

Memorandum

July 11, 2019

TO: Historical Memo

FROM: Rick Butler, Process Control Supervisor

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

STP met all of its conventional permit limits for secondary effluent in June 2019. Flow averaged 55-mgd. The max-day flow was 59-mgd (June 20). Final effluent quality averaged 4-mg/L carbonaceous BOD (cBOD₅), 8-mg/L TSS and 16-mg/L total BOD₅. Respective removals were 98%, 98% and 97%. All flows received secondary treatment.

June was very dry and notably warmer than normal. Rainfall totaled 0.90-inches. June's average precipitation is 1.57-inches; the record is 3.90-inches (1946). The max-24hr rain was 0.41-inches on June 20. Daily high and low air temperatures were 73.4°F and 54°F, respectively, which are about 3°F warmer than normal. Wastewater temperatures increased almost 2°F across the month, starting near 69°F and ending near 71°F.

Offsite Flows and Loads: 2.30-MG of septage were received in June, accounting for 7.5% of STP's influent solids load. The Southern Transfer (aka Allentown) flowed to STP all month, averaging 3.8-mgd with a max-day of 5.1-mgd on June 20. Sewage from the Brightwater area accounted for <2% of STP's influent load. Brightwater flow to STP (via York P.S.) averaged 0.8-mgd with a max-day of 3.7-mgd on June 13. Essentially no deicer was discharged to the STP in June.

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 210,000-lbs/day for BOD, 124,000-lbs/day for CBOD, and 170,000-lbs/day for TSS. The loads from septage and Brightwater, along with loads and plant mass balances from recent months, suggest that the measured loads are slightly higher than expected – especially for BOD. Centrate recycle was sent to the DAFTs all month. The effluent chlorine (Cl₂) at the ETS outfall was below the 0.75-mg/L daily average and 0.5-mg/L monthly average limits. The ETS outfall Cl₂ has been monitored using the on-line Hach CL-17 analyzer.

STP Facilities Status: STP operations was in summer mode in June with a few process tanks out of service. The secondary process was operated to fully nitrify during the first

half of June and then to limit nitrification during the second half. The gas scrubbing system was in operation all month. Basically all of the scrubbed gas was injected into the PSE pipeline for RINs sales. Process heat was provided by the solids-area boiler using natural gas, though it was offline for one week to install a new burner. Reclaimed water was applied offsite all month.

All 12 primary tanks, 3-4 of 4 aeration tanks, 20 of 24 secondary clarifiers, and 1-2 of both chlorine contact channel (CCC) were in service all month. The 4 north primary tanks returned to service June 1 after scheduled PMs. Aeration Tank 1 was taken out of service June 6 to complete aeration/diffuser leak repairs. POD-5 remained out of service to install new agitation air diffusers in its MLSS channel. The north CCC (west of POD-1) was taken out of service June 12 due to low flows in one of the CCCs. Flow from PODs 1-4 was forced eastward in the north CCC until it entered the south CCC and mixed with flow from POD6. After June 12, all disinfection was performed in the south CCC using the east hypochlorite system. 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. Dewatering operated every day. On June 30, STP operated with all 12 primary tanks, 3 aeration tanks, 20 secondary clarifiers, one CCC, 5 of 6 DAFTs and all 5 digesters.

Secondary Treatment: The secondary process was operated to fully nitrify in the first half of June and to limit nitrification in the second half. Aeration Tank 1 was taken out of service June 6. The aeration tanks continued to operate in plug-flow mode with a ½-pass un-aerated zone in Pass-1 through the month. The MLSS concentration was about 2600-2800 mg/L with four aeration tanks, and about 2300-2500 mg/L near month's end. D.O. operating setpoints were about 1.7-2.0 mg/L while in full nitrification and 1.4-mg/L near month's end. The secondary system's solids retention time (SRT) was near 5-days with all four aeration tanks and closer to 3.5-4.0 days in late June. The RAS return rate was near 140-160% during the first half of June and near 80-100% in the second half of June. Aeration tank air use averaged 90 million-ft³/day early in the month and closer to 70 million-ft³/day near the end of the month.

Nitrogen (N) and phosphorus (P) removal averaged 56% and 53%, respectively. Nitrogen removal dropped from about 60% to 50% across the month. Effluent ammonia (NH₃-N) and nitrite plus nitrate (NO₂+NO₃) averaged 17-mg/L and 19-mg/L, respectively. However, effluent NH₃-N increased from about 12-mg/L to about 25-mg/L across the month. Effluent Total-P averaged 4.5-mg/L for the month. P-removal increased from about 40% to 60% across the month, indicating a shift towards growing PAOs (phosphorus accumulating organisms). Effluent alkalinity increased substantially with the transition from full nitrification to limited nitrification. Effluent alkalinity averaged 66,000 lbs/day, increasing from about 40,000-60,000 lbs/day in the first week to about 85,000 near month's end.

Disinfection: 28,318 gallons of 12.5% sodium hypochlorite (NaOCl) were used to disinfect STP's final effluent in June. This resulted in an average dose of 2.1-mg/L as Cl₂ based on

effluent flow. Daily hypochlorite use was usually in the range of about 850-1100 gpd. High short-term doses (6-10 mg/L dose for 2-hours) of hypochlorite were applied every other week to control bio-growth on the surfaces of the contact channels and ETS forebay. Even with the high short-term doses, the Cl_2 residual at the outfall was $<0.2\text{-mg/L Cl}_2$. RAS chlorination (for SVI control) was not operated in June. Pre-chlorination (for odor control of the influent wastewater) was not operated in June.

Both the north and south Cl_2 Contact Channels (CCC) were in service until June 12 when all POD flows were sent down the south CCC. A gate installed in the north CCC just west of POD 1 caused all POD1-4 effluent to flow eastward in the north CCC until it entered the south CCC by POD4. At POD4, all the POD flows were disinfected in the south CCC using the east hypochlorite system. The north CCC from POD1 west to the ETS falls was then drained and cleaned. The “West” dosing system was also then taken out of service because it only applies hypochlorite to the north CCC. The primary reason that the north CCC was taken out of service was because of the challenges of controlling hypochlorite dosing with only one POD (POD6) flowing down the south CCC.

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 6.0% TS. Three small DAFTs and both large DAFTs were in service all month. The solids loading rates averaged 25 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 all DAFTs. 18,150-lbs/month of Polydyne WE-1531 polymer were added to the DAFT feed sludge for an average dose of 4.0 lb-active/dry ton feed, or 6.9 lb-active/dry ton THS.

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 65.0% and 58%, respectively. The digestion detention time averaged 35-days; 4 of those days were provided by Digester 5. Digester temperatures were in the 95-101°F range. The lower temperatures occurred during a week’s shutdown of the solids hot water boiler. The VS/TS content entering and leaving the digesters averaged 88.5% and 72.9%, respectively. Digester alkalinity levels were usually in the range of 7000-7600 mg/L as CaCO_3 . All primary digesters were operating in parallel and fed equal amounts of THS. The digester VS loading rate averaged 0.11-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.

Dewatering/Biosolids: 4720 wet tons of biosolids (1110-dry tons @ 21.4%TS) were beneficially reused in June. 85% of the 1110- dry tons were applied to Eastern WA agriculture sites, and 15% were applied to forest sites in Western WA. Digested sludge production was closer to 1179 dry tons since digester inventory increased by 69 dry tons across the month. An estimated 49,580 lbs-active polymer were used for dewatering, resulting in an average polymer dose of 49.1 lb-active/dry ton hauled. The applied polymer was Polydyne WE586, a

June 2019 Historical Memo – South Plant
July 11, 2019

41.5% cationic emulsion solution. Biosolids were dewatered every day. Centrifuge feed rates were usually 150-gpm to 160-gpm. Only two centrifuges were usually in service. Centrate was sent to the DAFTs all month. Gas Scrubber return water was mixed with centrate to control struvite buildup in the centrate conveyance system.