

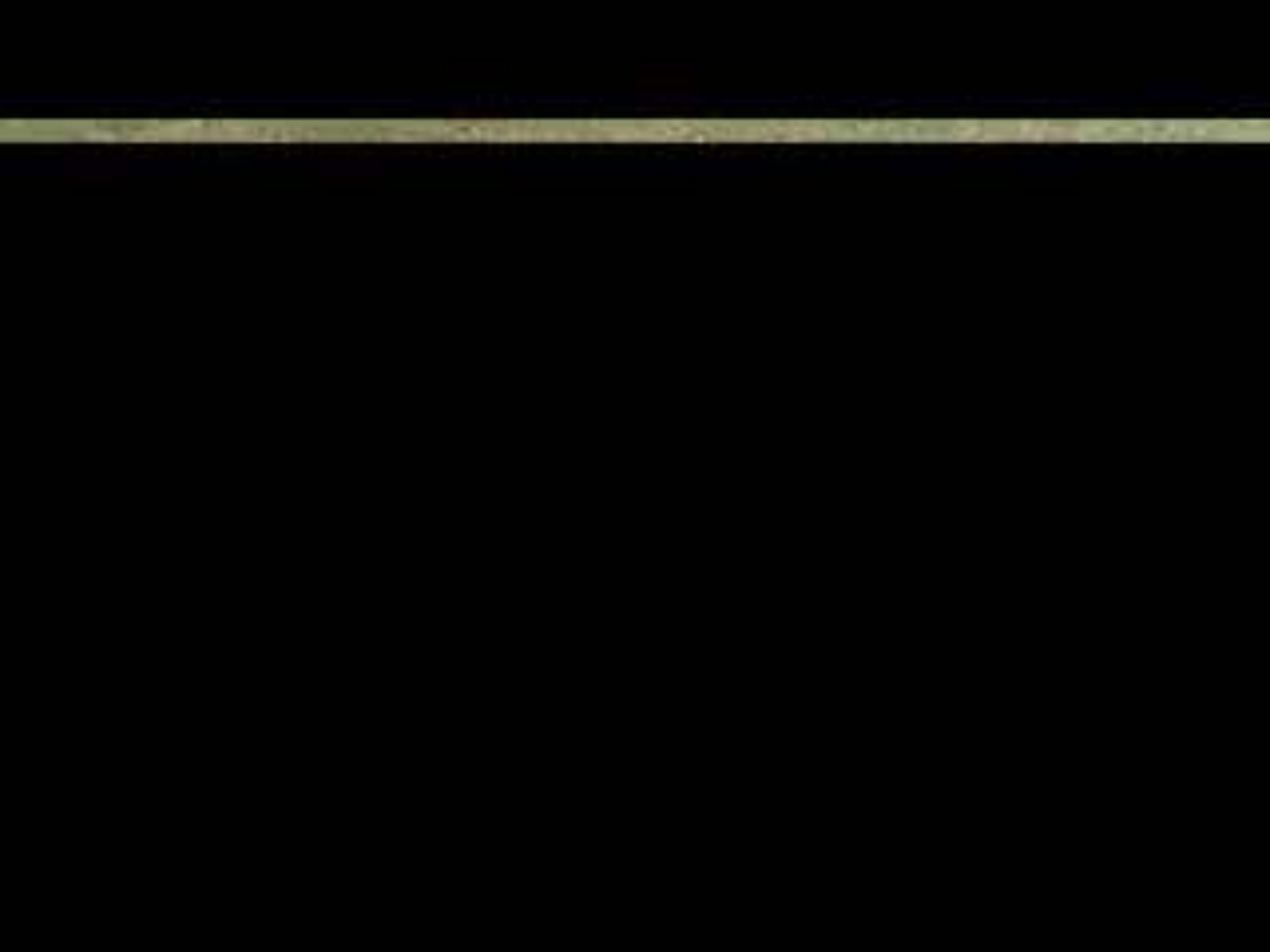
VIRTUAL TOUR OF THE FORT WAYNE WASTEWATER TREATMENT PLANT



Process Overview

- ▣ Sewage is collected from homes and businesses and transported to the wastewater treatment plant via a network of pipes and pump stations. Sewage collection and treatment, both residential and industrial, is subject to state and federal regulations. Compliance with these standards requires an understanding and cooperation from the whole community. The treatment process is divided into four stages, called preliminary, primary, secondary and tertiary treatment. Lets take a closer look at what happens in Fort Wayne.







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Preliminary
Treatment
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Preliminary Treatment a Physical Process

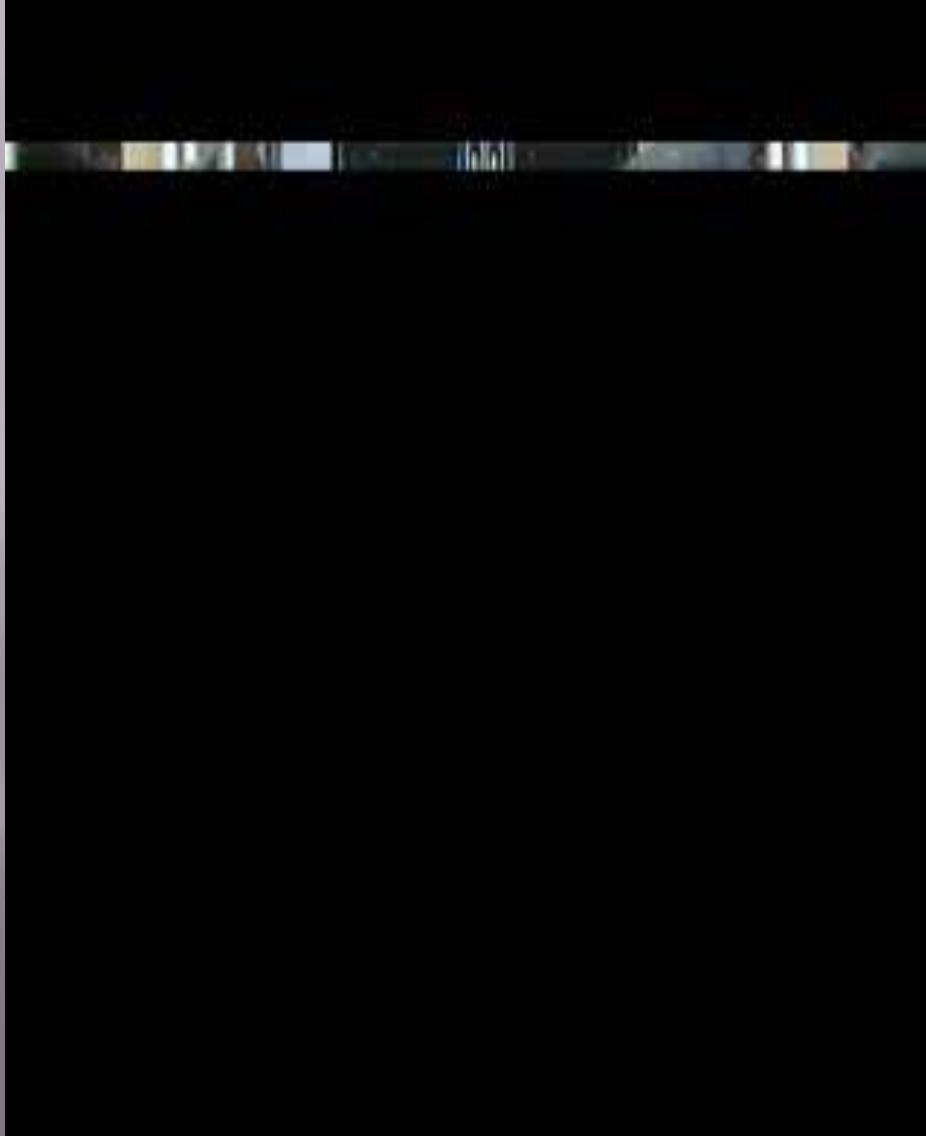
- ▣ Screening
- ▣ Pumping
- ▣ Grit Removal



Screening

- ▣ The physical process of removing large objects carried in the sewage stream before treatment of the water begins. Fort Wayne's treatment plant has three screens that remove debris a quarter inch or larger from the waste stream. These screens are controlled automatically by the scada system at the plant. The screenings are then washed and compacted to squeeze the excess water out and deposited into a waste container that is disposed of at the land fill.

▣ Screens



▣ Removed screenings



Grease



Pumping

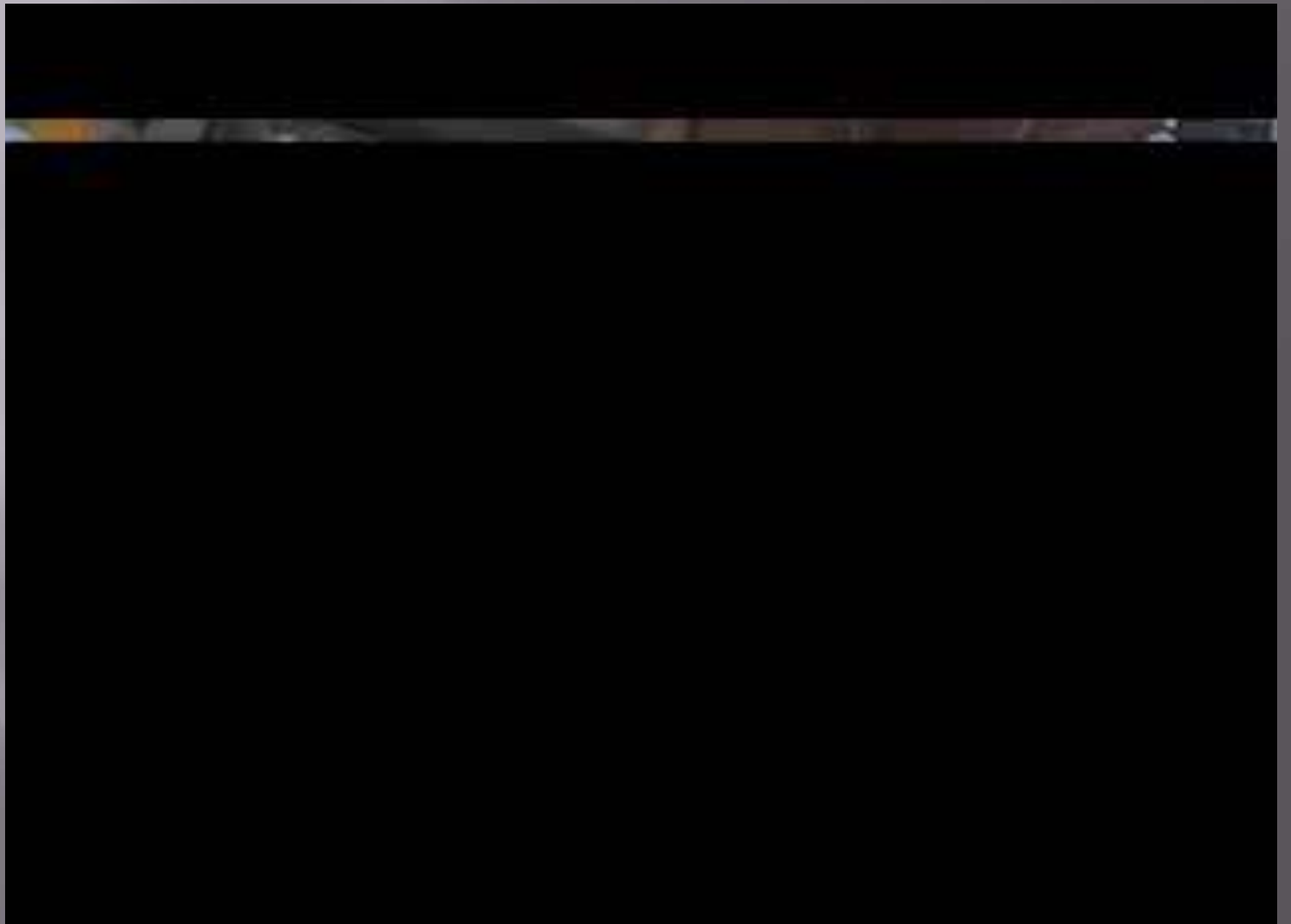
- ▣ Pumping is the process of lifting the wastewater into the treatment process. Fort Wayne currently has four raw water pumps. Each pump has the ability to pump 20 million gallons per day. The speed of the pumps is controlled by the scada system to maximize the flow of wastewater into the plant. Waste water is pumped only once at this facility and flows by gravity through the process to the Maumee River.

Raw Water Pumping



Grit Removal

- ▣ The physical process of removing sand, grit, stones, broken glass and egg shells from the waste stream. This process is necessary to protect the processing equipment in the plant from excess wear due to the abrasive nature of the grit. Grit is removed from the waste stream through the use of centrifugal force and concentrated into a slurry that is pumped to a concentrator where the remaining water is removed and the dewatered grit is conveyed to a container that is disposed of at the landfill.





Primary
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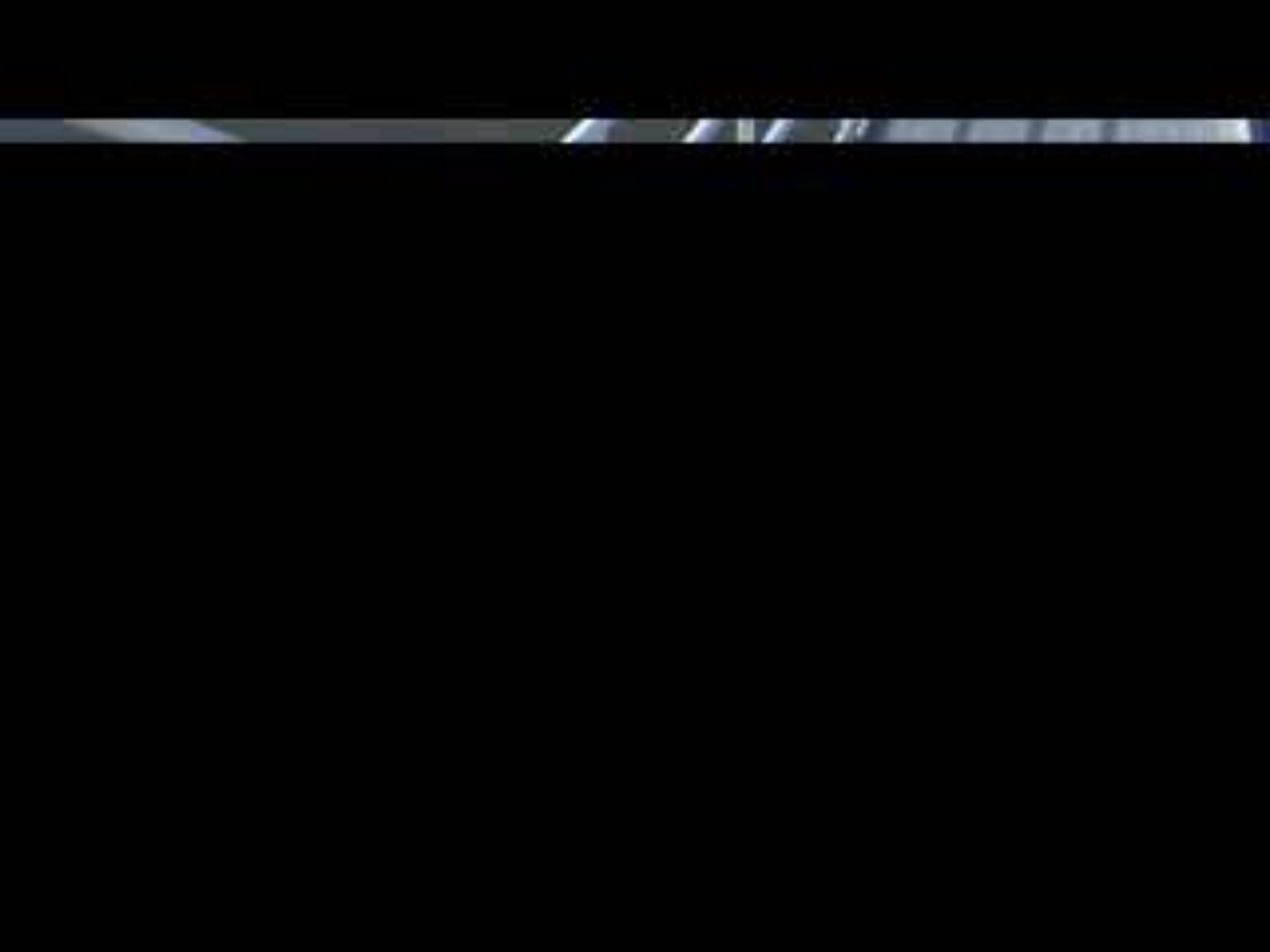
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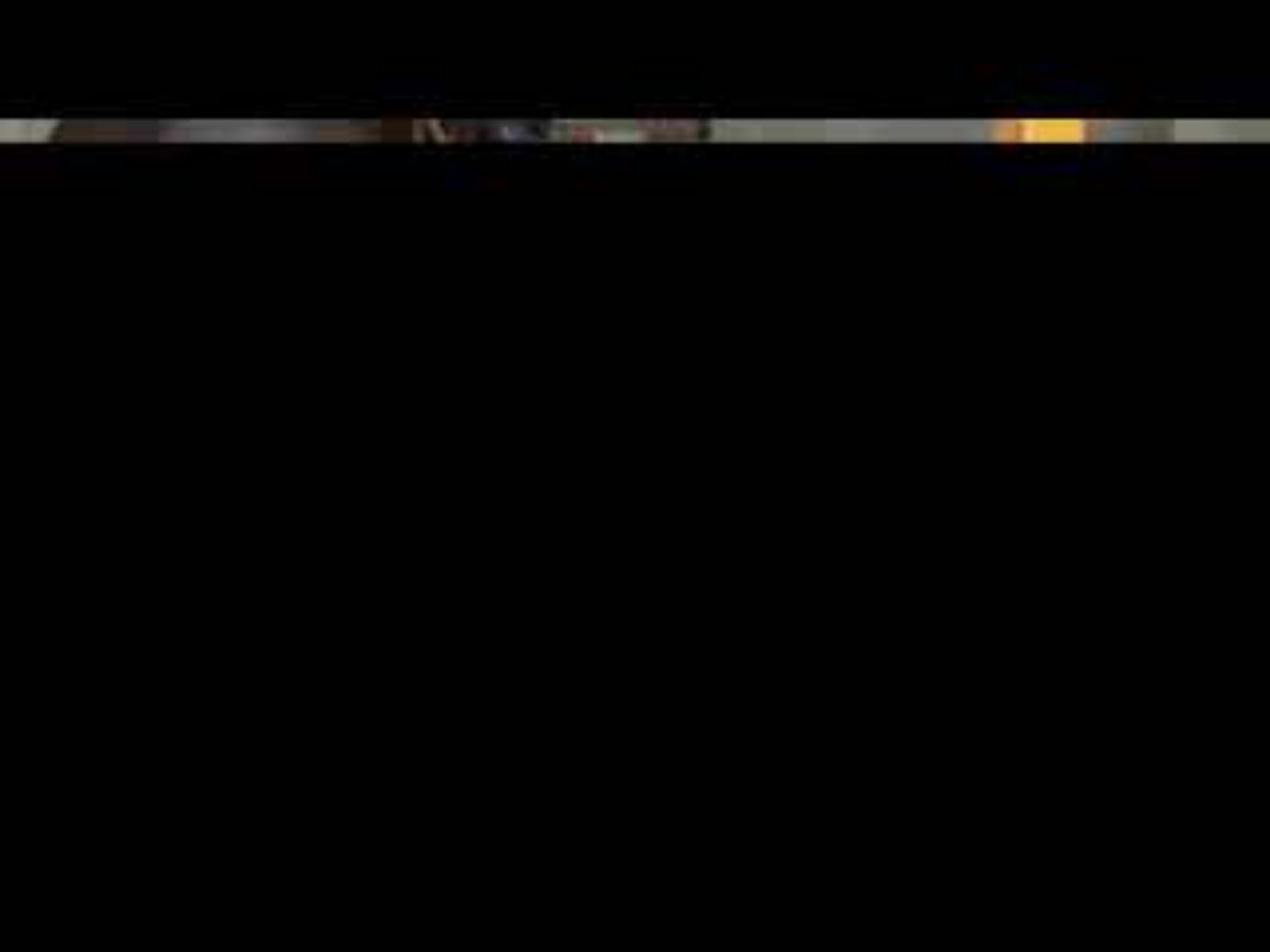
Primary Settling

- ▣ Primary sedimentation is a process that slows the velocity of the wastewater to allow floatables and sinkables to be separated from the wastewater. The floatable portion is skimmed off the top of the clarifier and disposed of either at the landfill or pumped in the digestion process for further processing. The sinkable portion or raw sludge is removed by scrapers at the bottom of the clarifier where this sludge is concentrated and pumped into the digestion process.



Phosphorus Removal

- ▣ This is the first of three chemical processes in the treatment of Fort Wayne's wastewater. As the wastewater enters the primary treatment area ferric chloride is added to the waste stream to precipitate out phosphorus. The iron in the ferric chloride combines with the phosphorus in the wastewater to form iron phosphate. This precipitate is collected in the sinkable portion primary sedimentation process. Phosphorus is required to be removed before the water is returned to the environment because it is a nutrient that can cause algae blooms and leads to oxygen depletion in the receiving stream.





Secondary
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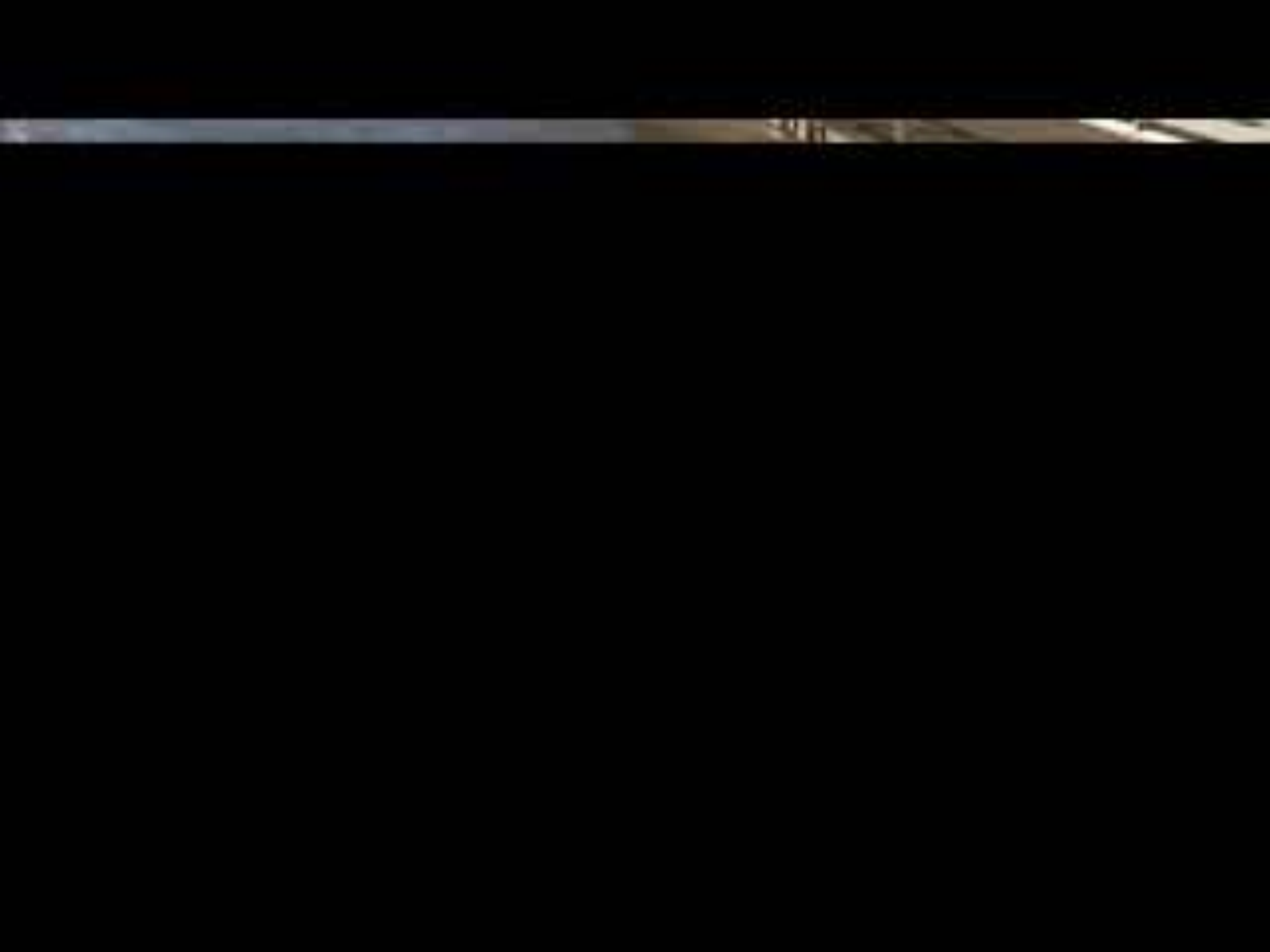
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Secondary Treatment

- ▣ Secondary treatment is an aerobic process that promotes the growth of a biological floc that removes organic materials from the waste stream. The biological floc is grown in large processing tanks called aeration basins. The water enters these basins and takes approximately eight hours to be treated. Organics like ammonia, fats, oils and greases, BOD (biological oxygen demand) and TSS (total suspended solids) are removed in these tanks.

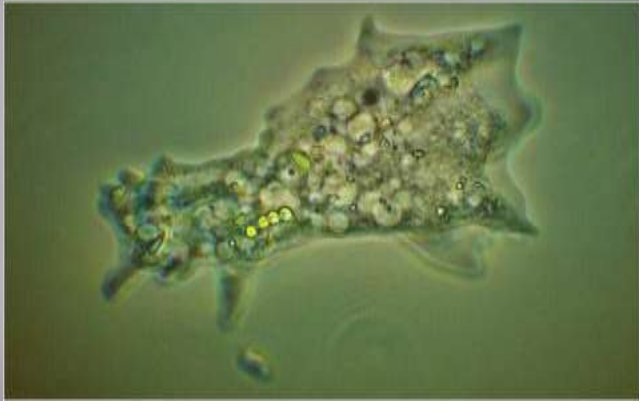


The Biological Process

- ▣ The activated sludge process is a living biological process. Activated sludge is made up of many different types of microorganisms which are called mixed liquor. The types and number of certain organisms are good indicators of how well the treatment process is working. A good aeration tank contains 5% amoeboids, 5% flagellates, 10% free swimming and crawling ciliates, 70% stalked ciliates, and 10% invertebrates such as rotifers, bristle worms, and water bears.

The Micro life

Amoeba



- Amoeba – has a very flexible cell membrane that changes shape with the movement of protoplasm. Amoebas move very slowly and are usually present when there is an abundant food supply. When the food is limited they form a shell called a testate. The presence of amoeba indicates a young sludge.

The Micro life

- ▣ Flagellates – They possess one or more long hair-like appendages called flagella. The cell propels itself in search of food by a whipping action of the flagella. The most common flagellate found in waste water is called Mastigophora. Their presence is also an indicator of younger sludge.



The Micro life

- ▣ Free Swimming Ciliates – They have numerous short hair-like extensions called cilia. The cilia beat in a rhythmic fashion to propel the organism in search of food. Other cilia around the mouth of the organism direct food particles through the mouth. Their presence indicates the process is approaching a stable condition.

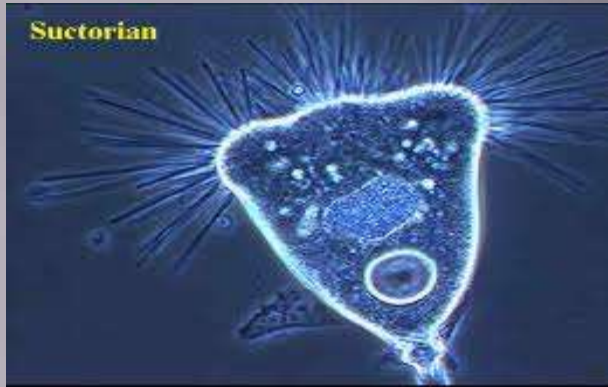


The Micro life



- ▣ Stalked Ciliates – these ciliates grow on a flexible stalk that attaches to a floc particle. One of the most common types is called Vorticella. They are tulip shaped and have cilia around the outer edge of the bell. Food particles are caught in a whirlpool created by the beating action of the cilia. When the gullet is full of food the bell closes and the stalk recoils. The presence of stalked ciliates indicates a stable process.

The Micro life



- ▣ Suctorina – They grow on a stalk also, but have rigid tentacles which catch other protozoa that are swimming by. The tentacles are then used to suck the protoplasm out of the prey. Their presence usually indicates an older sludge .

The Micro life

- ▣ Rotifers – They are multicellular animals with rotating cilia on the head and a forked tail. The cilia are used to catch food and to move the animal around in the search for food. The forked tail is used to attach the animal to particles. The forked tail can also be used to push the animal. Their presence indicates an older and mature sludge.

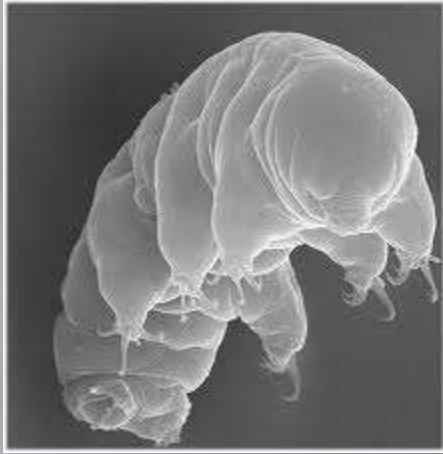


The Micro life



- ▣ Bristle Worms – one of the only organisms visible with the naked eye. They have many internal organs and bristle like setae or feet for locomotion. One very distinguishing characteristic are the pink spots on their body. They have been known to turn an entire clarifier pink . Their presence usually indicates the presence of high nitrates. Also they are an indicator of low food to microorganism ratios and older sludge.

The Micro life

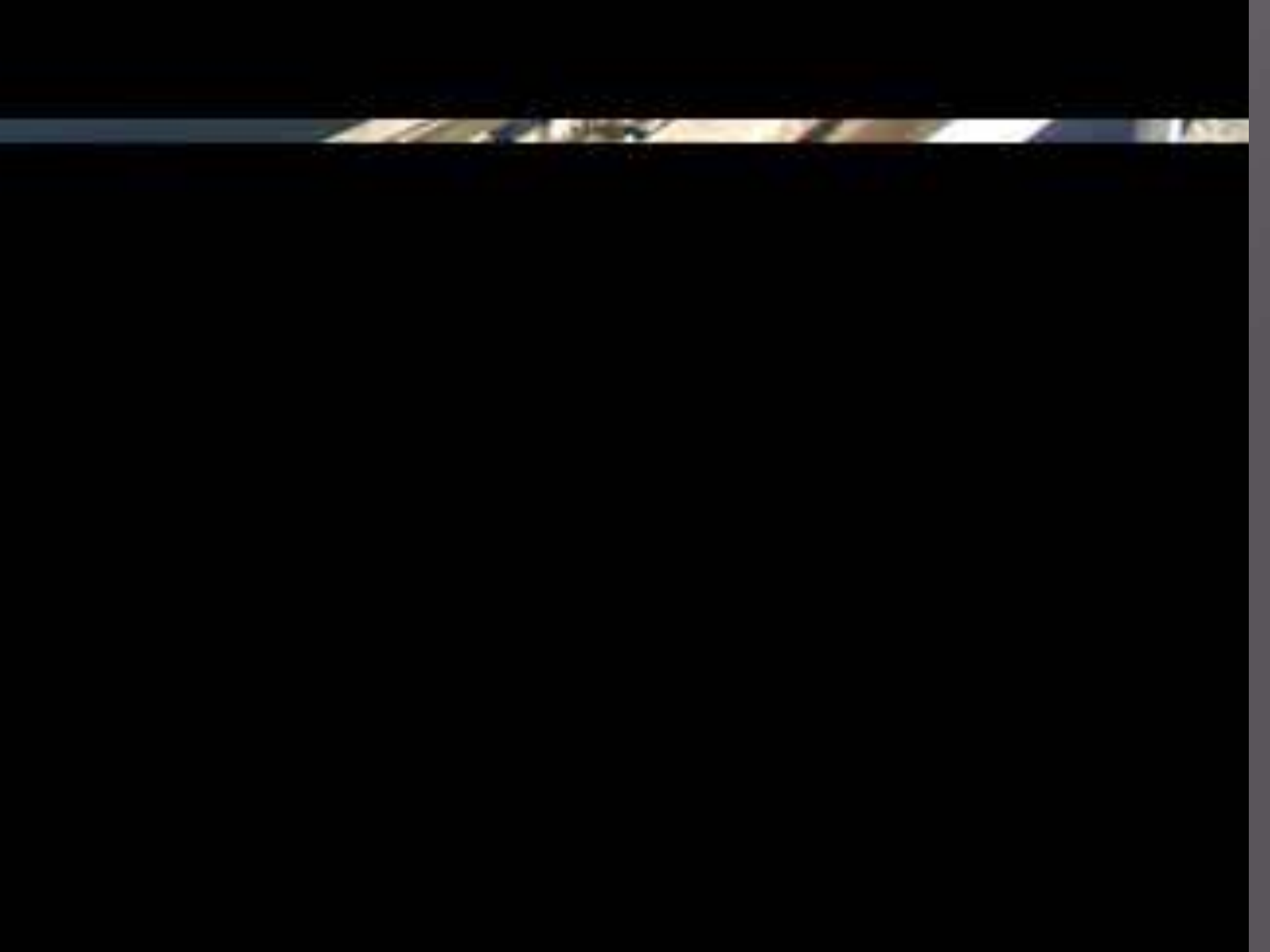


- ▣ Water Bears are the a macro-invertebrate whose role in the wastewater treatment process is not clear. They eat other organisms by grabbing them with their claws and tearing them apart. They are indicators of higher dissolved oxygen levels, low food to microorganism ratios, and older sludge.



Secondary Clarification

- ▣ In this step the biomass is separated from the treated water. A percentage of the biomass is returned to the aeration basin to treat more wastewater and a smaller percentage is wasted out of the system. This wasted sludge is sent to thickeners and deposited in the digesters for final disposal. The older organisms are replaced by new ones that are naturally occurring in the incoming raw sewage. The treated water is collected in diversion structures where a disinfection chemical can be introduced.





Thickening
Treatment
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Thickening

- ▣ For the Biomass to maintain efficiency and health a portion is wasted out of our system each day from the secondary clarifiers. All waste activated sludge plants function best at a pre-determined sludge age. The age depends on the type of waste that is produced in that City. Fort Wayne's plant functions best with a sludge age of about 10 to 14 days. This means every 10 to 14 days the biomass is replaced with new organisms. These organisms that are wasted out of the system go to a centrifuge where they are thickened (excess water is removed) and pumped into the digestion process.





Disinfection
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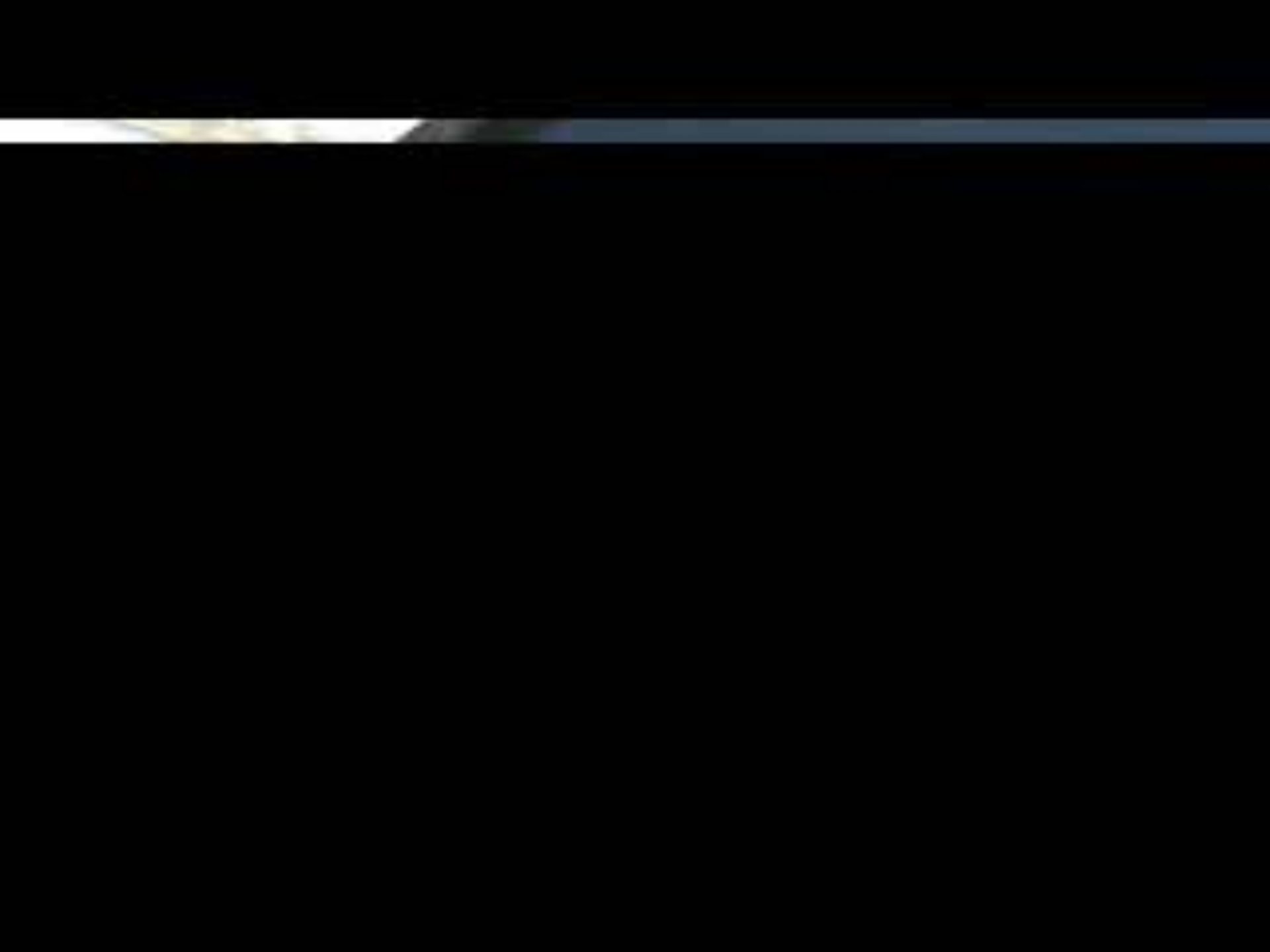
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Disinfection Process

- ▣ The purpose of disinfection in the treatment of wastewater is to substantially reduce the number of microorganisms in the water to be discharged back into the environment. This is the second of three chemical process used at the plant. Fort Wayne's disinfection effectiveness is measured by the number of *E. coli* colonies per hundred milliliters left in the water after the contact period. In Fort Wayne Sodium Hypochlorite (concentrated bleach solution) is used to achieve the disinfection standards required.



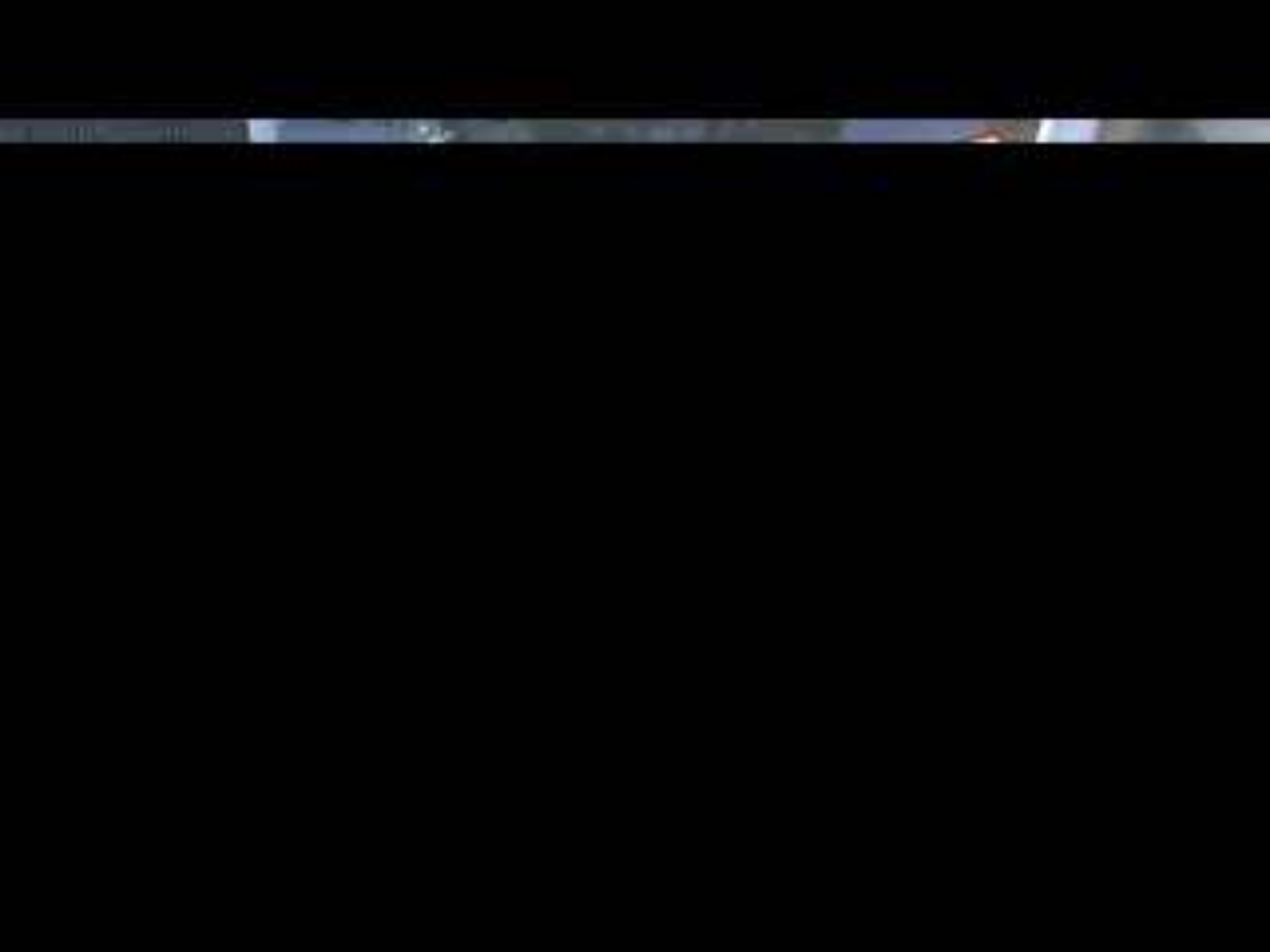


Tertiary Treatment

- ▣ The purpose of tertiary treatment is to provide a final treatment stage to raise the effluent quality before it is discharged to the receiving stream. In Fort Wayne we have a polishing pond that is approximately 40 acres in size that allows for final settling, reaeration, and dechlorination of the water before its return to the environment. This process takes approximately 1 day. Fort Wayne's final effluent is discharged to the Maumee River where it flows downstream to Defiance, Ohio and becomes the source water for their drinking water.

Reaeration

- ▣ The purpose of the reaeration process is to add back dissolved oxygen to the treated water before the introduction to the receiving stream. Fort Wayne has three aerators. The water falls through one of these three aerators where it goes through a series of holes and air is mixed into the effluent to increase the dissolved oxygen above 7.0 ppm. Dissolved oxygen is essential to support the aquatic life in the receiving stream.



Dechlorination Process

- ▣ The purpose of this process is to remove any residual chlorine from the effluent before the water is returned to the environment. Chlorine and its byproducts are toxic to the aquatic environment and are required to be removed before water is released back to a receiving stream.







Digestion
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Digestion Process

- ▣ The purpose of digestion is to reduce the amount of organic matter and the number of disease-causing microorganisms present in the solids. Fort Wayne uses anerobic digestion. The microorganisms in this process work without air present and produce as a final waste product methane gas. This gas is captured and stored on site and used as a secondary fuel to heat sludge and heat and cool buildings at the plant.



Bioisolids

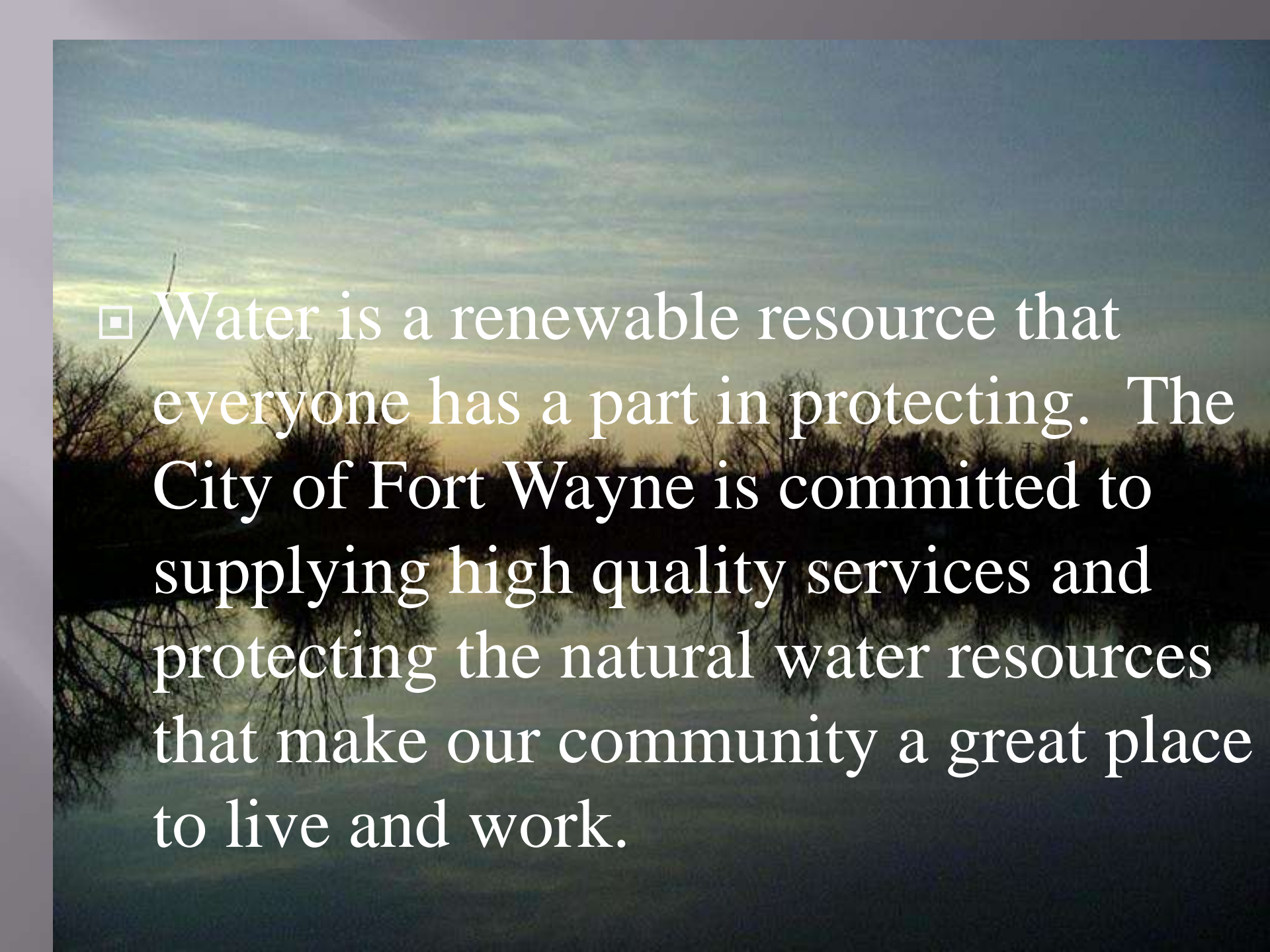
- ▣ After the sludge is digested Fort Wayne sends this product to its Biosolids Handling Facility where the sludge is composted and dried. This process takes approximately 2 to 3 years. The resulting product is a soil amendable product called biosolids. Fort Wayne has a give away program to dispose of the biosolids. Anyone can come to our facility and pick up this product and use it for lawn, scrubs, gardens and tree plantings. We also accept brush, leaves, grass clipping and other yard waste and recycle it back into mulch that is also given way to the public.



Every day 27 dry tons of primary and secondary waste activated sludge is stabilized in the digesters at the plant. The treated sludge is pumped into 55 acres of drying basins. Biosolids are air dried for 3 plus years and turned with special equipment. The biosolids are then combined with tree trimmings , grass clippings and composted leaves

The biosolids are then blended and tested to verify that they meet the “Exceptional Quality” requirements. They are then screened to remove any debris. The screened biosolids are then ready to be given away to be used in gardens, lawns, mulch and in the planting of trees and scrubs.





▣ Water is a renewable resource that everyone has a part in protecting. The City of Fort Wayne is committed to supplying high quality services and protecting the natural water resources that make our community a great place to live and work.

What Can You Do

1. Reduce the amount of oil and grease that you put down your drains in your home
2. Properly dispose of mercury containing items in your home and try and replace them with mercury low or mercury free alternatives
3. Help label storm drains in your neighborhood
4. Properly dispose of any hazardous household waste in your home. Dilution is **not** the solution to pollution
5. Do **not** flush any unwanted or expired medications
6. Pick up pet waste
7. Install a rain garden if drainage or run off is a problem in your yard
8. RECYCLE when ever possible

Questions

