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## MEMORANDUM

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**TO:** SINTANA VERGARA  
**FROM:** FRANCISCO ALVAREZ  
**SUBJECT:** LAB 6 MEMO: ARCATA WASTEWATER TREATMENT PLANT  
**DATE:** OCTOBER 6, 2017

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### **Purpose**

The purpose of this memorandum is to provide an overview of the ENGR 115 class trip to the Arcata wastewater treatment plant (AWWTP) on September 29, 2017. The information gathered and provided to the class by Thea Sevelson, a plant employee and tour guide, includes, but is not limited to, the Arcata wastewater treatment plants average effluent volume and seasonal variation, recent modifications, and its water quality standards.

### **Discussion**

The tour began with a view of the pretreatment site (the “headworks”) where, with a design flow of 2.5 million gallons per day, an average of 1.1 million gallons of effluent volume is received daily when HSU is in session and significantly less when HSU and its roughly 8,000 inhabitants are out of session. Arcata’s rainy season provides the AWWTP with some issues, where an increase in rain causes large volumes of inflow and infiltration, increasing the peak flows way beyond the design flow of the plant, leading to much of that water being diverted directly to Pond 1 without primary treatment.

The primary clarifier provided insight on the settling process and removal of solids through the use of sludge rakes that remove settled solids and skim the floating solids out of the settling tank, feeding the sludge to an anaerobic digester for treatment. The anaerobic digester, an airtight oxygen deprived container, treats the sludge through a thermophilic process. The heating and mixing of the sludge at high temperatures breaks down the sludge and further separates the solids from fluids while in the process producing a biogas byproduct, methane, which is used to fuel the digester, ideally minimizing the waste produced by the sludge and offsetting the cost of fueling a heated anaerobic digester.

The secondary treatment sites provided a view of the grand scale of the natural treatment process the AWWTP utilizes to remove BOD. Marsh 5 and 6 are the most recent additions to the Treatment Wetlands in the plants secondary treatment process. The addition of the two newer marshes was necessary to further increase the removal of BOD, which is the primary purpose for the treatment wetlands. The AWWTP uses shading and settling as its primary method in removing BOD in its treatment wetlands. The Cattail and Hardstern Bulrush filling the marshes provide shading for the water, reducing the ability for algae to photosynthesize, killing the algae, allowing it to settle in the marshes. The plants and the natural microorganisms living on the roots of the plants continue in the reduction of BOD and nutrient removal.

Upon full treatment, the AWWTP’s discharge must meet a monthly BOD5 average of 30 mg/L. The effluent BOD5 levels coming into the plant are typically 250 mg/L, while in rainy seasons it is less than 100 mg/L. There is a 40-60% reduction in BOD5 levels leaving the clarifiers (60-70 mg/L) and ultimately the water discharged from the plant is typically within the 30 mg/L average.

### **Conclusion**

The natural treatment of waste water in the AWWTP has, for the most part, been successful in properly treating its effluent within established water quality standards with its low tech, low maintenance approach, though its past violations shows that some improvements can be made.