Field Trip # 3: To Metropolitan Sewer District

Host: Mr. Henry Chapman, Operations, Metropolitan Sewer District
Date: July 14, 2011
Time: 1:00 - 3:00 PM
Venue: Metropolitan Sewer District, 1600 Guest Street, Cincinnati, OH

Prepared by:
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This field trip was given by Mr. Henry Chapman, Plant Operator at the Metropolitan Sewer District of Greater Cincinnati (MSDGC). Mr. Chapman has been working at the Guest Street Treatment Facility for 23 years. Mr. Chapman extremely passionate about his job and he is highly motivated to continuous improvement of waste water.

Mr. Chapman's tour of the GSTF provided the history and operational functions of the plant. The participants were the 12 RET teachers, who come from various backgrounds and teaching positions around the tri-state area, and REU students, who are undergraduates in science fields. Safety at the plant was a must. All participants were instructed to wear hard hats, watch where they were walking, and not to touch any of the machinery.

The tour began at the foot of the Mill Creek where Mr. Chapman provided the history of Greater Cincinnati's treatment of waste water. He explained the Mill Creek used to be the Ohio River. Cincinnati was a very favorable place to settle, which came with pollution. Mill Creek was where the waste was dumped and became one of the most polluted waterways in the country with very little plant or animal life. In 1910, the Mill Creek Interceptor was created to transfer the waste water to the Ohio River in an effort to reduce the pollution. Mr. Chapman explained that this was unsuccessful because "dilution was not the solution." Then in 1953, the Waste Water Treatment Center was created using part of the already existing interceptor. Since the creation Center and increased legislation on what can be dumped, life has been restored to the Mill Creek.

At the foot of the Mill Creek is where the first step of the treatment process began. Mr. Chapman explained this step is called collections, where the water is taken up out of the Mill Creek to be screened.

The next step in the process was called preliminary treatment. In this step, the inorganic solids and trash were removed by screens. This step had the worst smell in the whole process. Mr. Chapman also showed the Area Operator Station 1, which controlled both the screening and the next part, pumping. There were nine pumps in the North building. The pumps were the original pumps from 1953. The purpose of the pumps was to bring the water from creek level up to the plant.

The next step was called primary solids treatment (organic solids), which included grit removal and oil removal. In grit removal, sand was removed in order to avoid wear and tear on machinery. The grit is removed by using the velocity of water to spin grit to the outside of the tank where it settles. Mr. Chapman also showed the building of the new grit removal station that was being built. Next, there were settling basins for oil to move to the top and skimmed off.

Finally, the secondary solids treatment was for the removal of suspended solids from the waste water. The waste water was first mixed with return activated sludge. Within the sludge, microorganisms remove suspended solids by eating them. Mr. Chapman was very concerned to ensure the food to mass ratio so the microorganisms do not get tired. Then the water goes through the clarifiers, which had duckweed growing inside them. This was a good sign the clarifiers were being maintained at the proper pH.

Once the water has gone through the collections, preliminary treatment, primary solids treatment, and secondary solids treatment, the effluent water is pumped to Ohio River. This water is also tested many times a day for dissolved oxygen, phosphates, pH, turbidity, temperature, and sodium hypochlorite to ensure the water going to the Ohio River is clean. Mr. Chapman concluded the tour pointing out how important the quality of the effluent water was to him and to the environment.