

Memorandum

August 14, 2018

TO: Historical Memo

FROM: Rick Butler, Process Control Supervisor

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

STP met all of its conventional permit limits for secondary effluent in July 2018. Flow averaged 54-mgd. The max-day flow was 61-mgd (July 30). Final effluent quality averaged 5-mg/L carbonaceous BOD (cBOD₅), 8-mg/L TSS and 13-mg/L total BOD₅. Respective removals were 98%, 98% and 97%. All flows received secondary treatment.

July was very dry and very warm, with a rainfall total of only 0.05-inches. The historic average rainfall for July is 0.70-inches and the record rainfall is 2.39-inches (1983). Air temperatures were nearly 7°F and 4°F warmer than normal, respectively, with average daily high and low temperatures of 83°F and 59°F. Wastewater temperature increased across July from 70.0°F to 74.0°F. The max-day flow of 61-mgd was the result of receiving 5.5-mgd from the Brightwater service area.

Offsite Flows and Loads: 2.55-MG of septage was received in July, accounting for 9% of STP's influent solids load. The Southern Transfer, aka Allentown, averaged 3.7-mgd with a max-day flow of 3.9-mgd. Sewage from the Brightwater (BW) service area accounted for about 2% of STP's influent load. BW-based flows (via York P.S.) averaged 1.0-mgd raw sewage. York's max-day flow was 5.5-mgd (July 30).

Sampling and Analyses: All permit-required samples (influent and effluent) were collected and analyzed. The final ETS effluent sample line/sampler was usually chlorinated every other day. Effluent chlorine at the ETS outfall was monitored using two on-line analyzers; the outfall chlorine level was well below the permitted limits of 0.75-mg/L daily average and 0.5-mg/L monthly average. Recent months' loads and plant mass balances suggest that the influent BOD and TSS loads in July should be close to 160,000-lbs/day. The measured influent loads were 179,000-lbs/day for BOD, 121,000-lbs/day for CBOD and 148,000-lbs/day for TSS. It's possible that the higher measured BOD values may be the result of nitrifier growth on the sampling system, which then seeds the sample.

STP Facilities Status: STP was in summer operating mode in July. Numerous process tanks were out of service for scheduled summer PMs. Offsite RW application occurred every day.

The secondary process was nitrifying most of the month. Process heat was provided by the boiler. The gas scrubbing system was in operation all month at essentially full capacity. All scrubbed gas was injected into the PSE pipeline for RINs sales.

8 of 12 primary sedimentation tanks, 4 of 4 aeration tanks, 15 of 24 secondary clarifiers, and 1 of 2 chlorine contact channels were in service essentially all month. The 4 southeast primaries, secondary clarifier 8, and POD4 (Clarifiers 13-16) remained out of service for scheduled PMs. POD3 (Clarifiers 9-12) returned to service July 26 when POD2 (Clarifiers 5-8) went out of service for repairs to RAS piping. The south chlorine contact channel remained out of service for scheduled PMs.

All six DAFTs (two large and four small) were in service until July 15 when DAFT6 went out of service for scheduled repairs. All five anaerobic digesters were in service all month. Dewatering operated every day. On July 31, STP operated with 8 of 12 primary tanks, 4 of 4 aeration tanks, 15 of 24 secondary clarifiers, 1 of 2 chlorine contact channels, 5 of 6 DAFTs and 5 of 5 digesters.

Secondary Treatment: The secondary process was operated in plug flow mode with a ½-pass un-aerated zone in Pass-1. The system was operated to nitrify all month, with effluent ammonia (NH_3) dropping below 10-mg/L as N at mid-month. The secondary system's solids retention time (SRT) was around 6-7 days during the first half of July and around 5-days for the second half. The MLSS concentration was about 2500-2900 mg/L for the first half and around 2500-mg/L for the second half. During the last half of July, nitrogen removal averaged 62% with effluent NH_3 and nitrite plus nitrate ($\text{NO}_2 + \text{NO}_3$) levels averaging 7.5-mg/L as N and 13-mg/L as N, respectively.

The RAS return rate was 80-110% of the influent flow for the month's first half. During the second half, RAS pumping was set at a constant rate of 85-mgd. This resulted in an average RAS return rate of about 125% of the influent flow, with instantaneous RAS return rates near 250% during the morning breakfast hours. The constant, high RAS flow was chosen to improve denitrification and to buffer the low effluent pH of the day – which was associated with the breakfast hours.

Aeration tank air use averaged 85 million-ft³/day, ranging from 74 to 106 million-ft³/day. The higher aeration rates of July (compared with previous months) were primarily the result of nitrification, though warmer wastewater temperatures and a slightly older SRT had a slight impact. Daily aeration tended to be 75-85 million-ft³/day at the end of the month (using DO control setpoints of 1.5-mg/L).

Nitrogen (N) and phosphorus (P) removals reflected the transition to N-removal. N and P removal averaged 56% and 38%, respectively, in July. Effluent NH_3 -N and $\text{NO}_2 + \text{NO}_3$ averaged 13.4-mg/L and 13.0-mg/L, respectively. Effluent total-P averaged 4.9-mg/L, a significant increase from June's average of 1.2-mg/L. Minimum effluent pH values were as low as pH

6.1-6.2 early in the month, and closer to pH 6.4-6.5 later in the month. Influent alkalinity was usually 90,000-110,000 lbs/day as CaCO_3 through the month. By month's end, effluent alkalinity was about 40% of the influent (about 35,000-45,000 lbs/day or 80-100 mg/L).

Disinfection: 37,204 gallons of 12.5% sodium hypochlorite (NaOCl) were used to disinfect STP's final effluent in July. This resulted in an average dose of 2.7-mg/L as Cl_2 based on effluent flow. Daily hypochlorite use was usually in the 900-1300 gpd range. Historically, the Cl_2 disinfection dose has been near 1.5-2.0 mg/L in winter and 2.0-3.0 mg/L in summer.

The north chlorine contact channel (CCC) was the only CCC in service during July. The "West" dosing system was used to apply hypochlorite to the north CCC. The CCC, ETS effluent pipeline, and ETS outfall structure were usually disinfected with a slug dose of hypochlorite every two weeks.

DAFT: An average of 76 dry tons/day of thickened raw sludge (THS) was fed to the digesters. THS flow averaged 0.34-mgd with a solids concentration of 5.4% TS. All six DAFTs (two large and four small) were in service until July 15 when large DAFT6 went out of service for scheduled repairs. 11,550-lbs/month of polymer were added to 162-dry tons/day of DAFT feed sludge for an average polymer dose of 2.3-lb active/dry ton feed. Polydyne polymer WE-1531 was used in July. (Note: we are suspicious that the THS sampler is under-reporting the TS% concentration. Other process data suggest that the %TS averaged closer to 6.2% in July. We'll continue to look into this issue.)

Anaerobic Digestion: Time and temperature requirements for Class B biosolids were met via digestion. All four primary digesters were in service all month. Volatile solids (VS) and total solids (TS) reductions averaged 62.0% and 54%, respectively. The detention time averaged 35-days; 3 of those days were provided by Digester 5. Digester temperatures were in the 98-100°F range. The VS/TS content entering and leaving the digesters averaged 87.0% and 71.8%, respectively. Digester alkalinity levels were usually in the 6800-7200 mg/L range. All primary digesters were operating in parallel and fed equal amounts of THS. The digester VS loading rate averaged 0.10-lbs./day. The gas and pumped mixing systems for all digesters operated in a "normal" mode.

Dewatering/Biosolids: 5202 wet tons of biosolids (1100-dry tons) were beneficially reused in July. About two-thirds of the dry tons (3131 wet tons @ 23.2%TS) were applied to Eastern WA agricultural sites. The other third (2071 wet tons @ 18.1%TS) was applied to Western WA silviculture sites. Digested sludge production was closer to 1048 dry tons as the digester inventory decreased by 52 dry tons across the month.

51,000 lbs.-active polymer were used for biosolids dewatering, resulting in an average polymer dose of 46.4 lb.-active/dry ton hauled. The applied polymer was Polydyne WE586, a 41.5% cationic emulsion solution. Centrifuge feed rates were usually 160-gpm to produce biosolids for Eastern WA. sites and 180-gpm for Western WA. sites.