

Dry Creek Wastewater Treatment Plant



Welcome to SD1's award-winning Dry Creek Wastewater Treatment Plant! Operational in 1979, this Villa Hills, Kentucky plant cleans industrial, commercial and residential wastewater from more than 94,000 customer accounts in Boone, Campbell and Kenton counties in Northern Kentucky. Dry Creek's dedicated and experienced staff treats an average of 33 million gallons of wastewater per day, seven days a week, 24 hours a day.

Preliminary Treatment

Headworks

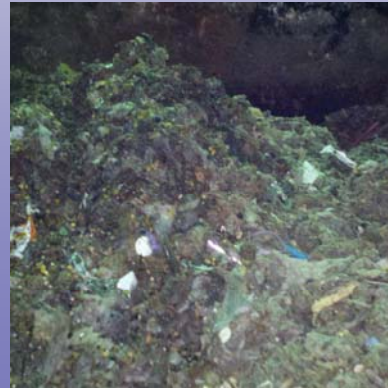
Wastewater first enters the Dry Creek Wastewater Treatment Plant from two incoming sources: the Bromley Pump Station and the Lakeview Pump Station. During this time, the wastewater is monitored for hydrogen sulfide, a colorless, flammable and highly toxic gas that can reach potentially fatal concentrations. Also during this time, sodium hypochlorite, a liquid form of chlorine similar to common household bleach, is injected into the wastewater to control odor. As the wastewater enters the Headworks Building, it is filtered through three bar screens that remove debris such as rags, cans, wood and cigarette butts. This debris is then carried on a conveyor belt into a dumpster and taken to a landfill.



Water pours into the Headworks building

Grit Removal

The wastewater is distributed into two grit tanks. Using a vortex motion, debris such as sand, gravel and eggshells are forced to separate from lighter materials. The grit removed from the waste stream is pumped up to a cyclone separator screw, where it is separated from the water, washed clean of organic materials, discharged onto the same conveyor belt as the debris from the bar screens and sent to a landfill. The water separated from the grit is returned back to the beginning of the grit tank cycle to receive further treatment.



Grit that has been removed from the wastewater

Primary Treatment

Settling Tanks

Flowing at a slower pace, the wastewater is distributed into six settling tanks. Heavy materials settle to the bottom while lighter materials, such as grease and scum, float to the top. The grease and scum are removed through a skimming process and sent to a landfill. The solids that settle at the bottom of the tank, which are collectively referred to as sludge, are pumped to holding tanks for further processing.

Although fats, oils and greases are removed from wastewater in this process, they can clog pipes on their way to the plant. That is why they should never be poured into drains or toilets.



Grease and scum are skimmed off the top

Secondary Treatment

Aeration Tanks

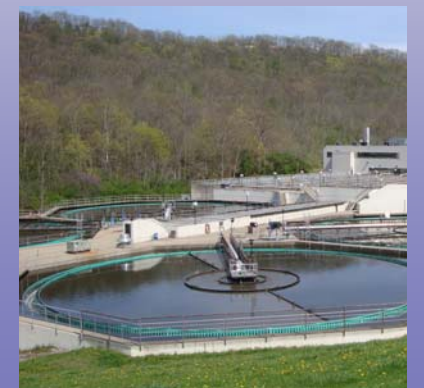
After flowing into six aeration tanks, the wastewater enters the activated sludge process, in which microscopic organisms use the wastewater as their food source. Bacteria in the tanks, which are often referred to as the "life" of the plant, eat the nonsettleable organic materials that remain in the wastewater, simulating a natural method of breaking down organic material. Because oxygen is vital to the bacteria, compressed air is pumped into the bottom of the tanks, where it then bubbles up through the wastewater.



Compressed air bubbles up through the tanks

Final Clarifiers

The water flows by gravity into the final clarifiers, which work to settle out the activated sludge solids. A portion of the sludge, known as return activated sludge, is returned to the beginning of the aeration tank cycle to mix with the incoming wastewater, and the rest of the sludge, called waste activated sludge, is conveyed to the solids handling system for processing. Nearly all of the solids settle out in the final clarifiers, leaving a purified effluent, the term for the treated flow discharged from the plant. At this point, sodium hypochlorite is added to the effluent to kill any remaining bacteria or pathogenic organisms.



The clarifiers at work

Secondary Treatment, con't.

Dechlorination & Discharge

The dechlorination facility is the final stop the treated wastewater makes before being discharged into the Ohio River. Chlorine is one of the chemicals found in the sodium hypochlorite used during preliminary and secondary treatment. The dechlorination facility removes the chlorine from the treated effluent, protecting fish and other organisms that can be harmed by even the smallest amounts. After leaving the dechlorination facility, the treated wastewater is discharged into the Ohio River.



Dechlorination pumps ready the effluent

Solids Handling

Gravity Belt Thickeners

So what happens to the waste activated sludge removed from the final clarifiers? It is sent to gravity belt thickeners for further dewatering. Here, a polymer is added that bonds to solids and helps them separate from liquid. The sludge/polymer mix flows onto a conveyer belt, where the liquid falls through the porous weave of the belt, leaving the sludge behind.

Centrifuges

But the sludge isn't done yet. Three continuous flow scroll centrifuges



Waste activated sludge is thickened on a gravity belt

further dewater the sludge at a rate of 150-200 gallons per minute. In the centrifuges, the sludge is pumped into a rotating bowl where the solids are separated from the liquids by centrifugal force, a process similar to the spin cycle of a washing machine.

Biosolids

The end product of the solids handling process is known as biosolids. The biosolids are collected in large dumpsters and sent to a nearby landfill. Every day, about 360 tons of dried sludge are removed from the Dry Creek Wastewater Treatment Plant.



The centrifuges separate water from sludge

Administration Building

Control Room

All activity in and around the plant is monitored 24 hours a day by staff from the control room in the administration building. Through an intricate network of computer systems, plant operators are able to ensure all machinery throughout the plant is operating efficiently. They also monitor the amount of wastewater entering the plant and maintain remote contact with a number of pump stations and other small treatment plants throughout SD1's service area.



A technician monitors plant operations

Laboratory

To ensure water quality standards are met, samples of the wastewater are studied every day by lab technicians trained in chemical and biological sciences. Their job is vital to ensure harmful chemicals and other substances have been eliminated from the wastewater before it is discharged into the Ohio River. Dry Creek lab technicians test about 6,000 samples each month to evaluate the quality of the influent and effluent flows at the plant. Technicians run tests to determine levels of dissolved oxygen, fecal coliform and pH, among many others. These tests are mandatory procedures and must comply with Environmental Protection Agency regulations.



A technician tests water samples

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