Arcata Treatment Plant Trip Memo

MIKE MALONE

ENGINEERING 115-INTRO TO ENVIRONMENTAL RESOURCES ENGR

PROFESSORS E. CASHMAN AND M. LANG

The purpose of this writing analysis was to discuss our field trip to the Arcata wastewater treatment plant in Arcata, CA on September 30, 2016.

MEMORANDUM

TO: EILEEN CASHMAN AND MARGARET LANG
FROM: MIKE MALONE
SUBJECT: ARCATA WASTEWATER TREATMENT PLANT TRIP REPORT
DATE: OCTOBER 7, 2016

Purpose

The purpose of this memorandum is to discuss the field trip to the Arcata Wastewater Treatment Plant and the Arcata Marsh for the Engineering 115 Lab at 8AM on Friday September 30, 2016. The purpose of the field trip was to learn about the wastewater treatment plant's water treatment train and the purpose/function of the different stages.

Discussion

We were given a worksheet of questions to be answered during the fieldtrip pertaining to the wastewater treatment plant. We walked through the wastewater treatment train from beginning to end. We started the fieldtrip at the "headworks" component of the wastewater treatment train. The headworks consisted of two Archimedes screw pumps that brought raw waste from the towns of Arcata, Sunnybrae and parts of Fieldbrook. Only one pump was functional at the time of the visit. The grit chamber pulled out heavy objects under high flow and we saw the discharge coming out of the top of the headworks (corn, coffee grinds, grit etc.). Eileen Cashman came and met us on the trail to discuss methods used to keep birds (mainly seagulls) from landing on the headworks, ultimately, fishing line at regular intervals seemed to be the best solution. The wastewater treatment plant has a design capacity of 2.3MGD (the operator said 5MGD, I think she was saying if both screw pumps were operational at the same time), often exceeded during high flows in the winter (up to 7-8MGD and <1MGB in summer).

The next stop was the primary clarifier, which functions to settle the sludge via gravity; then be pumped to the anaerobic digester. The anaerobic digester is kept at 96° F mesophilic range which sit in a middle area of amount of time and energy required. Co-generation process uses the methane released to sustain temperature of the digester via a boiler. There were hardier methane formers and more temperamental acid formers which have a symbiotic relationship with each other in the digester. The floating cover allows for fluctuating levels of gas to be formed on top of the digester. The processed sludge is sent to storage tanks which are then emptied into the drying beds where it is dried via evaporation. The processed dried sludge becomes landscape compost for the City of Arcata.

Water from the primary clarifier is sent through the treatment train on to the two oxidation ponds which removes a large amount of BOD through bio-processes using bacteria. The oxidation ponds have weirs that can be raised or lowered depending on what is wanted by the plant operators. Hydrocotle is a plant that is removed yearly with large equipment and then converted to the nitrogenous component of the compost.

The water then goes to the treatment wetlands (Arcata Marsh) which slow the rate of flow to allow many of the bacteria to die off while removing N/P nutrients and additional BOD removal as well as solid trace contaminant removal. The plant operator said that it mainly uses the physical structure of the marsh plants to impede the flow of water along with raised land in intervals to prevent a short circuit of the water flow. The water is sometimes not up to par with the 30mg/L TSS and BOD regulation so the enhancement wetlands help lower these to desirable levels fitting government regulations of water quality. Water coming into the plant has 200-250mg/L of BOD/TSS and after primary treatment, it is reduced to 60-70 mg/L of BOD/TSS (by about 70%). The wastewaters final level needs to be under 30mg/L of BOD/TSS to fit regulations and most of the year this is met.

Towards the end of treatment train, we walked up to the "Blue Frogs" in the enhancement wetlands which are mechanical pumps that circulate the sludge to allow more interaction with degradation capable bacteria along with other claims of the manufacturer. Kyle, an environmental engineering student is working on his senior project evaluating the claims of the "Blue Frogs" and their claim of being able to reduce the amount of BOD/sludge that is accumulated on the bottom of the wetlands.

From there we looked at the disinfection, chlorination system and how it interacts with the enhancement wetlands. In the future, they plan on switching to a UV disinfection system.

Conclusions

It is my conclusion that the Arcata Treatment Plant needs major renovation to update or repair many parts of the infrastructure involving the wastewater treatment train. Much of the equipment is out of date, original from grant money in the 1960's and 1970's, which funds are no longer available. The plant operator gave a little speech on "flushable wipes" and how they add more time and operation cost to the maintenance workers of the septic system. She suggested to not flush anything except toilet paper and human waste. Recently, two swaths ~10' wide were removed from the enhancement wetlands to help control the mass of marsh plants. Many renovations are needed: renewing the headworks, renovating the ponds/marshes and increasing the quality of the infrastructure in general in order to bring discharge levels into compliance all year long. I found the fieldtrip very informative and beneficial to understanding the overall process of how wastewater can be converted through the treatment train into other forms. Ultimately, the main goal is to change form of wastewater into water that can be safely discharged into Humboldt Bay. The treatment wetlands provide many ancillary benefits: a habitat for wildlife, a place for recreation, wetland research and environmental education. The nutrients also help in feeding oyster farms in Humboldt Bay.