



# EarthWatch Rhode Island



## **Topic: "So what happens *after* I flush?" – Waste Water Treatment in Rhode Island**

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The battle lines between the waters of the Ocean State and human and industrial sewage are at wastewater treatment facilities. It is these multi-million dollar investments into our environment, staffed by dedicated professionals, that profoundly protect human health and the environment.

Each time a toilet is flushed and each time water and chemicals are sent down a sink, Rhode Islanders create sewage, also known as wastewater. How much? The number might surprise you. Rhode Islanders create over 100 million gallons of wastewater *every* day. This wastewater contains harmful bacteria and chemicals that left untreated would destroy the environment and become a public health hazard. Too many nutrients, like nitrogen and phosphorus, in wastewater are of particular concern in Rhode Island because they act like fertilizer in the water, causing low dissolved oxygen levels in some waters, which have led to massive fish kills.

In urban and suburban areas wastewater is collected by quasi-state, private and municipal wastewater treatment facilities (WWTFs) and purified before it finds its way back into our rivers, lakes or bays. Wastewater treatment facilities, the frontline of water pollution control, have been widely used in America since the beginning of this century. In fact, Providence was one of the first cities in the United States to build a citywide sewage collection system and the third in the country to build a wastewater facility. Wastewater treatment plants are specialized, highly complex facilities that require the expertise and presence of specially trained, skilled individuals (certified operators), who ensure that effluent discharged into the State's waters meets, or is below, state and federal pollution discharge requirements.

### **What's DEM's role?**

DEM regulates all nineteen of the state's major municipal WWTFs in Rhode Island, as well as dozens of other, smaller industrial and commercial systems. DEM reviews and approves facility designs and operating plans and inspects & monitors wastewater facilities to



**The Bucklin Point Wastewater Treatment Facility is on of 19 major municipal facilities regulated by DEM.**

ensure compliance with permit requirements. DEM certifies operators and provides training & technical assistance to wastewater personnel. The Department also approves how wastewater sludge generated by WWTFs is disposed of, used and transported.

### **How Wastewater Facilities Work?**

Wastewater from homes and businesses flows into progressively larger pipes until it reaches the wastewater treatment plant. In order take advantage of gravity, wastewater treatment plants are usually located in low-lying areas, and sewer mains often follow natural downhill contours to the plant—otherwise expensive pumping stations are needed. There are hundreds of such stations in the state that must be monitored and maintained. Once the water reaches the wastewater treatment plant, it will go through a number of stages of treatment depending on the sophistication of the plant.

The first stage, known as **preliminary treatment**, collects the solids for disposal. Screens let water pass, but not trash (such as rags, diapers, etc.). The trash is collected and properly disposed of.

Typically this is followed by **primary treatment**, which uses gravity and buoyancy to allow heavy solids to settle for collection and lighter-than-water solids to float for skimming off. Both settled wastes and floatable wastes are collected for treatment and disposal.



The Bucklin Point WWTF uses state of the art laser technology to treat wastewater.

The next stage, known as **secondary treatment**, removes dissolved organic materials and nutrients. This is done with the help of bacteria. The water flows to large, aerated tanks which provide the necessary environment for to bacteria consume everything they can. Think of an aeration basin like a large aquarium, with the bacteria acting like fish eating up the dissolved pollutants. There are many technologies that provide this important contact for bacteria and wastewater.

The wastewater then flows to settling tanks where the bacteria settle out. Secondary treatment might remove 90 percent of all solids and organic materials from the wastewater. The solid material removed from the treatment process is called **sludge** or **biosolids**.

In many cases, biosolids removed from the primary and final clarifiers are pumped to gravity thickeners to be concentrated. The biosolids can be sent to a facility that produces an environmentally-friendly compost-like material. DEM uses biosolids to rehabilitate wastelands and restore them into wildlife habitat (a subject for another EarthWatch segment). Most of the sludge in Rhode Island is incinerated, which drastically reduces its volume and creates an inert ash that can be disposed at a landfill.

The third stage, known as **tertiary treatment**, varies depending on the community and the composition of the wastewater. Typically, the third stage will use chemicals to remove phosphorous from the water. The removal of nitrogen is often done as a variation to the aeration “bacteria eating” process, but creating the environments in the tanks that encourage a different type of bacteria that eat nitrogen compounds.

Lastly, the treated, clear-looking wastewater is disinfected prior to being re-released back into the environment. Chlorine or ultra-violet disinfection kills any remaining bacteria, and the treated water is discharged into a receiving water body. (If chlorine is used, another step helps remove any excess chlorine, since chlorine is toxic.) DEM issues permits under the RI Pollution Discharge Elimination System program to the treatment facilities that allow them to discharge the treated wastewater back into the environment. The permits set strict limits, based on studies conducted at URI’s Marine Ecosystems Research Laboratory, on the amounts of nitrogen and other pollutants in the treated wastewater that can be discharged from the facilities into the state’s waters.



**The jar on the left shows wastewater as it enters the Bucklin Point WWTF. The jar on the right shows the wastewater after treatment.**

### **Nutrient Pollution**

As mentioned earlier, nutrient pollution can be extremely harmful to our state waters. The state has adopted a goal of reducing nitrogen discharges from WWTFs into the Upper Bay by 50 percent. To accomplish this goal, 11 treatment facilities within the Upper Narragansett Bay watershed have been identified for nutrient control, and eight plants have already implemented nitrogen reduction technologies: Burrillville, Cranston, East Greenwich, NBC Bucklin Point WWTF, Smithfield, Warwick, West Warwick, and Woonsocket. Significant progress toward reducing nitrogen discharges from the State’s wastewater treatment facilities is well underway.

### **Specifics on Bucklin Point Wastewater Treatment Facility**

The Bucklin Point Wastewater Treatment Facility is one of two facilities owned and operated by the Narragansett Bay Commission (NBC). The facility processes over 30 million gallons of wastewater per day from Pawtucket, Central Falls, Cumberland, Lincoln, the northern portion of East Providence and a small section of Smithfield and discharges into the Seekonk River.

A \$70 million upgrade to the Bucklin Point facility completed in June 2006 reduced nitrogen discharges by 55%. The upgrade included hydraulic and process improvements as well as updates to the instrumentation and controls at the plant to ensure reliable and continuous process control. The improvements also increased the capacity of the facility.

## What can Rhode Islanders do?

As DEM and NBC do their part to reduce pollution from wastewater treatment facilities they also encourage Rhode Islanders to take steps at home, including:

- Dispose of household products safely. Don't pour solvents, pesticides, paint thinners, engine oil, or household cleaning products with hazardous chemicals down the drain or into a storm sewer.
- Try to find safe alternatives to products that can harm water supplies.
- **Use Water Wisely.** Practice water conservation at home and at work. Fix leaks and install water-saving devices and appliances. Be aware of how much water you use in your household. Don't take this valuable resource for granted!
- **Support Your Local Treatment Plant.** Be aware of your treatment plant's effort to provide clean water. Help make sure it has the money, equipment and personnel to get the job done. Visit your local treatment plant. Learn what special problems it must solve and what you can do to help. A listing of local facilities can be found on DEM's website.

## The unsung heroes:

To often the real heroes of environmental protection, the state's 200 wastewater operators do not get the attention they deserve. Rigorously tested and certified, these professionals come from many backgrounds. They are engineers, biologists, laboratory specialists, electricians, mechanics, and many more. Because plants must run 24 hours a day, seven days a week, all year, these men and women are on call constantly to keep the state's clean water infrastructure operating at peak performance. And the facilities are only getting more sophisticated as the state increasingly tightens treatment requirements.

**Interviews** (show below being conducted by NBC10 Reporter Lisa Purcell):

- Bill Patenaude, Principle Sanitary Engineer, RIDEM (left) discussed DEM's role in regulating, certifying, training and nutrient pollution
- Gilbert "Gil" Veilleux, Plant Operator, Narragansett Bay Commission (right) talked about the Bucklin Pt. facility and how the operations work

