

Memorandum

May 15, 2019

TO: Historical Memo

FROM: Rick Butler, Process Control Supervisor

SUBJECT: South Treatment Plant at Renton (STP)
April 2019 Operating Record

STP met all of its conventional permit limits for secondary effluent in April 2019. Flow averaged 67-mgd. The max-day flow was 88-mgd (Apr. 13). Final effluent quality averaged 4-mg/L carbonaceous BOD (cBOD₅), 7-mg/L TSS and 10-mg/L total BOD₅. Respective removals were 98%, 98% and 97%. All flows received secondary treatment.

April's precipitation/temperature was slightly more/higher than normal. Rainfall totaled 3.53-inches. The max-24hr rain was 0.65-inches (Apr. 12). Historic average precipitation for April is 2.71-inches; the monthly record is 6.53-inches (1991). Daily high and low air temperatures were 0.8°F warmer and 3.4°F warmer/colder than normal, respectively; they averaged 59°F and 46°F, respectively. Wastewater temperatures increased slightly across the month, starting near 63°F and ending at 64°F.

Offsite Flows and Loads: 2.60-MG of septage were received in April, accounting for about 8.4% of STP's influent solids load. The Southern Transfer (aka Allentown) flow averaged 5.7-mgd with a max-day of 11.7-mgd on Apr. 12. Sewage from the Brightwater service area (via York P.S.) accounted for <1% of STP's influent load. York P.S. flow averaged 0.5 -mgd with a max-day flow of 1.8-mgd (Apr. 12). 186 tons of deicer BOD was discharged to the STP over 25 days in April. On a monthly basis, deicer BOD accounted for about 9% of STP's influent cBOD load. The max-day deicer BOD load was 21,600 lbs./day, which accounted for about 20 and 14% of STP's influent cBOD load for those two days.

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 about 180,000-lbs/day for BOD, 136,000-lbs/day for CBOD and 164,000-lbs/day for TSS. The deicer, septage and Brightwater loads, along with loads and plant mass balances from recent months, show that the measured loads are similar to the loads that would be expected. Centrate recycle was sent to the influent from April 1 through 11 and then it was sent to its usual spot of the DAFTs. The additional loads in the centrate artificially increased the influent BOD, CBOD and TSS loads by about 2% over then month. Even with this artificially heightened load, South Plant easily met the 95%

removal requirements. The effluent chlorine (Cl_2) 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_2 has been monitored using the on-line Hach CL-17 analyzer.

STP Facilities Status: STP operations started to transition from wet weather mode to spring mode when some process tanks could be taken out of service. The secondary process was operated to grow phosphorus accumulating organisms (PAOs). The gas scrubbing system was in operation all month. Essentially all of the scrubbed gas was injected into the PSE pipeline for RINs sales. Process heat was provided by the boiler using natural gas. Reclaimed water was applied offsite for about one-third of the month. Dewatering centrate was directed to the influent (instead of the DAFTs) for the first 11 days and then it was sent back to the DAFTs for the remainder of the month. The newly repaired mixed sludge (aka DAFT feed) pipeline returned to service Apr. 11.

All 12 primary tanks, all 4 aeration tanks, 20-24 of 24 secondary clarifiers, and both chlorine contact channels (Cl_2CC) were in service all month. POD5 went out of service for planned maintenance and upgrades. Five of six DAFTs were in service all month - 3 small DAFTs and both large DAFTs. DAFT4 remained out of service for scheduled PMs. All five anaerobic digesters were in service all month. Dewatering operated every day; centrate was valved to the influent until Apr. 11 when it was returned to the DAFTs. On April 30, STP operated with all 12 primary tanks, all 4 aeration tanks, 20 secondary clarifiers, both chlorine contact channels, 5 of 6 DAFTs and all 5 digesters.

Secondary Treatment: The secondary process was operated to promote the growth of phosphorus accumulating organisms (PAOs). The aeration tanks operated in plug-flow mode with a ½-pass un-aerated zone in Pass-1. The secondary system's solids retention time (SRT) was usually in the 4.0 - 4.5 day range. The MLSS concentration was usually 2600-2800 mg/L. D.O. operating setpoints were 2.0-2.25 mg/L. The RAS return rate was 45% (of the influent flow). Some nitrification started to occur in the last half of the month. Aeration tank air use averaged 73.4 million-ft³/day; it was usually in the range of 65-75 million-ft³/day. Biomass settling characteristics was good, with the sludge volume index (SVI) in the 90-130 mL/g range.

Nitrogen (N) and phosphorus (P) removal averaged 26% and 85%, respectively. (These removals account for the artificially higher influent N and P loads due to centrate.) Effluent $\text{NH}_3\text{-N}$ and NO_2+NO_3 averaged 36-mg/L and 1.5-mg/L, respectively. Effluent Total-P averaged 1.1-mg/L. Effluent alkalinity was usually in the 120,000-140,000 lbs./day range.

Disinfection: 24,183 gallons of 12.5% sodium hypochlorite (NaOCl) were used to disinfect STP's final effluent in April. This resulted in an average dose of 1.4-mg/L as Cl_2 based on effluent flow. Daily hypochlorite use ranged from about 750 to 950 gpd, and averaged 806-gpd. Both the north and south chlorine contact channels (Cl_2CC) were in service. The "West" dosing system applies hypochlorite to the north Cl_2CC , while the "east" system

doses the south Cl_2 CC. RAS chlorination (for SVI control) and pre-chlorination (for influent odor control) were not practiced. The Cl_2 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 96 dry tons/day of thickened raw sludge (THS) to be fed to the digesters. THS flow averaged 0.40-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 28 lbs./d/ft² on the large DAFTs and 20 lbs./d/ft² on the small DAFTs. One fizz system per DAFT was in service for the smaller DAFTs. The larger DAFTs often used two fizz systems. 16,500-lbs/month of polymer were added to the DAFT feed sludge (165-dry tons/day) for an average polymer dose of 3.3 lb-active/dry ton feed, or 5.7 lb-active/dry ton THS. Polydyne polymer WE-1531 was used in April.

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 60.9% and 52%, respectively. The digestion detention time averaged 32-days; 4 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 85.7% and 70.1%, respectively. Digester alkalinity levels were usually in the range of 6500-7,000-mg/L as $CaCO_3$. All primary digesters were operating in parallel and fed equal amounts of THS. The digester VS loading rate averaged 0.12-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 digester covers had some accumulation of scum/sludge; air-spargers were available to control the accumulation.

Dewatering/Biosolids: 6410 wet tons of biosolids (1362-dry tons @ 21.2%TS) were beneficially reused in April. About 98% of the wet-biosolids were ultimately applied to agriculture sites and 2% were applied to forests. Digested sludge production was closer to 1317 dry tons since digester inventory decreased by 45 dry tons across the month. It's estimated that about 4% of the 1317 dry tons were associated with deicer.

An estimated 70,500 lbs-active polymer were used for dewatering, resulting in an average polymer dose of 51.8 lb-active/dry ton hauled. The applied polymer was Polydyne WE586, a 41.5% cationic emulsion solution. Centrifuge feed rates were usually 140-gpm to 160-gpm. No less than two centrifuges were in service at any time, and almost all of the time. Three centrifuges were occasionally operated. Scrubber-water was sent to the centrate sump to provide struvite control when gas scrubbing was underway. Centrate flowed to the influent until April 11 when it returned to the DAFTs.