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Easton Wastewater Treatment Plant Field Trip Lab Report
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Typical flow rate?

The Easton Wastewater Treatment plant is a 10 million gallons per day facility, that is, the tanks and complex as a whole can hold 10 million gallons of water. The inflow of sewage and storm water to the plant is five million gallons per day and that is the same flow rate of water that is released from the plant and put back into the Delaware River. The Easton Water Treatment Plant takes six to eight million gallons per day off of the Delaware River, but not all of this water goes to the wastewater treatment plant. Some is lost to consumption or other uses, and many buildings in this area have septic systems which independently manage sewage.

Does Easton have a combined sewer system? If so, how do storms affect the treatment process?

Easton has a combined sewer system meaning the water arriving at the wastewater treatment plant is wastewater from sewage, and storm water throughout the city that is collected and brought to the plant via eight pumping stations. The typical flow rate at the plant is five million gallons per day and can go up to six to seven million gallons per day with storms and large rainfall events. If this occurs, the water coming into the plant for treatment is practically storm water diluted with sewage. In rare cases, after filling out a lot of paperwork and permits, the massive amounts of storm water can be completely mixed with the wastewater and then only primarily disinfected before going back out into the river. The reason the wastewater treatment plant would default to this option is because overflow or excess water at the plant caused by the storm washes out microorganisms which are necessary to clean the water. A reduced amount of microorganisms in the oxidation ditches creates not optimized treatment. But, large rainfalls can happen frequently and the plant will not use the mixing method often. So, if it seems that many of the microorganisms have been washed out, the plant can buy a "bag of bugs" to replenish the microorganisms in the tanks. To reduce the amount of storm flow the plant receives, the City of Easton should consider adding more storm water detention basins, riparian buffers, or other types of green infrastructure to reduce the amount of storm runoff which is received by the wastewater treatment plant.

Discuss various treatment steps at a typical WWTP.

First, inorganic materials are removed from the water in fine screening or the headworks buildings. Water then enters a grit chamber which further removes sand, gravel and other rocks. Twelve times a day, a manual bar rack is used to collect solid materials that were missed. The water then enters primary clarifiers through a splitter box. Next, centrifuges control quick spinners that separate the water from the solids. The water goes into the next step of treatment and the solids from this step and all previous steps are sent to the landfill. The water flows into an oxidation ditch and goes through aeration before arriving at the secondary clarifiers. Chlorine

is added to the water for disinfection and then the water is dechlorinated using sodium bisulfate. The cleaned water then flows through a grid system into the Delaware River. Other steps in the process include the RES and WAS or return activated sludge and waste activated sludge, respectively, which control the age of microorganisms. The energy from anaerobic digestion goes to another step at the plant where it is converted to methane and used for heat at the plant and other energy sources. The excess is burned off.

What chemicals, if any, are added and why?

The Easton Wastewater Treatment Plant adds multiple chemicals to the water. Magnesium hydroxide is added for pH adjustment. This base will raise the pH in the water to get it close to seven. Chlorine is also put into the water. The plant uses sodium hypochlorite for disinfection. The chlorine removes harmful bacteria and pathogens from the water. Because chlorine cannot stay in the water when it is emptied back into the river, dechlorination must also occur. For this, the plant adds sodium bisulfate to the water to take out the chlorine. Ferric sulfate is also added to the water at the plant to get the “bugs” or bacteria to group together during flocculation.

Which river is the treated water emptied into? Compare the river flow to the effluent flow.

Sanitized water leaves the Easton Wastewater Treatment Plant, flows under the Delaware Canal, and empties into the Delaware River. The flow of the Delaware River near the Easton Wastewater Treatment Plant is about 50 million gallons per day. The river flow upstream near the Easton Water Treatment Plant is about 33 million gallons per day and downstream the Lehigh River adds about 20 million gallons per day of flow to the Delaware River at the point where they meet in Easton. The Easton Wastewater Treatment Plant is about one mile south of the confluence. The effluent flow of the plant is typically around five million gallons per day, but can get as high as six to seven million gallons per day during or shortly after storms.

Is chlorine used in any part of this treatment? If so, why?

Chlorine in the form of sodium hypochlorite is added to the water at the Easton Wastewater Treatment Plant for disinfection. The chlorine removes harmful bacteria such as pathogens and eColi from the water, but the chlorine cannot stay in the water so dechlorination must also occur. Sodium bisulfite is added to the water to take out the chlorine.

Are there any water treatment plants downstream? If so, how far?

The next closest water treatment facility on the Delaware River is 20 miles south of the Easton Wastewater Treatment Plant. The town where this facility is located is fairly small. There are also water and wastewater treatment plants on the Delaware River near Trenton, New Jersey and Philadelphia, Pennsylvania.

What is the average BOD entering the EWWTP and the average BOD leaving the plant?

The average BOD of the influent entering the plant is 329 parts per million and the average BOD of the effluent leaving the plant is 6.44 parts per million. In addition, the average ammonia coming into the plant is 40 and the average ammonia leaving the plant in the water is 1.11.

Why does a management company run the EWWTO and not the city? Is this common?

Formally known as the Easton Area Joint Sewer Authority, the Easton Wastewater Treatment Plant business and administrative tasks are handled by the Executive Security. The Pretreatment Coordinator deals with the Environmental Protection Agency (EPA). The Easton Wastewater Treatment Plant is controlled by the City of Easton. It is not too uncommon to have wastewater treatment plants run by management companies. This can happen because of politics; if a mayor does not want the responsibility of running a plant. Or, if the wastewater treatment plant is underperforming or a mistake occurs, a management company can be brought in to take over the plant and get it up to speed. For example, Easton's Wastewater Treatment Plant used to be notorious. They had frequent permit violations, were blacklisted by the EPA, and two of the supervisors were sent to jail. Due to this, the mayor of Easton signed a contract with United Water in the 1990s to manage the utilities of the plant and fix the wrongdoings of the past. Although the workers at the plant work for the City of Easton, United Waters runs the Easton Wastewater Treatment Plant.

Are there any anaerobic zones throughout the oxidation ditch or is it entirely an aerobic process? If there is an anaerobic zone, what treatment process might the zone aid in?

Before entering the oxidation ditch, influent is aerated. It turns noxious and then almost anaerobic but never becomes completely devoid of oxygen. This step helps the nitrate process as well as remove phosphorous. The water is then re-aerated. If the water went completely anaerobic, all of the microorganisms would die due to lack of oxygen, but all of the phosphorous would be removed as sludge.