

“Plant Tour”

The Galesburg Sanitary District was established November 14, 1924, and serves the City of Galesburg and East Galesburg. The waste water treatment plan is designed to provide complete treatment for average flow of 11 million gallons (11 MGD) per day and a maximum flow of 28 MGD. Approximately 7000 lbs of solids are removed from the sewage flow per day with 90-95 % removal of BOD (biochemical oxygen demand), a measure of the organic strength of wastewater.

Wastewater, collected from a distribution system of approximately 100 miles of sanitary and combined sewers, enters the treatment plant through a 66” influent sewer. The screen house, built in 1993, has two mechanically cleaned bar screens. The bar screens are operated by timers or floats. Material, such as rags, sticks, paper, etc. is deposited on a conveyer that is transferred to dumpsters. This material is collected three times per week and taken to the landfill.

Parallel to the bar screens, there is a wet well for collection of excess flows during storms. The wet well has three 60 HP submersible pumps that are capable of pumping over 4000 GPM (gallons per minute). Excess flow is pumped into a three million gallon storage lagoon, then into a six million gallon storage lagoon. If more than nine million gallons is pumped, the excess flow is chlorinated and discharged to Cedar Creek. Once the storm ends and influent flow is reduced, the lagoons are drained back into the interceptor ahead of the bar screens.

The wastewater passes through the bar screens and continues into a wet well under the raw sewage pumps in the main building, built in 1930-31. There are two pumps driven by electric motors, no.1 is a 50 HP, 5.5 MGD pumping capacity and no.2 is a 100 HP, 11 MGD pumping capacity. No. 3 and 4 pumps, driven by dual fueled Waukesha engines, are fueled primarily by digester gas produced from our anaerobic digesters, and each have a pumping capacity of 11 MGD.

Wastewater is pumped to the grit chamber where grit, the heavy material present in wastewater, such as sand, gravel, etc. is removed. The grit is taken to sludge drying beds and blended with sludge (bio-solids).

The wastewater flow proceeds into two primary clarifiers. These two clarifiers, 55 feet by 11 feet each and a total volume of 497,000 gallons, provide a detention time of approximately two hours. This allows substances that readily settle or float to be separated. The solids (sludge) that settle to the bottom are pumped to digesters 1, 2, 3 or 4. The floatable grease (scum) is scraped to a scum well where it is pumped to the digesters.

Wastewater from the primary clarifiers continues to the dosing tank which is divided into two parts. In the south half of the tank, flow continues to the east and west rotary distributor trickling filters. Each filter is 145 feet in diameter with a rock media depth of six feet. The north half of the dosing tank fills up to a point that triggers a siphon and then drains to a fixed nozzle trickling filter that is 145 feet by 290 feet with a rock media depth of 6 feet. The trickling filter media forms slime or biomass that contains organisms that feed upon and remove organic wastes from the wastewater being treated.

From the trickling filters, water flows to the north and south intermediate clarifiers. The south clarifier is 60 feet in diameter by 10 feet and the north clarifier is 80 feet in diameter by 10 feet with a total volume of 587,000 gallons. This intermediate clarifier also holds wastewater for a period of time to reduce the concentration of suspended matter. The solids (sludge) that settle to the bottom of these tanks are pumped back into a grit chamber where they will settle to the bottom of the primary clarifiers. The solids (sludge) are then pumped to either digesters 1, 2, 3 or 4.

This flow consists of what we call the old plant that treats 5.0 – 6.0 MGD. This flow is pumped from the roundhouse to the new plant. The new plant starts with two grit chambers on the east side of the large rectangular brick building that was built in 1970. There are four primary clarifiers, each 25 feet by 134 feet by 11 feet deep with a total volume of 1,100,000 gallons. Two sludge pumps pump the sludge to the No. 4 Digester. Flow continues through the clarifiers to the north and south trickling filters that are 165 feet in diameter with a 6 foot rock media in depth.

Wastewater flow from the north and south trickling filters is discharged to a concrete vault (splitter box) that directs the flow to the three final clarifiers. Inside the splitter box is a 45 HP submersible Flygt pump that recirculates wastewater to the headworks of the main building where it is mixed with influent raw wastewater and pumped by raw sewage pumps through the treatment plant process again. The recirculation pump and 12 inch piping were installed by District personnel in the summer of 2002. Capacity of the recirculation pump is 1 – 4 MGD, based on a variable torque drive. The recirculated wastewater is used to maintain adequate flow for trickling filter operation during low influent flow periods.

Flow that is not recirculated goes to three final clarifiers. The two built in 1970, are 80 feet by 80 feet by 10 feet deep with a total volume of 957,000 gallons. The third clarifier, built in 1993, is 100 feet in diameter with a depth of 10 feet and a total volume of 589,000 gallons.

From the final clarifiers, the wastewater (up to 18 MGD) is pumped to the tertiary filter building. This building was constructed in 2007. The building houses 8 drums which are encased with polyester filters with 17 micron openings. Wastewater enters the inside of the drum, flows through the filters, and additional TSS (total suspended solids) are removed. The filtered water leaves the building via a step cascade aeration designed to elevate oxygen levels in the wastewater. When the filters become clogged or dirty, they are backwashed with the filtered wastewater. The backwash wastewater is returned to the head works of the plant to be retreated.

Finally, flow goes to the chlorine contact tank, 37.5 feet by 76 feet by 9 feet with a capacity of 192,000 gallons. Chlorine has not been applied to our wastewater since June 1990. Flow then travels through the parshall flume to Cedar Creek where the total flow is recorded and composite samples are taken for quality control and recording requirements of the EPA. Solid materials (sludge) that have been removed from the clarifiers are pumped to anaerobic digesters where bacteria decompose the solids. The methane fermenters break down the acids to methane that is used to operate our wastewater pumps and boilers.

Digester supernatant (liquid removed from the settled sludge) flows to a batch sequential biological reactor (SBR tank) where the aeration and treatment cycles occur

within the same tank. This process is beneficial to our total plant effluent ammonia levels.

In the old plant, digesters 1, 2, and 3 are 35 feet by 17 feet with a total capacity of 467, 000 gallons. The new plant digester (primary) no. 4 is 75 feet in diameter and 24 feet deep with a volume of 793,000 gallons. The secondary digester is 65 feet in diameter and 18 feet deep with a capacity of 447, 000 gallons. Sludge wasted from the digesters is pumped to the drying beds, built in the summer of 1993 and 1994, for dewatering.

We produce approximately 600 dry tons of sludge per year which is landfilled or land applied to 163 acres of the District's corn and soybean fields. There are 20 drying beds north of the plant covering an area of 320 feet by 411 feet and 5 more east of the plant, 220 feet by 100 feet.

The treatment plant has 11 full time employees with 3 shifts per day seven days per week. One of the employees is a full time chemist. The remaining 10 employees operate and maintain the plant, equipment and buildings.