



# BRANFORD WASTEWATER TREATMENT PLANT



**OWNER:**

Town of Branford  
Branford, Connecticut

**ENGINEER:**

Earth Tech, Inc.  
Glastonbury, Connecticut

**GENERAL CONTRACTOR:**

C.H. Nickerson & Co., Inc.  
Torrington, Connecticut

# Introduction

The Town of Branford operates a wastewater treatment facility on Block Island Road. The facility treats all wastewater generated by Branford as well as some wastewater from North Branford. Septage disposal, boat waste, and RV waste for Branford residents are also accommodated at this plant.

## History of the Project

The original treatment plant was constructed in 1962 to treat a flow of 1.5 million gallons per day (mgd). It was upgraded to a pure oxygen plant in 1982 with additional capacity to treat a design flow of 4.5 mgd. In the late 1990s, as part of efforts to help protect the waters of Long Island Sound, the US Environmental Protection Agency and State regulators established new effluent discharge limits for the plant, requiring plant processes to be upgraded to include nitrogen removal.

Branford hired Earth Tech to perform facilities planning to determine both future treatment requirements to serve a growing population, and the best means to achieve denitrification at the plant. The facilities plan also addressed how best to control odors from the septage and sludge processing systems. Branford approved the facilities plan and hired Earth Tech to design the upgrade and expansion of the treatment plant. With this upgrade, the plant is now able to treat a design flow of 6.5 mgd, while reliably producing effluent that meets or exceeds regulatory requirements. The construction upgrades were completed in August 2002 by the General Contractor, C.H. Nickerson & Co., Inc.

*Primary Clarifier*



*Return  
Activated Sludge  
Pumps*



*Pretreatment Screening*



## Other Processes

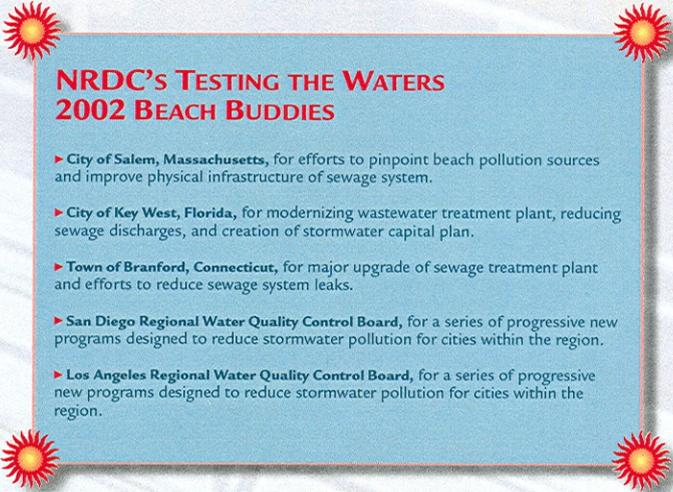
In addition to treating wastewater, the Branford facilities treat odors and sludge generated during the wastewater treatment process. Odors at the plant are collected in a centralized scrubbing unit that treats all odorous air. Sludge generated during primary treatment is thickened (dewatered) by gravity. Secondary sludge is thickened using a mechanical dewatering process. Thickened sludge is pumped to holding tanks where it is stored until the thickened sludge is hauled away by tanker truck.

The treatment plant process is controlled by a state-of-the-art computer control system. This system allows all plant processes to be controlled at any of a number of locations within the treatment plant, and also allows dial-up access to the plant from a remote site. Alarm and status conditions are monitored constantly to ensure that the treated effluent is of the highest quality.

## Plant Performance

Since startup of the upgraded facilities, effluent results of the plant show much higher water quality than had been anticipated. This high quality effluent has allowed the town to obtain money from the State in the form of nitrogen credits.

The upgrade has also made a major impact on the quality of beaches in Branford. The town's efforts to protect its beaches have been recognized by the Natural Resources Defense Council. Branford was one of only five communities nationwide to receive the Council's 2002 Beach Buddies award.



### NRDC'S TESTING THE WATERS 2002 BEACH BUDDIES

- ▶ **City of Salem, Massachusetts**, for efforts to pinpoint beach pollution sources and improve physical infrastructure of sewage system.
- ▶ **City of Key West, Florida**, for modernizing wastewater treatment plant, reducing sewage discharges, and creation of stormwater capital plan.
- ▶ **Town of Branford, Connecticut**, for major upgrade of sewage treatment plant and efforts to reduce sewage system leaks.
- ▶ **San Diego Regional Water Quality Control Board**, for a series of progressive new programs designed to reduce stormwater pollution for cities within the region.
- ▶ **Los Angeles Regional Water Quality Control Board**, for a series of progressive new programs designed to reduce stormwater pollution for cities within the region.

# Major Process Elements

The upgraded treatment plant process begins with pretreatment of the wastewater. Screening removes larger particles from the wastewater. Grit removal removes sand and other similar materials, protecting downstream process elements from excessive wear. Following pretreatment, the wastewater is pumped to primary settling tanks.

The primary treatment process removes suspended matter in the wastewater. After primary settling, the wastewater flows to the secondary treatment tanks for biological processing of the wastewater and removal of nutrients. In this secondary process, more than 95% of the wastewater nutrients and contaminants are removed.

The secondary process in Branford consists of biological nutrient removal (BNR) in a four-stage process that includes two anoxic zones and two aeration zones. In the final step of secondary treatment, the treated wastewater is settled in three new secondary clarifiers.

The clarified water then proceeds to disinfection prior to discharge. In Branford, disinfection is accomplished by exposure to ultraviolet light, thereby eliminating the concerns associated with chlorine disinfection. Effluent pumping during high tides completes the liquid process.

*Secondary Clarifier*



*Computer Control System*



*Secondary  
Aeration Basin*



# TREATMENT PROCESS TRAIN

## **Pretreatment**

*Mechanical Bar Screen  
Aerated Grit Chambers  
Influent Pumping*

## **Primary Treatment**

*Primary Settling Tanks*

## **Secondary Treatment**

*Primary Anoxic Zone  
Primary Aeration Zone  
Secondary Anoxic Zone  
Secondary Aeration Zone  
Secondary Clarifiers*

## **Disinfection**

*Medium Pressure, High Intensity*

## **Effluent Pumping**

*Axial Flow Pumping*

## **Sludge Processing and Disposal**

*Gravity Thickener  
Gravity Belt Thickener  
Sludge Storage*

## **Other Processes**

*Odor Control  
Septage Receiving*

## **Screening and Grit Removal**

*16 mgd capacity  
3 minutes detention time at 15 mgd  
4 pumps @ 4,500 gpm each*

## **Primary Settling Tanks**

*2 @ 65-foot diameter*

## **4-Stage BNR Process**

*3.1 hours detention time  
10.5 hours detention time*

*60 minutes detention time  
3 @ 85-foot diameter*

## **Ultraviolet Disinfection**

*30,000 microwatts/sec/cm<sup>2</sup> dose*

## **Axial Flow Pumping**

*3 pumps @ 7,000 gpm each*

## **Thickening, Storage, and Removal by Tanker Truck**

*30-foot diameter thickener  
3 meter, 600 gpm capacity GBT  
2 storage tanks @ 50-foot diameter,  
20-foot SWD*

*8,000 cfm scrubber  
20,000 gallon storage*



# DESIGN DATA

## Plant Flow

<i>Average Daily Flow (ADF)</i>	4.9 mgd
<i>Design Flow</i>	6.5 mgd
<i>Peak Flow</i>	15.3 mgd

## Influent Design Values

<i>Biological Oxygen Demand (BOD)</i>	9,000 lb/day (167 mg/l)
<i>Total Suspended Solids (TSS)</i>	9,600 lb/day (177 mg/l)
<i>Total Nitrogen (TN)</i>	1,700 lb/day (31 mg/l)

## Effluent Design Values

<i>BOD</i>	410 lb/day (10 mg/l)
<i>TSS</i>	410 lb/day (10 mg/l)
<i>TN</i>	160 lb/day (4 mg/l)



E A R T H  T E C H

*A Tyco Infrastructure Services Company*