

## **THE HERSHEY'S MILL WATER TREATMENT PLANT**

Nature has a way of taking care of its own contamination. The pollution from decayed vegetation, animals, geese, other birds and wild life, is purified by naturally occurring microbes, which live in the water, and convert the waste into carbon dioxide and water using oxygen from the air.

To do their work, the microbes combine air dissolved in the water with the pollutants. In ponds and streams, such as Ridley Creek, the air is absorbed through the surface of the water, and the amount of air, which can be absorbed through the surface of the water, determines the rate at which the pollution is eliminated. Our Hershey's Mill Sewage treatment plant uses this same natural process to purify the wastewater from all the houses and buildings in the Mill.

In our plant the amount of air in the water, and the rate and degree of cleansing, is increased by bubbling air through thousands of small holes in pipes laid at the bottom of our three treatment ponds. The water is sampled and treated to maximize this treatment process, because if the water becomes stale or sour, the microbes cease to breakdown the waste into carbon dioxide and water. It is interesting to note that the water is so pleasant in our three treatment ponds that geese and ducks raise families on them. These ponds are located on the right side of Chandler Drive when driving from Mill Road to the Clubhouse.

The water spends about one week in each of the three treatment ponds, so it spends three weeks being aerated and purified by the enhanced activity of the microbes. Some of the waste in the water is not degradable by the microbes and settles to the bottom of the ponds, where a different slower process, not requiring oxygen dissolves most of the residue into sludge. The ponds are drained, one at a time, every few years for the sludge to be removed and trucked away for disposal. At this time the aeration system at the bottom of the ponds is inspected and any necessary maintenance done.

After passing through the treatment ponds the water is pumped into the storage lagoon, where the geese, ducks, and fish love to swim. Aeration is applied in the lagoon to keep the water moving and to assist further cleansing. Bubbles from the aeration can be seen breaking the surface of the lagoon in four places. The noise from the little shed at the end of the lagoon close to the golf driving range is from the air compressor pumping air for the aeration.

The treated water is pumped from the lagoon and used to spray the golf course to keep the grass fresh and green. On its way to the spray system a very small amount of chlorine is injected into the water to knock out any microbes picked up in the lagoon.

The nozzles spraying water on the golf course and spray fields are operated automatically by radio, programmed and controlled from a computer control center in the maintenance building or by local controls. Most of the spraying is done at night and is adjusted for the air temperature and amount of rain, which has recently fallen or is falling. Also adjusted according to the quantity of water needing to be disposed of.

During the winter there is excess water, which is stored in the lagoon raising the level of the water. In summer when there is less rain and the golf course needs water, the level of the lagoon falls. A reserve of storage capacity is always kept in the lagoon for emergencies, such as times of excessive rain when the golf course is saturated or in winter when the ground is frozen and spraying is not permitted. Pipes and spray nozzles are installed in wooded and unused open areas of the Mill, to be used for disposing of the excess when there is more water available than is needed for the golf course or storage. A farmer harvests and uses the grass produced by the water sprayed on the open areas.

All the collection pipes from the houses and buildings slope downhill and the water flows by gravity into a collection pit at the plant. From the collection pit the water is first pumped to the treatment ponds and then to the lagoon and the spray areas. All critical pumps are duplicated so if one fails there is another to take over the duty. A problem in an operating pump automatically causes a transfer to the back-up pump and activates an alarm. The defective pump is replaced or repaired before a complete failure occurs. In the history of the plant no defective pump or compressor has quit before a twin took over its duty, and the plant has never unintentionally ceased operation because of a mechanical or other failure.

The plant includes an emergency diesel electric generator, which starts automatically when there is a power failure and provides power to all the plant. The generator is housed in a shed across Chandler Drive from the Golf Club, and can be heard running when there is a power failure, and every Monday morning when the generator is tested. All pumps and air compressors are driven by electricity.

Every day all items in the plant are inspected by the operators, the water condition is monitored at several points in the system to ensure the water is to the microbes liking. The water flowing through the plant is measured and recorded every day so any irregularities are detected and corrected. Each item of equipment is thoroughly checked on a preset schedule. Checks are made periodically like the oil in your car is checked or changed. Maintenance is done at appropriate intervals to keep everything working properly. Equipment is replaced before it reaches a condition in which it may fail. The pipes bringing waste water to the plant are probed with miniature TV cameras to check for blockages, breaks, leaks, in and out, etc. every few years, or as necessary.

Any trouble in the plant sounds an alarm in the maintenance building and calls the superintendent's cell phone and the phones of one of the two operators 24 hours a day. The plant operates unattended through the nights, without operators being present, but with at least two licensed operators on call.

Records are maintained of all plant operations and periodically compared looking for any irregularities, which might indicate an impending problem. Reports of the operations of the plant are made to the Pennsylvania Department of Environmental Protection, which inspects the plant and requires any defect to be corrected before renewing the license to operate. In the many years that the system has been in operation, the Pennsylvania Department of Environmental Protection has found very few errors in the operation of our system during their annual inspections. The Hershey's Mill plant is held up by the D.E.P. as an example of a well-run system.

During year 2000 the BCM Engineering Company, which has considerable experience in wastewater treatment plant design and operation, was retained to review operation and design of the Hershey's Mill facility and to recommend improvements in design, safety, and operation. Their report found no significant defects, and commended the system for being well constructed, operated and maintained. Some recommendations were made of a minor nature. All were accepted and either, have been, or are scheduled to be implemented.

The Hershey's Mill waste water system pioneered the use of treated water for irrigation. There are now many imitators, and many groups investigating possible use of the system have visited the Mill to see how it is done.