Team 4: Nutrient Removal at Waterbury, CT Water Pollution Control Facility

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Nutrient pollution is an increasing problem in global water sources. Human waste contains larger amounts of nutrients - most importantly phosphorous and nitrogen - which can have negative effects on ecosystems. Therefore, it is important to have nutrient removal systems at wastewater treatment plants in order to lower concentrations before the waste stream enters natural water bodies. The Water Pollution Control Facility in Waterbury, Connecticut treats municipal wastewater from the city of Waterbury for nutrients, metals, suspended solids, etc. They currently have an effluent total phosphorus concentration limit of 0.7 mg/L before the treated wastewater can be pumped into the Naugatuck River. This will soon change, as by the year 2020 new EPA regulations will require the seasonal discharge limit of phosphorous to decrease to 0.2 mg/L. The plant has a design capacity of 27 MGD but averages around 21 MGD throughout the span of a year.

This group has been tasked with exploring all possible removal methods and technologies that could remove enough phosphorous to reach the new limit. The facility presently uses a process of chemical addition, which adds aluminum sulfate and magnesium hydroxide to react with phosphorous-containing compounds, creating solid particles that will precipitate the phosphorous out of the waste stream. This project examines the cost and ability to continue running chemical processes in larger doses to account for the additional removal required. Other biological methods, such as enhanced biological phosphorus removal (EBPR), are also examined to compare the efficiency of biological removal with chemical removal. The budget for the upgrade is approximately $30 to $50 million dollars.

The project also considers the removal of biosolids created in phosphorus removal. Currently, biosolids are incinerated on site, but alternatives for biosolid management are examined as well. These alternatives must also consider the new regulations set by the EPA; modifying the chemical process increases the amount of precipitate formed, while the biological process produces more biofilm. As part of the goal of this project, increasing treatment process efficiency and exploring options to increase energy efficiency and sustainability are considered.