West Point Treatment Plant Facts (2013)

Treatment Process Technical Facts and Information

Design basis

- Average flow (Volume expected in Average Rainfall Year): 105 million gallons per day (MGD)
- Maximum flow design: 440 million gallons per day (MGD)
- Biosolids Hauled: (2012) 45,000 wet tons, 12,500 dry tons @ 27.8%.
- Service Area: 114 square miles for population of 688,887

Preliminary Treatment:

Screening

- Screening Equipment: Six bar screens, 5.9ft wide x 15ft tall
- Screen spacing 5/8-inch (2012)

Raw Sewage Pumping

- Pumping Equipment: Four variable speed methane/propane driven raw sewage engines that power non-clog centrifugal influent pumps downstream of the bar screens.

Grit Removal

- Pre-aeration Tanks: Four total, 29.9ft x 100ft, 15ft deep

Primary Treatment:

- Design: 440 MGD

Primary Sedimentation

- Sedimentation Tanks: Twelve total, 38ft wide x 254ft long and 9.5ft deep.
- Raw Sludge Pumps: Twelve total progressive-cavity type. Each rated 120 gpm at a total head of 98.9 Psi

Flow Diversion

- Flow diversion is performed via the CSO Gates. These gates are typically closed. Gates open to allow Primary Effluent flows in excess of 300 MGD (million gallons per day) to bypass Secondary Treatment and flow directly to Disinfection.

Secondary Treatment:

- Design: 300 MGD

Intermediate Pump Station (IPS)

- The IPS is located downstream of Primary Treatment and upstream of Secondary Treatment. Three motor-driven non-clog centrifugal pumps convey, up to 300 MGD, of Primary Effluent, to Secondary Treatment.

High Purity Oxygen (HPO) Aeration Trains:

- Six trains of four stages, each stage, 56ft x 56ft and 9.5ft deep. Total volume of HPO system is 141 MG
- Solids- Average retention time is 1.5 days

Oxygen Generation:

- Oxygen Generation: Two 70 tons per day VSA (Vacuum Swing Absorption)
- Liquid Oxygen – two 100 ton storage tanks.

Mixed Liquor Channel

- Mixed Liquor Channel Blowers: Four, centrifugal type, each rated at 35.2 gal per second with 149kW.

Secondary Clarification

- Clarifiers: 13 cement cast in-place type tanks each with a 142.5ft diameter and side depth of 16ft.
- Return Activated Sludge: Twenty-six, non clog centrifugal variable speed drive, rated 21.2 gal to 61.7 gal per second.

Final Effluent

- Effluent from Secondary Treatment flows toward Chlorine Contact Channels for Disinfection. If Plant flow is above 300 MGD, Secondary Effluent is combined with excess Primary Effluent flows before Disinfection.

Disinfection

- Hypochlorite applied as disinfectant.
- Contact Channel: Four chambers 1420 ft. long, average width 7 ft. and average depth 12.3 ft. Total volume of all four chambers is 3.7MG.
- Contact time: at 133 MG per day is 0.66 hours, and at 4.4 MG per day is 0.20 hours.

Dechlorination

- Sodium bisulfite applied for dechlorination.

Effluent Pump Station (EPS)

Pumping Equipment: Four motor driven non-clog centrifugal pumps to discharge up to 440 MGD of plant effluent into Puget Sound.

Submarine Outfall

- Diameter: 8ft
- Length: 3651.6ft
- Diffuser Length: 600ft
- Depth of diffuser: 240.1ft below mean sea level

Reclaimed Water – Tertiary Treatment Sand Filter

- 0.7 MGD capacity

Solids Handling

Sludge Thickening

- Gravity belt thickeners- 10 belt thickeners 10.8ft long
- Thickens solids to approx. 6% solids content
- Polymer is added as a flocculating aid.

Sludge Digestion

- Anaerobic digesters: 6 total; typical operate as 5 Primary digesters and 1 Blend/Storage tank.
- Side water depth: 37.4ft
- Depth at cone: 47.6ft
- Diameter: 100.1ft
- Volume: 2.2MG each
- Approx. retention time 28 days
- The digestion process breaks down the solids content from 6% to approx. 3% (approx. 50% solids reduction)

Sludge Dewatering

- Centrifuges – 4 total
- Dewatered Biosolids –23 to 28% solid content
- Polymer is added as a flocculating aid.

Energy Systems- supply and recovery

Plant Power Supply

- Primary power supply: plant typically powered via a dedicated feeder from the Canal Substation, Seattle City Light.
- Back-up power: feeder from Broad Street Substation, Seattle City Light.
- Loss of Power Plant will automatically switch to back feeder when there is a power outage.
- Average energy demand is typically ranges from 6 to 7 MW.
- Peak energy demand is above 10 MW.

Power Generation

- Engine generators: Two, 2.3 MW each, fueled by methane (digester) gas. Correct. Digester gas is mostly methane.

Odor Control System

- Liquids Process Odor Control
  - ◊ Scrubber: Three one-stage (chemicals, sodium hydroxide and hypochlorite) packed tower, 11.8ft diameter.
- Solids Process Odor Control
  - ◊ Scrubber: Three one-stage (chemicals, sodium hydroxide and hypochlorite) packed tower, 11.8ft diameter.

Effluent quality

- National Pollution Discharge Elimination System permit. Reporting through the Washington State Department of Ecology
- Carbon Biological Oxygen Demand (CBOD) – monthly average permit limit of 25 mg/L:
- Total suspended solids (TSS) monthly average permit limit of 30 mg/L:
- Fecal Coliform limits: monthly geomean permit limit of 200 counts per 100 mg/L
- Chlorine residual: monthly average permit limit of 139 µg/L