, about 2 miles west of the San Ysidro Port of Entry. The physical-chemical plant treats sewage originating in Tijuana, Mexico and discharges it to the Pacific Ocean through the South Bay Ocean Outfall, a four and one-half mile long 11 foot diameter pipe completed in January 1999. The plant is located just north of Tijuana's Pump Station No. 1, Tijuana's largest raw sewage lift station. Raw sewage is pumped from Pump Station No.1 west to Tijuana's wastewater treatment plant at San Antonio de Los Buenos, located approximately 6 miles south of the border and 1 mile east of the Pacific shoreline. The SBIWTP is connected to the Tijuana sewer collection system by a 96" diameter pipe which crosses the border. Peak daily flows from Mexico are treated at the SBIWTP, thereby relieving pressure on the Mexican system and reducing flows in the Tijuana River.

The 96" influent pipe enters the inlet junction structure which also receives sewage flow from collection and conveyance facilities for transboundary raw sewage flows located at Smugglers Gulch, Goat Canyon and Stewarts Drain. The sewage passes thru mechanical bar screens. The screens trap solids greater than 5/8" in diameter on the face of the screen. The screenings are scraped up along the face of the screen and deposited on a
conveyor belt which transports the screenings to grit bins. Vertical turbine solids handling pumps then lift the sewage through a 60" diameter pipe to the aerated grit chamber.

The aerated grit chamber is designed to remove grit using spiral flow aeration. Air is blown into one side of a rectangular basin with a positive displacement blower. The resulting spiral flow causes the sewage to make 2 or 3 passes across the bottom of the tank where steeply sloped hoppers are located. As the flow slows down at the bottom of the tank, grit is deposited in the hoppers. The grit pumps move the grit back to the Headworks, where it is washed by the hydrogritters and deposited in the grit bins, along with the screenings.

After it leaves the aerated grit chamber, the sewage flows by gravity to the rapid mix chambers, where ferric chloride and anionic polymer are added to assist in coagulation of solids. The sewage then flows to the primary sedimentation tanks where settling takes place. Chain mounted scrapers in the primary sedimentation tanks push the sludge into hoppers. Positive displacement sludge pumps then transfer the sludge from the hoppers to the unstabilized sludge storage tank. The rapid mix pumps and primary sludge pumps are located underground (below the inlet to the primary sedimentation tanks) in the PST gallery. The USST sludge pumps transfer the sludge to the belt filter presses where the sludge is chemically conditioned with a small amount of polymer and dewatered to a cake consistency. The sludge is then treated with lime and conveyed to the truck solids loading building where it is deposited into sludge hauling trucks.

There are odor control facilities provided for the Headworks, Primary Sedimentation Facilities, USST, and Solids Processing Facilities. Each facility consists of packed tower scrubbers and chemical storage and addition facilities. Ancillary support facilities consist of a stand-by generator, non-potable water pump station, local control centers, the Main Switchgear Building, and the Solids Processing Personnel Building.

**South Bay Water Reclamation Plant**  
**2411 Dairy Mart Road, San Diego, CA 92154**

The South Bay Water Reclamation Plant (SBWRP) is located at the intersection of Dairy Mart and Monument Roads in the Tijuana River Valley. The plant relieves the South Metro Sewer Interceptor System and provides local wastewater treatment services and reclaimed water to the South Bay. The plant opened in May 2002 and has a wastewater treatment capacity of 15 million gallons a day. The plant design incorporates the newest technologies and meets strict odor control standards.

**The Wastewater Treatment Process**
The SBWRP Operations Building houses the Control Center which monitors and controls every phase of the treatment process. The facility is staffed from 6:00am to 4:00pm Monday through Friday. Outside these hours, control of the South Bay plant is transferred to Metropolitan Wastewater's Communications Center in Kearny Mesa. The SBWRP Operations Building also houses Process Control Laboratories where samples of wastewater from every stage of treatment are analyzed.

Untreated wastewater (Influent) enters the plant's Headworks from the South Bay region. In the Headworks, the wastewater passes through large, rake-like Bar Screens to remove solid debris and floating material (called "Rags") such as cloth, wood, and plastic material. These "rags" are dewatered and trucked to a landfill.

Odor Control is an important part of the overall wastewater treatment process. Odor is caused primarily by hydrogen sulfide gas. Throughout the plant, fans draw the foul air off the flow of wastewater and deliver it to Odor Control "Scrubbers." The foul air passes through a bleach solution spray which neutralizes odor-causing sulfide compounds. The "scrubbed" air then passes through carbon filters which remove any additional foul air before being released into the atmosphere.

Following the headworks, the screened wastewater then passes through aerated Grit Chambers where heavier solids such as sand, gravel, coffee grounds and eggshells settle out and are removed. The grit is then dewatered and taken to landfills.

Wastewater then flows into the Primary Sedimentation Basins where the sedimentation
process starts. Solids sink to the bottom of the tanks and "scum" (grease and cooking oil) float to the surface. "Raw Sludge" which has settled to the bottom of the basins is returned to the sewer system and sent to the Point Loma Wastewater Treatment Plant. Similarly, the scum is skimmed from the surface and returned to the sewer system.

The wastewater then enters Anoxic Zone Chambers that are oxygen depleted. The wastewater mixes with bacteria ("Bugs") that eat soluble organic material. The wastewater then flows into Aeration Basins where diffused air is pumped into the water. Here, the bugs begin to ingest and digest the organic solids while increasing in number and density.

Wastewater flows from the Aeration Basin into the Secondary Clarifiers where the bacteria and digested solids settle to the bottom as "Secondary Sludge." Some of this Sludge and any remaining scum are removed and returned to the sewer system for treatment at the Point Loma Wastewater Treatment Plant. The remaining sludge is returned to the Anoxic Basins and again mixed with the wastewater.

The water, now treated to a Secondary Treatment level, can either be discharged into the ocean though the South Bay Ocean Outfall or moved on to Tertiary Treatment for reclaimed water applications.

In Tertiary Treatment, the treated wastewater (effluent) flows into Anthracite Coal Beds where it is filtered of remaining solids as it passes through the coal medium. The filtered water then passes through chambers where it is disinfected through exposure to ultraviolet light. At this stage the "reclaimed" water meets State Title 22 full body contact requirements.

**South Bay Ocean Outfall (SBOO)**

Located near Imperial Beach, the SBOO discharges treated wastewater from the International Wastewater Treatment Plant to the Pacific Ocean. It also discharges effluent from the South Bay Water Reclamation Plant.

The Metropolitan Wastewater Department has worked closely with a number of governmental agencies to meet wastewater treatment upgrade and expansion goals in the South Bay. As a border community, San Diego interacts with many agencies that specialize in facilitating and regulating border issues, such as the Environmental Protection Agency, the State Water Resources Control Board, the Regional Water Quality Control Board, the International Boundary and Water Commission, the Border Environment Cooperation Commission, the U.S. Border Patrol and the government of Mexico. Each has a key role in the shape and future of our border environment, and is an integral part in the expansion and upgrades of our facilities.

The South Bay Ocean Outfall extends approximately 3.5 miles offshore and discharges effluent in approximately 100 feet of water. A tunnel boring machine was used to excavate the tunnel for this project. The tunnel has an 11 foot diameter and is 19,000 feet
long. Barges were used as platforms to trench the ocean floor, install pipe, and then cover the 1.5 miles of exposed pipeline with more than 400,000 tons of rock to protect the outfall from ocean waves and ship anchors.