

SCARBOROUGH SANITARY DISTRICT WASTEWATER TREATMENT FACILITY

GENERAL OVERVIEW

Your wastewater treatment facility (WWTF) is capable of treating an average of 2.5 million gallons per day (mgd) of raw sewage. It uses a process called "activated sludge" to treat wastewater. In the activated sludge process, microorganisms are used to remove waste products from the discharge stream.

SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA)

SCADA systems allow personnel to manage information. In this way, operators can troubleshoot equipment, diagnose treatment plant health, make seasonal modifications to process control, and re-route essential functions when necessary.

LABORATORY

Plant personnel regularly sample and analyze the wastewater at the plant to check its effectiveness. In the laboratory, the technician can test for conventional pollutants as well as evaluate the health of the microorganisms that treat the wastewater.

INFLUENT

The wastewater flow that enters the WWTF is from residential areas, commercial businesses, schools, municipal facilities, and some industrial facilities in the Town of Scarborough.

SEPTAGE RECEIVING

Septage arrives by tank trucks and recreational vehicles (RVs) and is unloaded at the receiving station where it is gradually added to the influent for treatment.

FILTER SCREEN

The raw influent wastewater passes through a filter screen in the Headworks Building. The screen is the first step in treating the wastewater, and removes debris contained in the wastewater that is larger than ¼ inch. The debris removed is automatically washed to remove organic material and compacted to remove water.

GRIT REMOVAL SYSTEM

Following screening, the wastewater flows by gravity into the aerated grit chamber. In this chamber, air agitates the wastewater sufficiently to allow only the heavier particles or "grit" to settle for removal.

PRIMARY CLARIFIERS

After the grit removal system, wastewater is conveyed by gravity to the two primary clarifiers, where approximately 70% of the suspended solids settle and are pumped to the Primary Sludge Aerated Storage Tank. The wastewater leaving the primary clarifiers has had what is called "primary treatment".

AERATION SYSTEM

The recent WWTF upgrade allows operators to achieve removal of additional pollutants and treat the wastewater to a quality exceeding standards called "secondary treatment". Effluent from the primary clarifiers flows by gravity to three aeration trains. Each aeration train consists of an "anoxic tank" followed by two "aeration tanks". The anoxic tank is mixed but not aerated which removes nitrogen from the wastewater. The aerated tanks provide oxygen that the microorganisms need to consume organic matter, effectively cleaning the wastewater. The more organic "food" there is in the wastewater, the more oxygen will be needed by microorganisms to treat the wastewater.

PROCESS AIR BLOWERS

The oxygen needed by the microorganisms is delivered to the aeration tanks by a series of process air blowers located in the Blower Building. Compressed air is released in the bottom of the aeration tanks through a fine bubble diffuser system similar to what you might have in your fish tank at home.

SECONDARY CLARIFIERS

Once the microorganisms in the aeration tanks have done their work they must be removed from the system. This treatment process is called "secondary clarification", and allows the microorganisms to settle out.

ACTIVATED SLUDGE

Activated sludge is made of settled microorganisms that continue their work by being recycled from the center of the clarifiers and pumped into the aeration tanks by the return activated sludge pumps. Waste activated sludge is the activated sludge which is removed from the process to control the population of microorganisms.

DISINFECTION

Disinfection is the term applied to the destruction of disease-causing organisms. Disinfection in wastewater treatment involves exposing these organisms to a chlorine-based chemical, in this case, sodium hypochlorite (bleach) to destroy or disable them. Controlled quantities are added to the effluent to disinfect the wastewater prior to release to the ocean.

EFFLUENT PUMPING

Effluent leaving the Secondary Clarifiers flows to the tank in the basement of the Blower Building. From this tank, three effluent pumps convey treated and disinfected effluent through a 10,100 foot long, 20-inch diameter force main to the outlet diffusers off Prout's Neck.

SLUDGE STORAGE

Sludge storage is an important component of every WWTF. The storage tanks at the WWTF permit personnel to blend sludge from the Primary Clarifiers and the Waste Activated Sludge to obtain for the best removal of water.

GRAVITY BELT THICKENER

At the WWTF, the waste activated sludge is thickened by removing water from it with a Gravity Belt Thickener. The thickened sludge is then pumped to one of the aerated sludge holding tanks, where it is blended with primary sludge before being sent for dewatering.

ROTARY SLUDGE PRESS

Dewatering is accomplished in a rotary sludge press. Sludge is pumped into a hollow cavity between porous, chrome-plated screens. Free water passes through the screens, and a sludge "cake" is extruded. This dry sludge cake is hauled to the compost facility.

AERATED STATIC PILE COMPOSTING

In aerated static pile composting, dry sludge cake is mixed together in a large pile. After a set number of days, the composting process is complete and the compost material is ready for use.

PLANT WATER SYSTEM

The WWTF uses two separate water systems, city water (which is drinkable, or "potable"), and plant water, which is non-potable. Plant water is treated effluent from the WWTF that is used in several plant processes where water is needed, but does not need to be drinking water quality.

ODOR CONTROL SYSTEM

Air from many processes is drawn through a network of ducts and introduced to what is called a "packed bed scrubber". As air travels through the scrubber, the air mixes with a scrubbing solution and the odors are transferred to the scrubbing liquid. Cleaner air is exhausted to the atmosphere, while the scrubbing liquid is eventually discharged to the wastewater treatment system.