

# Memorandum

January 15, 2019

TO: Historical Memo

FROM: Rick Butler, Process Control Supervisor

SUBJECT: South Treatment Plant at Renton (STP)  
December 2018 Operating Record

STP met all of its conventional permit limits for secondary effluent in December 2018. Flow averaged 77-mgd. The max-day flow was 108-mgd (Dec. 30); York/Brightwater flows accounted for 7.5 of the 108-mgd. Final effluent quality averaged 5-mg/L carbonaceous BOD (cBOD<sub>5</sub>), 7-mg/L TSS and 9-mg/L total BOD<sub>5</sub>. Respective removals were 98%, 97% and 96%. All flows received secondary treatment.

December rainfall was slightly-above normal. December's rainfall total 6.08-inches while the historic average for December is 5.35-inches. Record rainfall for December was 11.85-inches in 1979. High and low air temperatures were about 3°F warmer than normal, with daily high and low temperatures averaging 49°F and 39°F, respectively. Wastewater temperature dropped from about 63°F to 60.5°F across December.

**Offsite Flows and Loads:** 1.77-MG of septage was received in December, accounting for 6.7% of STP's influent solids load. The Southern Transfer, aka Allentown, averaged 8.2-mgd with a max-day of 19.7-mgd on Dec. 18. Sewage from the Brightwater (BW) service area accounted for 3% of STP's influent load. BW-based flows (via York P.S.) averaged 1.8-mgd. York's max-day flow was 7.5-mgd on Dec. 30. Deicer was discharged to STP on an estimated nine days at BOD loads ranging from about 1500 to 5400 lbs./d.

**Sampling and Analyses:** All permit-required samples (influent and effluent) were collected and analyzed. The final ETS effluent sample line/sampler was chlorinated every other day. The measured influent loads were 145,000-lbs/day for BOD, 124,000-lbs/day for CBOD and 135,000-lbs/day for TSS. Loads and plant mass balances for this and recent months suggest that December's influent BOD/TSS loads should be close to 140,000 - 150,000 lbs./day.

The effluent chlorine (Cl<sub>2</sub>) at the ETS outfall was below the 0.75-mg/L daily average and 0.5-mg/L monthly average limits. The ETS outfall Cl<sub>2</sub> has been monitored using the on-line Hach CL-17 analyzer in December.

**STP Facilities Status:** STP operated in winter mode in December with most process tanks in service. The secondary process was operated to inhibit nitrification and promote the growth of phosphorus accumulating organisms (PAOs). The gas scrubbing system was in operation all month. All scrubbed gas was injected into the PSE pipeline for RINs sales. Process heat was provided by the boiler using natural gas. There was no offsite application of reclaimed water.

All 12 primary sedimentation tanks, all 4 aeration tanks, 23-24 of 24 secondary clarifiers, and both chlorine contact channels ( $\text{Cl}_2\text{CC}$ ) were in service all month. Five of six DAFTs were in service all month: 3 small DAFT and both large DAFTs. DAFT3, and then DAFT2, was out of service for scheduled PMs. All five anaerobic digesters were in service all month. Dewatering operated every day but Christmas; centrate was valved to the DAFTs. On December 31, STP operated with all 12 primary tanks, all 4 aeration tanks, 24 of 24 secondary clarifiers, both chlorine contact channels, 5 of 6 DAFTs and all 5 digesters.

**Secondary Treatment:** The secondary process was operated in plug flow mode with a  $\frac{1}{2}$ -pass un-aerated zone in Pass-1. During higher flows, the process moved to step-feed mode (i.e., additional feed gates open in Pass-1) in order to handle the additional flow. The secondary system's solids retention time (SRT) was in the 4 to 5 day range. The resulting MLSS concentration was usually 2100-2400 mg/L. D.O. operating setpoints were near 1.75-mg/L. The RAS return rate was 50% or 60% of the influent flow. Aeration tank air use average 59 million-ft<sup>3</sup>/day and ranged from 47 to 69 million-ft<sup>3</sup>/day.

Nitrogen (N) and phosphorus (P) removal averaged 29% and 83%, respectively. Over the month, effluent  $\text{NH}_3\text{-N}$  and  $\text{NO}_2+\text{NO}_3$  averaged 26-mg/L and 3.5-mg/L, respectively. PAOs were firmly reestablished in the secondary biomass over the month with effluent Total-P averaging 0.9-mg/L. Effluent alkalinity was usually in the 100,000-140,000 lbs./day range (180-20 mg/L). Influent alkalinity was usually 120,000-150,000 lbs./day as  $\text{CaCO}_3$ .

**Disinfection:** 29,930 gallons of 12.5% sodium hypochlorite ( $\text{NaOCl}$ ) were used to disinfect STP's final effluent in December. This resulted in an average dose of 1.5-mg/L as  $\text{Cl}_2$  based on effluent flow. Daily hypochlorite use ranged from about 750 to 1250 gpd, and averaged 965-gpd. Both the north and south chlorine contact channels ( $\text{Cl}_2\text{CC}$ ) were in service. The "West" dosing system applies hypochlorite to the north  $\text{Cl}_2\text{CC}$ , while the "east" system doses the south  $\text{Cl}_2\text{CC}$ . RAS chlorination (for SVI control) and pre-chlorination (for influent odor control) were not practiced. The  $\text{Cl}_2\text{CC}$ 's, ETS effluent pipeline, and ETS outfall structure were usually disinfected with a slug dose of hypochlorite every two weeks.

**DAFT:** The DAFTs produced an average of 88 dry tons/day of thickened raw sludge (THS) to be fed to the digesters. THS flow averaged 0.35-mgd with a solids concentration of 5.7% TS. Three small DAFTs and both large DAFTs were in service all month. The solids loading rates averaged 22 lbs./d/ft<sup>2</sup> on the large DAFTs and 20 lbs./d/ft<sup>2</sup> on the small DAFTs. One fizz system per DAFT was in service all month. 14,850-lbs/month of polymer were added to the

DAFT feed sludge (143-dry tons/day) for an average polymer dose of 3.4 lb.-active/dry ton feed, or 5.5 lb.-active/dry ton THS. Polydyne polymer WE-1531 was used in December.

**Anaerobic Digestion:** Time and temperature requirements for Class B biosolids were met via digestion. All four primary digesters and the fifth “blending” digester were in service. Volatile solids (VS) and total solids (TS) reductions averaged 57.7% and 49%, respectively. The digestion detention time averaged 35-days; 5 of those days were provided by Digester 5. Digester temperatures were in the 99-101°F range. The VS/TS content entering and leaving the digesters averaged 85.5% and 71.4%, respectively. Digester alkalinity levels were usually in the 7200-7500 mg/L range. All primary digesters were operating in parallel and fed equal amounts of THS. The digester VS loading rate averaged 0.11-lbs./day.

The gas and pumped mixing systems for all digesters operated in a “normal” mode, with one gas mixing compressor in service per digester. The digesters did experience some accumulation of scum/sludge on the digester covers; air-spargers were available to control that accumulation.

**Dewatering/Biosolids:** 5157 wet tons of biosolids (1149-dry tons @ 22.3%TS) were beneficially reused in December. Most of the biosolids were applied to Eastern WA. agricultural sites. Digested sludge production was similar to dry tons hauled since digester inventory changed very little across the month.

An estimated 56,000 lbs.-active polymer were used for biosolids dewatering, resulting in an average polymer dose of 48.6 lb.-active/dry ton hauled. The applied polymer was Polydyne WE586, a 41.5% cationic emulsion solution. Centrifuge feed rates were usually 150-gpm or 170-gpm. Only two centrifuges were usually in service: centrifuge 2 returned to service Dec. 13 after an overhaul. Scrubber-water was sent to the centrate sump to provide struvite control when gas scrubbing was underway. Centrate flowed to the DAFTs all month.