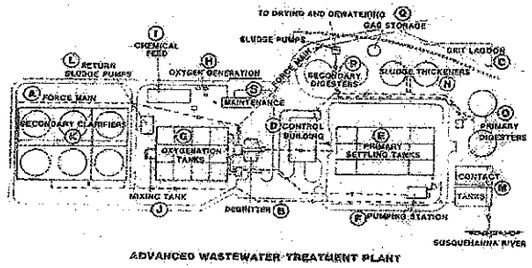
THE FACILITY



ADVANCED WASTEWATER TREATMENT PLANT

PRELIMINARY TREATMENT

All wastewater reaches the facility through force mains (A). A 48-inch diameter force main conveys wastewater from two City pumping stations to the facility, while an 18-inch diameter force main delivers wastewater from two suburban municipalities directly to the facility. Preliminary treatment involves removal of heavy particles (grit) in four, 16-foot cyclonic tanks (B). The grit is dewatered while removed before being disposed at a landfill. Wastewater flow is metered by a venturi tube located in the Control Building (D).

PRIMARY TREATMENT

Primary treatment is achieved in four rectangular settling tanks (E), each 35 feet wide and 220 feet long. During the 1.5 hours of detention in these tanks (at design flows), one-half of the suspended solids and 30 percent of the BOD are removed. Sludge that accumulates in the tanks is pumped to sludge thickeners and settled wastewater is pumped to the secondary treatment units. Each of the four settled sewage pumps (F) is rated at 15,025 gpm.

SECONDARY TREATMENT

The secondary treatment process comprising the high-purity oxygen, high-rate modification of the activated sludge process removes over 85 percent of the organic pollutants. Three covered oxygenation tanks, each having four 50 by 54 foot cells, provide 2.4 hours of detention at average design flow. Oxygen is fed into these tanks (G) where it is dissolved in the wastewater. Surface mixers are used to accelerate the gas transfer process. The oxygen supports a microbiological culture that oxidizes organic materials present in the wastewater. Oxygen is generated by a cryogenic process, where air is compressed and cooled until oxygen is liquefied and separated from the other constituents. A cold box, two 1,000-horsepower compressors, and two 11,000-gallon liquid oxygen storage tanks are included in the oxygen generation equipment (H). The oxygen facility is designed to produce 50 tons per day.

Phosphorus removal is accomplished by a chemical process. Coagulants such as ferrous sulfate combine with phosphate in the wastewater to form a heavy floc that is subsequently removed in the secondary clarifiers. Pumps located in the chemical storage building (I) feed coagulants to the mixing tank (J).

Biological and chemical flocs produced in secondary treatment are removed in the six secondary clarifiers (K). Much of the settled floc (sludge) is pumped to the oxygenation tanks to seed the process. The remainder is transferred to sludge treatment units. The 102-foot square secondary clarifiers contain circular rapid sludge removal mechanisms. A pipe galley located between the clarifiers houses process piping, valves, and sludge pumps, the return sludge pumping station (L) contains four 7,200 gpm pumps.

The treated wastewater is disinfected by chlorine prior to discharge in the Susquehanna River. Four chlorine tanks (M) that provide 17 minutes contact time at the peak wet weather flow of 61.4 mgd are provided.

SLUDGE TREATMENT

The primary and secondary sludges are combined prior to treatment. They are thickened in two 80-foot diameter gravity thickeners (N). The sludge is then pumped to two 90-foot diameter primary digesters (O), that provide 15 days of sludge detention. Anaerobic bacteria in the digesters consume organic matter in the sludge and produce gas containing approximately 60 percent methane. The digester gas is used as an energy source for heating the primary digester contents to the required 95°F and for heating facility buildings. Mixing of each primary digester's contents is accomplished by three gas eductor tubes powered by a 1,700 cfm gas compressor. The primary digested sludge is transferred by gravity displacement to two 85-foot diameter secondary digesters (P). These units permit additional sludge decomposition, gravity concentration, and storage of sludge. One secondary digester has a gas-holder cover that provides 55,500 cubic feet of storage. Excess gas is compressed to 50 psig and placed in a 42-foot diameter storage sphere (Q) having a gas capacity of 131,900 cubic feet. When heating demands require use of the stored gas, it is fed into the system at a pressure of 8.5 inches (water column).

Anaerobically digested sludge is dewatered by two belt filter presses to form a semi-dry product, biosolids. The biosolids are used beneficially for surface mine reclamation or are disposed by landfilling.

MANAGEMENT FACILITIES

Facilities and equipment are available for monitoring and control of all processes. The Control Building houses a Pennsylvania accredited laboratory containing instruments necessary for NPDES permit analysis of wastewater and other parameters for process control. A SCADA computer system is provided for monitoring all process operations, recording data and controlling selected facility operations. The Maintenance Building (S) houses shops, as well as locker and lunch room facilities.

HISTORY OF COMBINED SEWER OVERFLOW

Harrisburg's early sewers carried wastewater directly to the Susquehanna River and the Paxton Creek until the interceptor system and Wastewater Treatment Facility opened in 1959. Today, most sewage flows through the interceptor system to the treatment facility but some overflows to the Susquehanna River and Paxton Creek when it rains.

During rain events, Harrisburg's combined sewer system carries sewage from homes and businesses along with stormwater runoff from streets and other hard surfaces to the interceptor system. Excessive stormwater runoff causes the combined stormwater and sanitary sewage overflows to the Susquehanna River and Paxton Creek.

Please avoid all contact with water downstream of combined sewers. Swallowing or hand-to-mouth contact with sewage contaminated water could make you sick. Signs are posted along our waterways to identify 58 combined sewer outfalls and areas where contact with the water could be hazardous to your health. Additionally, large informational signs about combined sewer overflows are displayed in prominent locations. Even in dry weather, it is best to avoid contact with urban streams and teach children to stay away.

The Harrisburg Authority has engaged civil engineers to investigate mitigation and reduction of Combined Sewer Overflows to both the Susquehanna River and Paxton Creek through the development of a Long Term Control Program.