

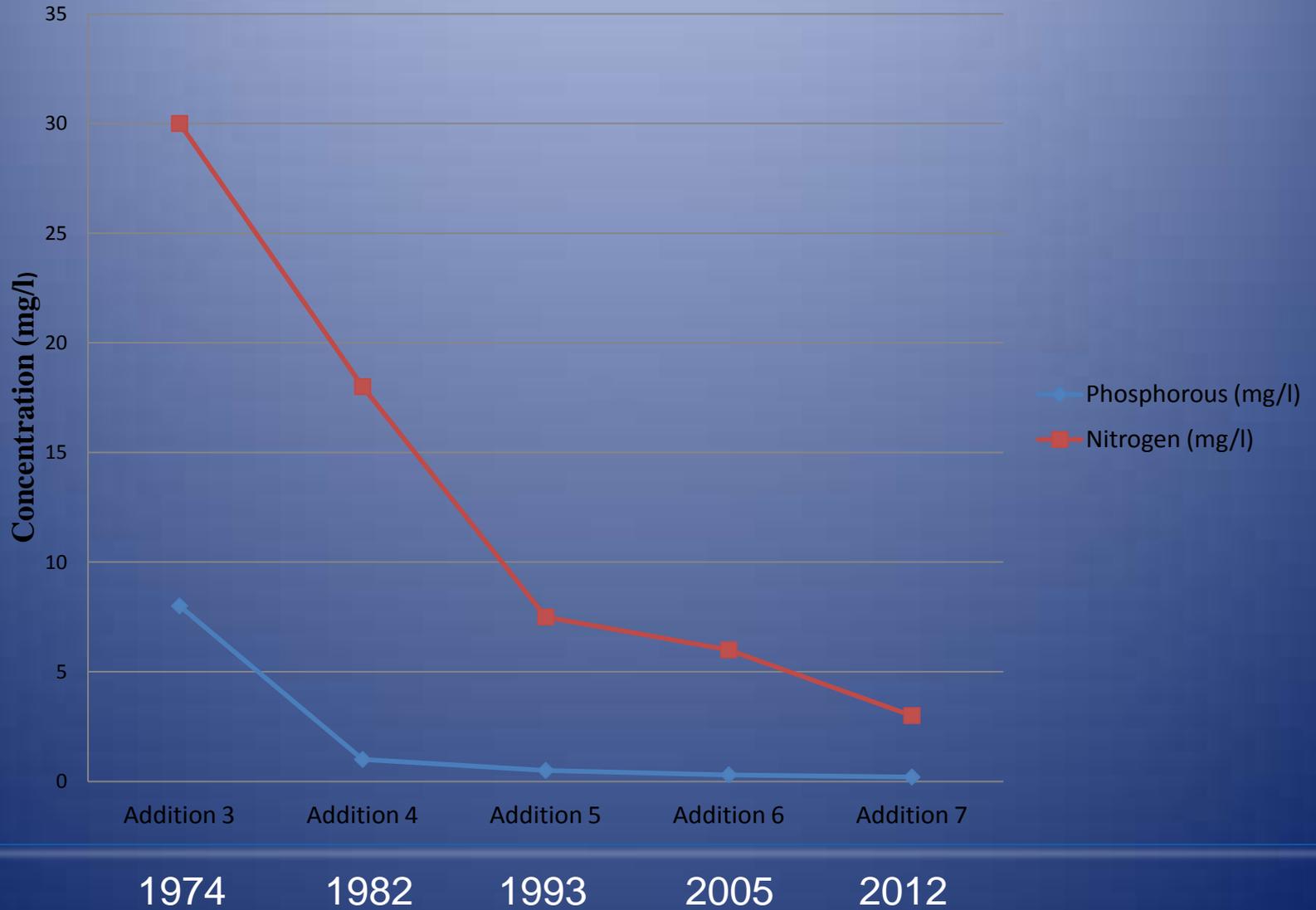
The Little Patuxent Water
Reclamation Plant
Howard County Bureau of
Utilities

Plant Statistics

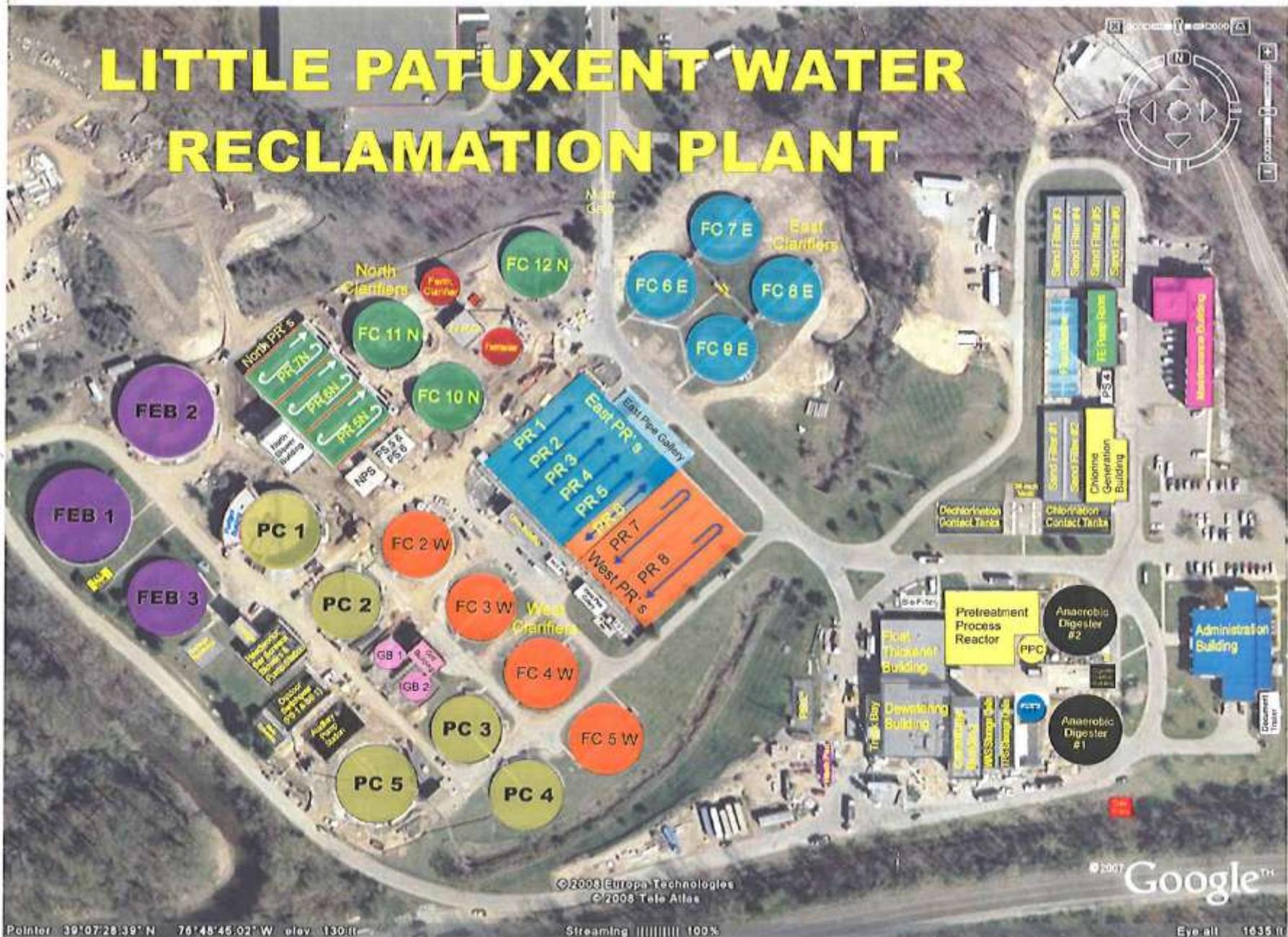
- Inflow 18 MGD
- Influent BOD 42,470 lb/day
- Influent TSS 39,840 lb/day
- Influent TN 4,500 lb/day
- Influent TP 950 lb/day
- Effluent 18MGD
- Effluent BOD 288 lb/day
- Effluent TSS 175 lb/day
- Effluent TN 780 lb/day
- Effluent TP 44 lb/day
- 2011 LPWRP Data

Plant Performance

Nitrogen & Phosphorus Removal



LITTLE PATUXENT WATER RECLAMATION PLANT



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The Faces Behind the Process



LITTLE PATUXENT WATER RECLAMATION PLANT



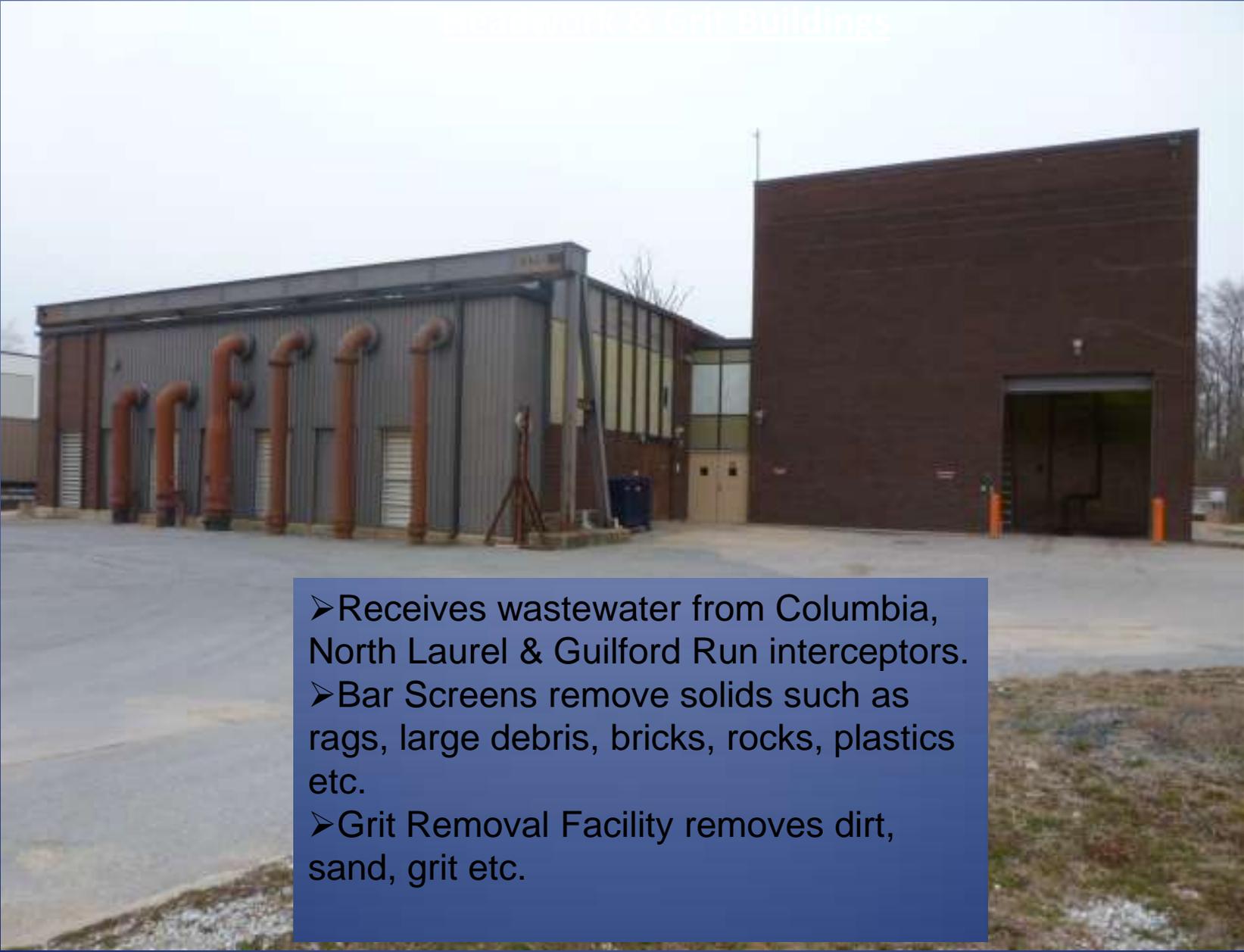
Headwork

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Headworks

Headwork & Grit Buildings

- 
- Receives wastewater from Columbia, North Laurel & Guilford Run interceptors.
 - Bar Screens remove solids such as rags, large debris, bricks, rocks, plastics etc.
 - Grit Removal Facility removes dirt, sand, grit etc.

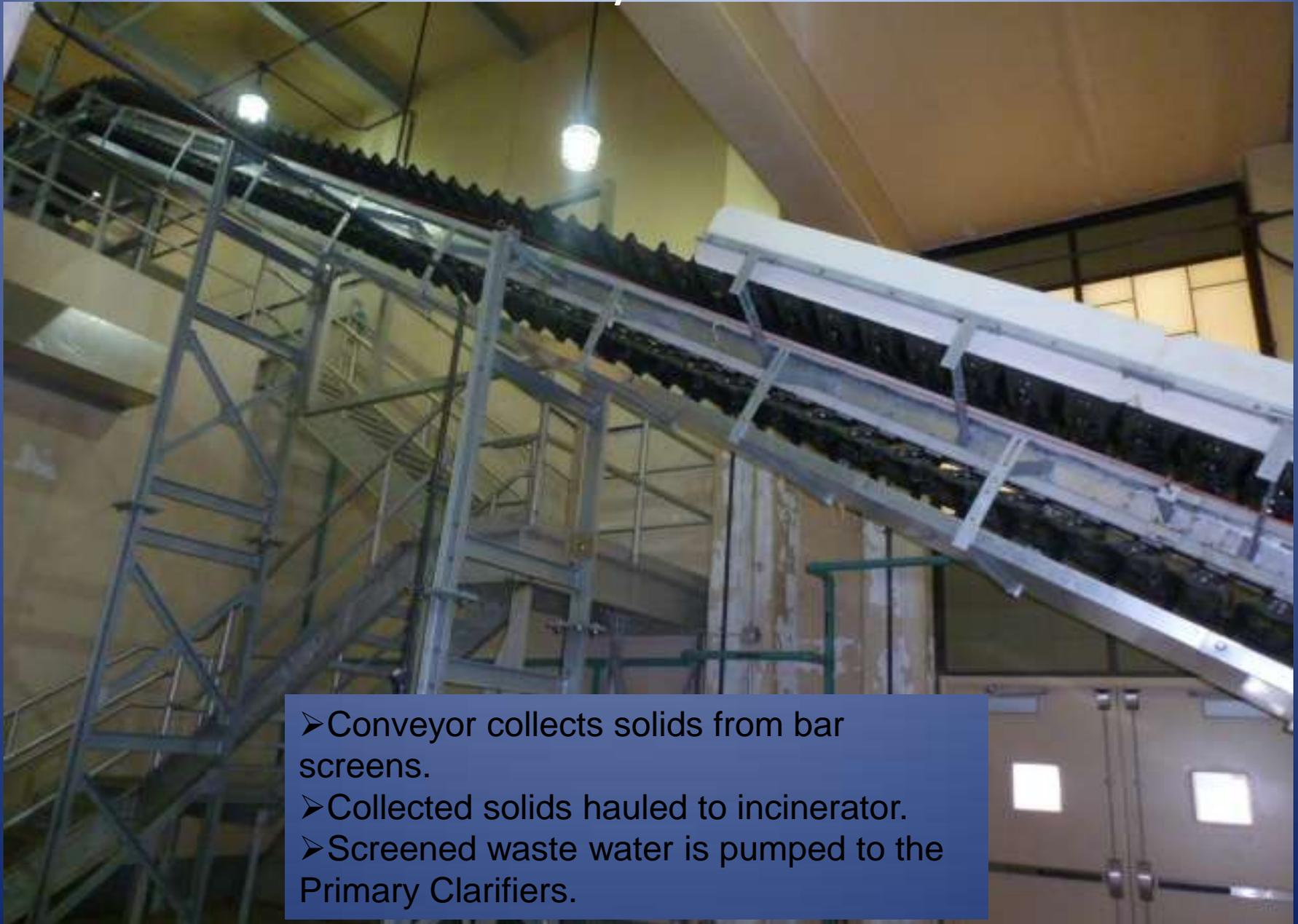
The Faces Behind the Process



Influent Pumps



Conveyors at Headworks



- Conveyor collects solids from bar screens.
- Collected solids hauled to incinerator.
- Screened waste water is pumped to the Primary Clarifiers.

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Primary Clarifiers

Primary Clarifiers

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Primary Clarifier

- Consist of circular tanks diameter ranging from 90-110 feet and 17 feet deep.
- Removes suspended solids & organic matters from waste water.
- Allow heavier solids to settle by gravity.
- Heavy organic material such as food, feces settle to the bottom of the tank.
- Lighter materials such as hair, oils & grease float to the top.
- Removes 30% of organic pollutants.



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Process Reactors

Process Reactors

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Process Reactors



- Biological Nutrient Removal (BNR) takes place in the reactors.
- Removes biodegradable organic matter, suspended solids & nutrients (nitrogen, phosphorus) by utilizing microorganisms.
- Microorganism use oxygen to reduce the organic matter and nutrients.
- Removes 95-99% of nutrients.

Process Reactor Zones



Process Reactors consist of 3 zones:

- 1) Anaerobic Zone : Where phosphorus is released.
- 2) Anoxic Zone: Where nitrate (NO_3) is converted to nitrogen gas (N_2).
- 3) Aerobic Zone: Where carbon compounds are metabolized into carbon dioxide (CO_2) and water and where phosphorus is up-taken and ammonia broken down into nitrite (NO_2) and nitrate (NO_3).

Energy Efficient Turbo Blowers

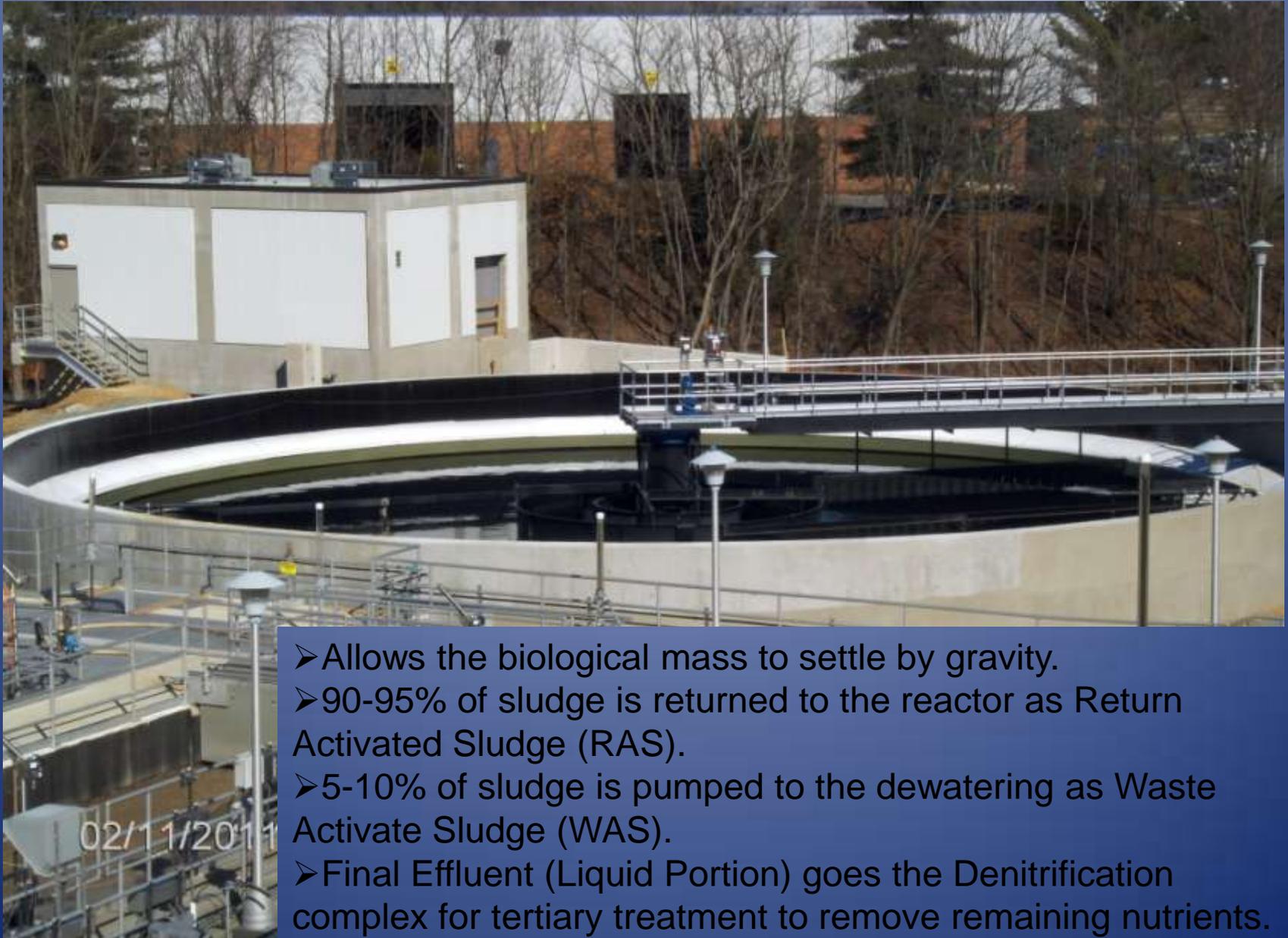


➤ Supply process air to process

The Faces Behind the Process



Final Clarifiers



- Allows the biological mass to settle by gravity.
- 90-95% of sludge is returned to the reactor as Return Activated Sludge (RAS).
- 5-10% of sludge is pumped to the dewatering as Waste Activate Sludge (WAS).
- Final Effluent (Liquid Portion) goes the Denitrification complex for tertiary treatment to remove remaining nutrients.

The Faces Behind the Process

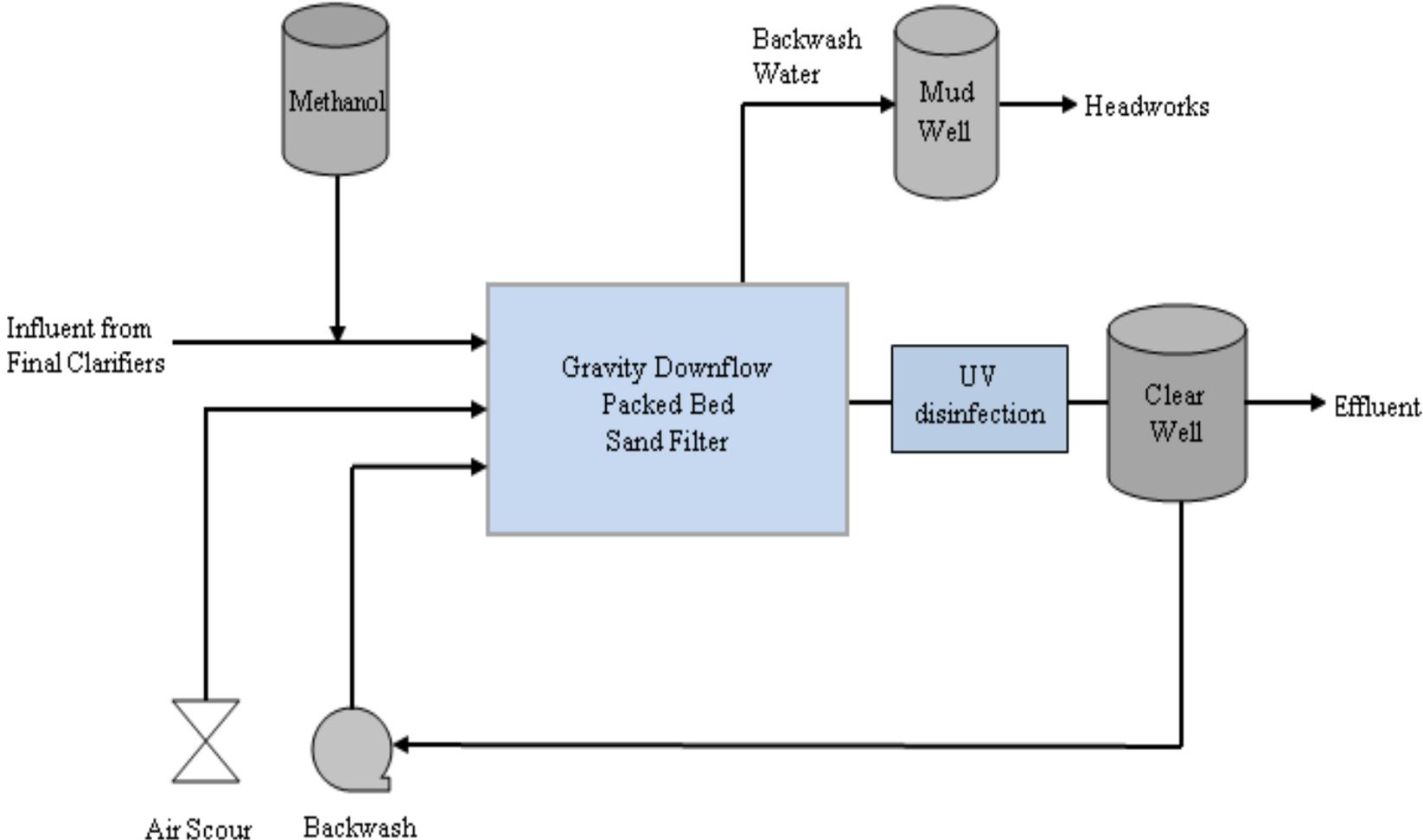


Enhanced Nutrient Removal



- Excess nutrients (nitrogen & phosphorus) in the wastewater effluent deteriorates water quality that impacts aquatic life.
- ENR is an advance treatment technology to reduce the nutrient concentration and meet the TN & TP permit limit.
- ENR goal is to reduce the nutrient concentration: nitrogen < 3.0 mg/l and phosphorus < 0.3 mg/l.
- ENR is achieved by the denitrification technology

Denitrification Filter Process



Schematic of Denitrification Filter

Denitrification Filters

- Denitrification is the process of reducing nitrate-nitrogen into nitrogen gas which will release into the atmosphere as nitrogen gas.
- Occurs in the denitrification filters under anaerobic condition.
- Done by denitrifying microorganism.
- Methanol is added as a source of energy for the microorganism to denitrify.
-



Filter Backwash



Dewatering Building/Biosolids



- Receives Waste Activated Sludge from the Final Clarifiers.
- Thickening to 4% solids, milkshake consistency.
- Dewateres by centrifuge to 25% solids, wet dirt consistency.
- Pasteurizes via heat and lime to 39% solids, moist dirt consistency.

Centrifuge



- Sludge from the thickener is dewatered by spinning in centrifuge.
- Liquids sent back to Head of the Plant.

2012 10:23

Lime Stabilization and Pasteurization Process



- Lime is added to a pH of greater than 12.
- Solids heated to a temperature of 160°F for 30 minutes to pasteurize the solids into biosolids.

Truck Loading



The Faces Behind the Process



Biosolids Application



A close-up photograph of a cornfield. The image shows several corn plants with vibrant green, pointed leaves and tall, brownish-tan tassels reaching towards a pale, overcast sky. The perspective is from within the field, looking slightly upwards. The text is overlaid in the lower half of the image.

Recycled biosolids return nutrients to the farm, often saving the farmer between \$50 and \$100 dollars per acre!



Biosolids Recycling
Cleaner rivers. Better agriculture.

Distributed Control System (DCS)

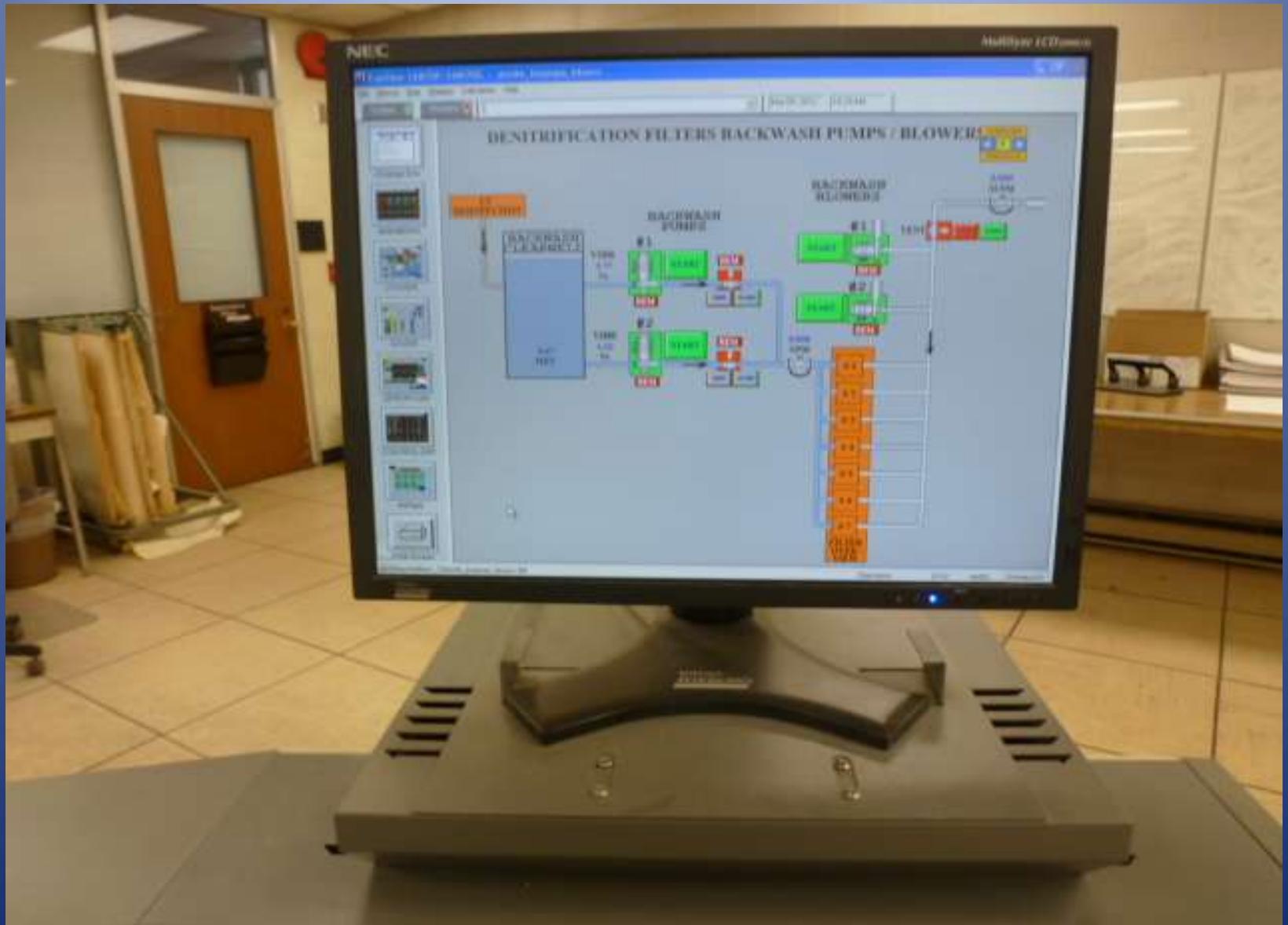


Process control computers monitor and control most plant process.

The Faces Behind the Process



Process Control Work Station



Behind the Scenes



Polymer Tanks store chemicals to help remove water from process solids

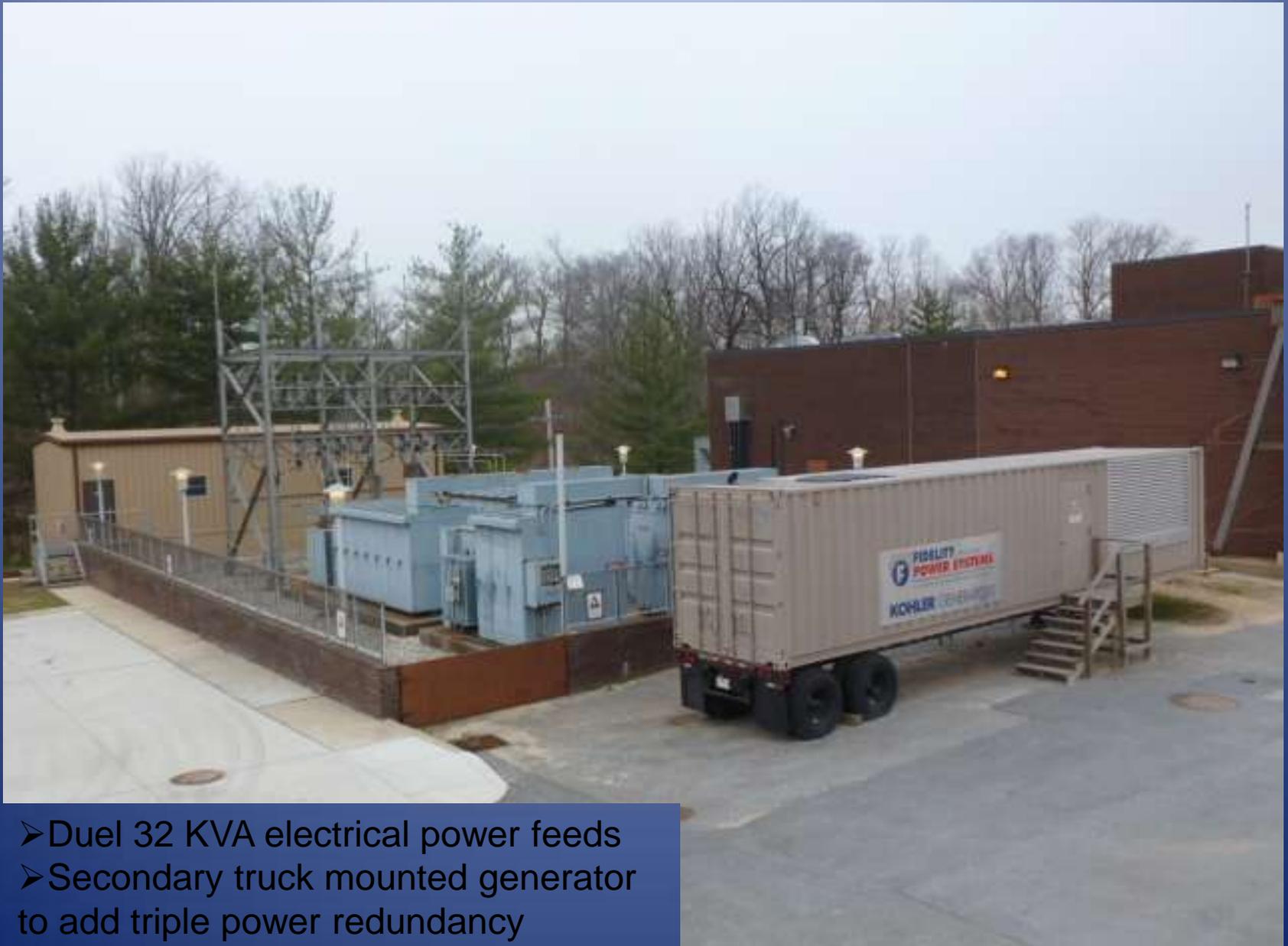
The Faces Behind the Process



Behind the Scenes Denit Pipe Gallery



Primary Substation & Standby Generator



- Dual 32 KVA electrical power feeds
- Secondary truck mounted generator to add triple power redundancy

Maintenance Shop



- Provides all electrical and mechanical support for the Plant.
- Provides all electrical and mechanical support for the Bureau of Utilities water distribution system and wastewater collection system as well as system operations.

Laboratory



- All laboratory analysis for plant process control.
- NPDS monitoring and drinking water compliance for the Bureau of Utilities



Contact Information:

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Website: www.howardcountymd.gov/dpw_bou_lpwrp_enr.htm

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