

**EPA Parameters and Limits for Waste  
Water Pollutants**

BOD	85% Removal  Daily Max. 50mg/l  Monthly Avg. 30mg/l	Biochemical oxygen demand (BOD) is a measure of organic pollution. Microorganisms in the environment feed on and break-down (biochemically oxidize) organic matter. BOD is a measure of how much dissolved oxygen the microorganisms use when they break-down the organic matter. Composite samples of the effluent from WPCF are collected twelve times a month for analysis.
SS	85% Removal  Daily Max. 50mg/l  Monthly Avg. 30mg/l	Suspended solids (SS) are particles of organic and inorganic matter in water or wastewater that can settle out. Excess SS can lead to sludge deposition in the receiving body of water. The SS level at the WPCF is 12 times a month.
TRC	Daily Min. 0.2mg/l  Daily Max. 1.5mg/l	A minimum total residual chlorine (TRC,) or excess chlorine, is maintained at the WPCF effluent to insure that it is properly disinfected (i.e. absence of pathogenic organisms.) The TRC is continuously monitored and checked four times a day.
Toxicity	Non-toxic  (greater than of equal to 90% survival of test organisms)	To ensure that the WPCF effluent will not be toxic to fish or microorganisms in the Thames River, samples are tested quarterly at the laboratory using the standard procedures dictated by the Connecticut DEP.
Fecal Coliform	Limit 200 per 100ml	Fecal coliform are organisms which are normally found in human waste. The presence of fecal coliform is used as an indicator of pathogenic (disease producing) organisms which may be present. The fecal coliform count is performed twelve times a month.

**HOW SERVICE IS ENSURED...**

**SPECIALIZED MONITORING**

In 1998, a SCADA system, which stands for Supervisory Control and Data Acquisition, was installed. The SCADA system is used to monitor and/or automatically operate plant equipment and processes. Many of these processes are tied into an alarm system to insure after hour protection for all the vital functions of the plant.

**COMMUNICATING WITH INDUSTRY**

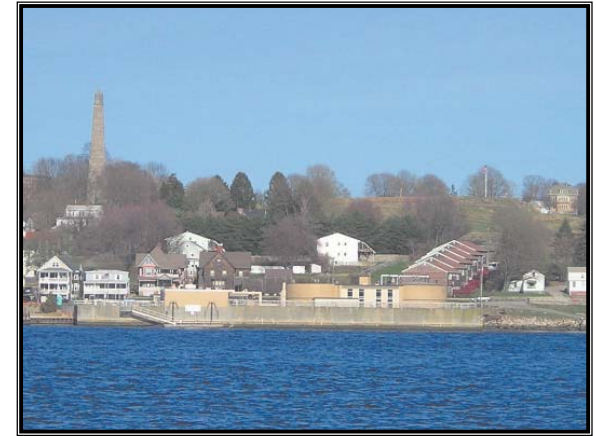
In an effort to ensure that the WPCF meets the operational needs of the community, the city formed a Task Force made up of representatives from the State of Connecticut DEP, large industries within the city, and the WPCF. The industries performed a comprehensive testing program where comparative industrial effluent and WPCF influent/effluent samples were collected over several months and analyzed for metals and organics. As a result of scrutinizing industrial discharge quality, reviewing the operational demands on the WPCF, and implementing specific recommendations made by the Task Force, operational problems have been resolved.

**DEVELOPING EMERGENCY CONTROL SYSTEMS**

For normal maintenance and emergency situations, the WPCF operators assists the Water Distribution Department with sewer line by-passing. With a Spill Emergency Response Trailer, the WPCF operators have mobile emergency disinfection, pumping, spill containment, and emergency power/lighting capabilities.



This brochure was designed by Cadets at the United States Coast Guard Academy.



**THE FORT STREET WATER  
POLLUTION CONTROL FACILITY**

...Serving the City of Groton and protecting the environment since 1955.



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## TO THE COMMUNITY:

The Groton Water Pollution Control Facility (WPCF) was originally installed in 1955. It has undergone numerous innovative upgrades to continually meet the needs of the community and EPA in its efforts to protect the environment. The community associated with the plant is made up primarily of industry, including Pfizer's research and development facility and General Dynamics. Though highly complex in nature, incoming wastewater is assured to comply with treatment standards by the supervision of an industrial city task force, innovative receiving water and watershed testing programs and the dedication of our licensed operators who closely monitor the overall process.

Even with an erratic industrial flow, the facility has consistently achieved permit compliance. Part of the credit for the exceptional compliance record can be directly attributed to the industrial city task force. This task force, first established in the 1970s, provides a unique forum for State Regulators, industry representatives, and the WPCF operators and management to discuss plant performance and operational issues. Direct actions include the implementation of comprehensive sampling programs, the modification of specific WPCF operations, and the installation of industrial pretreatment systems (i.e., equalization, bilge water treatment and odor control).

In conjunction with the DEP and support from the Clean Vessel Act Grant Program, a marine pump-off facility was constructed during the summer of 2000 at the Fort Street facility. This project is the first of its kind in CT and provides a convenient disposal site for domestic sewage waste from recreational boats on the Long Island Sound and the Thames River. The pump-off facility not only benefits recreational boaters, but also serves the UCONN vessels, Project Oceanology vessels and some commercial vessels and will set a positive example for other municipalities.

In summary, the Groton WPCF is an excellent example of a conventional activated sludge treatment system that consistently meets the needs of its residential and industrial community while minimizing the impact on the receiving body of water. In recognition of the commitment to clean water through outstanding operation and maintenance and continued compliance with the discharge limitations, the Fort Street WPCF received the 1993 EPA Region I Operation and Maintenance Excellence Award. The people of the Water Pollution Control Authority (WPCA) are proud to be serving the City of Groton and protecting the environment.

### The City of Groton WPCA



The collection system consists of 53 miles of sewer main, including 49 miles of gravity sewer main and 4 miles of pressurized sewer main. There are 9 pump stations ranging in capacity from 0.07 to 1.76 MGD.



The collection system is maintained regularly to ensure that the system continues to work. Maintenance of the system includes the following:

Each year approximately one third (53,000 linear feet) of the collection system is cleaned as part of a preventative maintenance program. Areas in the collection system where grease builds-up have been identified and are cleaned quarterly using a large vacuum truck. Older lines with known infiltration/inflow problems are relined.

Daily checks of all nine pump stations are performed by the WPCF operators seven days a week. The checks include routine inspection and maintenance of the pumping and odor control chemical feed systems.

## THE MORE YOU KNOW!

Excessive levels of nitrogen in the Long Island Sound have resulted in the alarming growth of algae blooms. When these microorganisms die they are consumed by bacteria, which reduce the amount of dissolved oxygen available for aquatic life. Groton WPCA innovatively reduced its nitrogen output with a bare minimal increase in costs. By providing both aerobic and anoxic conditions, nitrogen can be removed during secondary treatment. Hence, Groton WPCA's innovation has helped safeguard our environment while saving taxpayer money.

Groton WPCA treats an average of 2.1 million gallons of water per day (MGD), that's 1.3 million toilet flushes!! The plant can handle as much as much as 3.1 MGD.

Almost 65% of the water treated comes from industrial sources.

The rotary drum thickener has significantly reduced volume of sludge produced per day, thus saving costs in sludge transportation and disposal.

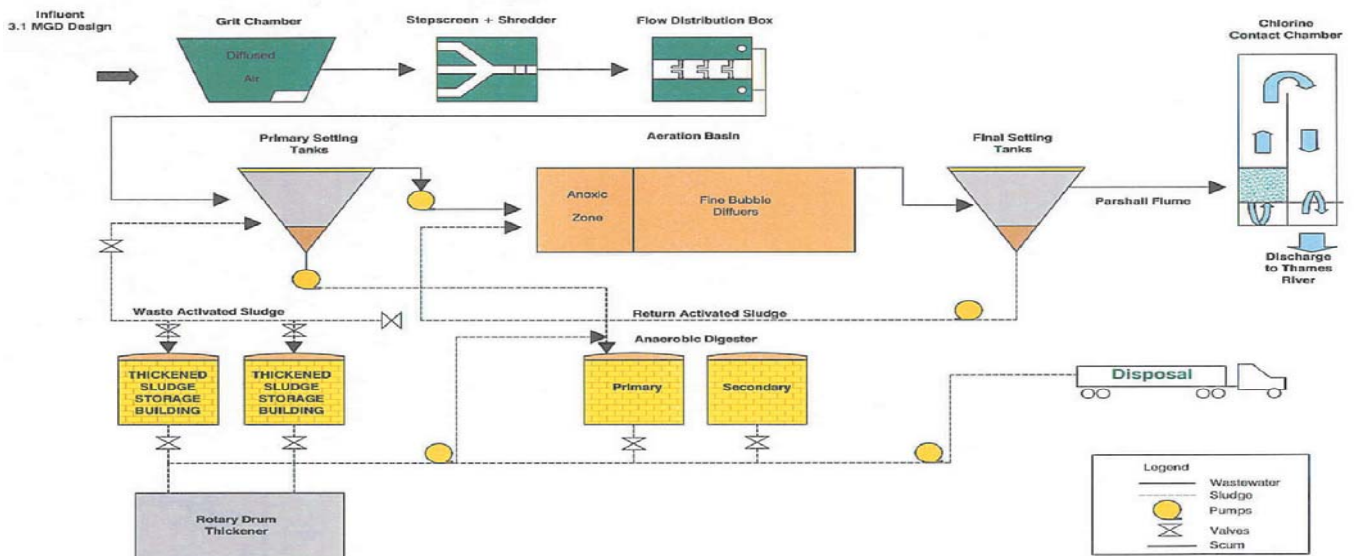
Odors from many of the plant's processes are vented to either a chlorine scrubber or a smaller bio-filter type scrubber unit. *Odor Gone*, a masking agent, is also used throughout the plant and remote pump stations. A chemical called Bioxide is used at two of the pump stations as an effective method for odor elimination in the collection system.

The clean water, or effluent, goes directly from the chlorine contact chamber into the middle of the Thames river. Effluent quality is continuously checked to ensure permit compliance.

The EPA maintains strict control levels of the pollutants, and their amounts, allowed in the clean discharged water.

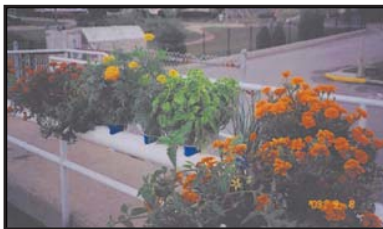


## Schematic Flow Diagram City of Groton WPCA



## Environmentally Friendly

- Effluent from the WPCF must meet strict limits so that the community can be assured that their health and environment is protected.
- The Fort Street WPCF received the 1993 EPA Region I Operation and Maintenance Excellence Award.



# The Wastewater Treatment Process

## Preliminary Treatment



**Flow Monitoring:** The wastewater enters the WPCF through an 18-inch sewer and passes by an area velocity meter where the flow is measured and remotely recorded in the control room of the operations building. At this point *Odor Gone* is added to mask the odor of the raw sewage.



**Grit Chamber and Step Screen:** Wastewater enters the grit chamber where it is aerated to keep organic matter in suspension while the heavier grit particles, like sand, are removed by settling. The wastewater then flows through a step screen with attached shredder. The floating solids are removed from the waste stream to prevent fouling of downstream equipment.

## Primary Treatment



**Primary Settling:** The flow is directed to one or both primary settling tanks where the suspended solids settle to the tank bottom and scum floats to the top. The effluent from primary settling is conveyed to a junction chamber and then to the primary effluent wet well. The flow is lifted to an axial flow pump to an elevation that will ensure gravity flow.



**Primary and Secondary Digestion:** The settled solids and floating scum skimmed from the primary settling tanks are combined with a small amount of thickened sludge from the sludge storage tank for digestion. There are two digestion tanks operated in series. The organic and inorganic matter in the sludge is decomposed in the absence of oxygen. This anaerobic process transforms the raw odorous sludge into a relatively inert product that can be disposed of with minimal nuisance or public health hazard.

## Secondary Treatment



**Aeration:** After primary settling, the wastewater is pumped into aeration basins where microorganisms consume organics and reduce the concentration of the pollutant BOD. Wastewater in the tank is aerated with fine bubble air diffusers. The mixture of water, oxygen and microorganisms in the aeration tank is called mixed liquor. An anoxic zone (no aeration) precedes the aerated zone to enhance the removal of nitrogen.



**Final Settling:** Following the detention period in the aeration basins, the mixed liquor flows to the final settling tanks. The solids settle to the bottom of the tanks and are either pumped back to the head of the aeration tanks (RAS) or sent to the rotary drum thickener (WAS) for processing and eventual disposal.



**Chlorination:** The supernatant, or clarified wastewater at the top of the settling tank, overflows to the chlorine contact chamber where a chlorine solution (sodium hypochlorite) is injected for disinfection. The long racetrack configuration of this tank ensures adequate contact time between the chlorine and the wastewater prior to discharge.

## The Sludge Treatment Process



**Rotary Drum Thickening:** The waste activated sludge (WAS) from the final settling tanks is fed to the rotary drum thickener at 0.3 to 0.6% solids and mixed with a polymer. The mixture flows into a mesh-lined drum where it spins around allowing excess water to pass through the screens and to the head of the plant. The thickened sludge, at 6 to 8 % solids, is then pumped to the sludge storage tank.