

Memorandum

October 14, 2020

TO: Historical Memo

FROM: Rick Butler, Process Control Supervisor

SUBJECT: South Treatment Plant at Renton (STP)
September 2020 Operating Record

Operations in September 2020 was characterized by fairly dry weather, some rain, warm wastewater temperature, good effluent quality, no nitrification, essentially no deicer, little flow/load from the Brightwater service area, scrubbed gas sales most of the month, almost daily offsite use of reclaimed water, and several facilities returned to service after summer maintenance.

September 2020 saw more phased movement through the “Stay Home, Stay Healthy” order for COVID-19. Operations at South Plant were little impacted by the new order of business except for changes in the number of on-site staff vs. telecommuting staff. Necessary deliveries of chemicals and supplies were received with limited change in delivery times. Hypochlorite use has increased to provide pre-chlorination as a preventive measure for staff working at the treatment plant. There were few signs that influent flows or loads have notably changed due to the “Shelter in place” order, though septage loads have increased slightly.

The STP met all its conventional permit limits for secondary effluent. Final effluent quality averaged 4-mg/L carbonaceous BOD (cBOD₅), 8-mg/L TSS and 9-mg/L total BOD₅. Respective removals were 98%, 98% and 98%.

Flow averaged 56-mgd, with about 0.6-mgd of that total from the Brightwater service area. The max-day flow was 71-mgd (Sept. 25). All flows received secondary treatment, i.e., no flows were diverted around the secondary process.

September’s rainfall totaled 2.48-inches. September’s historic average rainfall is 1.50-inches; the highest recorded is 6.17-inches (2013). The max-day rainfall was only 1.08-inches on Sept. 23. Daily high and low air temperatures averaged 74°F and 57°F, respectively, which are each about 4°F warmer than normal. Water temperatures varied between 73 to 70°F across the month.

Offsite Flows and Loads: 3.09-MG of septage were received in September, accounting for 10% of STP’s influent solids load. The septage load was higher than normal because Lynnwood raw sludge was received for several weeks while they did maintenance on their

sludge handling system. The Southern Transfer (aka Allentown) flow averaged 4.1-mgd with a max-day flow of 9.8-mgd on September 23. York P.S. flow (i.e., Brightwater based flow) averaged 0.6-mgd with a max-day flow of 2.4-mgd on September 24. Deicer was sent to the STP on two days in September with very low BOD loads.

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. Measured influent loads averaged 172,000-lbs/day BOD₅, 124,500-lbs/day cBOD₅, and 177,000-lbs/day TSS. These loads are in range of values expected this time of year with little Brightwater flow/load and essentially no deicer. 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.

STP Facilities Status: STP was in a “get-ready-for-fall” mode with various process units returning to service. The secondary process was operated to avoid nitrification. The gas scrubbing system operated at full capacity most of the month; all scrubbed gas was injected into the PSE pipeline for RINs sales. Process heat was provided by the boiler (fueled by natural gas). Reclaimed water was applied off-site most days; it was also used for internal process applications.

7 to 8 of 12 primary tanks, 3 to 4 of 4 aeration tanks, 14 to 19 of 24 secondary clarifiers, and 2 of 2 chlorine contact channels (CCC) were in service all month. South Primary Tanks 1, 2, 3 and 5 remained out of service for repairs and PMs. South Primary 4 went out of service as well on Aug. 9. Aeration Tank 2 (AT2) returned to service Sept. 29 after installation of safety access equipment and repairs leaky aeration diffusers. Secondary Clarifiers 6-8, 17-19, 113-16 and 21-24 were in service all month. Clarifiers that returned to service were Clarifier 20 on Sept. 9, POD1 (Clarifiers 1-4) on Sept. 24, and Clarifier 5 on Sept. 26. POD3 (Clarifiers 9-12) remained out of service for scheduled repairs and PMs. The south and north CCCs were in service all month. Five of six DAFTs were in service all month. DAFT3 was out of service all month for repairs. All five anaerobic digesters were in service. The main boiler was in service all month. Dewatering operated every day. On September 30, STP operated with 7 primary tanks, 4 aeration tanks, 19 secondary clarifiers, two CCCs, 5 DAFTs and all 5 digesters.

Primary Treatment: 7 to 8 of 12 primary tanks were in service. South Primary Tanks 1, 2, 3 and 5 were out of service all month for repairs and PMs. In addition, South Primary 4 was in service until Sept. 9 when it went out of service. Primary effluent TSS and BOD averaged 99-mg/L and 187-mg/L, respectively, with average monthly TSS and BOD removals of 71% and 46%. The hydraulic loading rate (HLR) averaged 1490-gpd per ft² of tank surface area.

Secondary Treatment: The secondary process was operated to grow phosphorus accumulating organisms (PAOs) and to avoid nitrification all month. Three aeration tanks were in service all month. Aeration Tank 2 returned to service Sept. 29 after PMs and modifications for safe tank access. 15 to 19 of 24 clarifiers were in service. Clarifiers 9-12

(POD3) were out of service all month. The aeration tanks were operated in plug flow mode (i.e., aeration tank feed gates open only in Pass-1) with a ½-pass un-aerated zone in Pass-1, except for a brief period on Sept. 23-27 when they operated in split feed (7 of 8 gates open in Pass 1 and 2 of 8 gates open in Pass 2).

The MLSS concentration was usually in the 2700-2800 mg/L range except for the several days of split feed when the MLSS dropped to 2200-2300 mg/L. The solids retention time (SRT) was usually in the 3.0 - 3.5 days range. D.O. setpoints were 1.75-mg/L and 2.0-mg/L (for Passes 1-2 and 3-4, respectively) for the month's first half and 1.6-mg/L and 1.75-mg/L, respectively, for the second half. The RAS return rate was always 40%. Biomass settling was very good with a sludge volume index (SVI) of 50-80 mL/g. Aeration tank air use averaged 62 million-ft³/day for the month. Aeration was usually in the 54-74 million-ft³/day range.

Nutrient Removal. Nitrogen (N) removal averaged 31%. Effluent ammonia (NH₃) averaged 43-mg/L as N. Effluent nitrite plus nitrate (NO₂+NO₃) averaged <0.2-mg/L as N. Phosphorus (P) removal averaged 57% and effluent Total-P averaged 3.7-mg/L. Effluent alkalinity was usually in the range of 110,000 - 125,000 lbs/day as CaCO₃. N&P analyses were usually performed only once per week (on Tuesday samples only). NH₃ analysis was also performed on Sunday samples.

Disinfection: 38,147 gallons of 12.5% sodium hypochlorite (NaOCl) were used to disinfect STP's final effluent in September. This resulted in an average dose of 2.7-mg/L as chlorine (Cl₂) based on effluent flow. Daily hypochlorite use was usually in the 1100-1400 gpd range. Higher short-term doses (6-10 mg/L dose for 2-hours) were applied every other week to control bio-growth on the surfaces of the contact channels and ETS forebay. The daily Cl₂ residual at the ETS outfall was always <0.1-mg/L. Dechlorination (via sodium bisulfite) was not required. RAS chlorination for SVI control was not practiced.

Both the south and north CCC Chlorine Contact Channel (CCC) were in service all month. When both CCCs are in service, a gate located between the north and south CCCs at POD4 forces POD1-4 effluent to flow in the north CCC towards the west hypochlorite system and POD5-6 effluent to flow in the south CCC to the east hypochlorite dosing system.

Prechlorination: Prechlorination was practiced throughout September to provide an additional layer of protection for on-site staff. A total of 29,190 gallons of 12.5% sodium hypochlorite (NaOCl) was applied for pre-chlorination over the month. The pre-chlorination dose was usually 15 or 20 gallons per MG of wastewater flow. Prechlorination has historically been practiced only for odor issues which can occur in the latter half of summer.

DAFT: An average of 92 dry-tons/day (0.33-mgd at 6.7% TS) of thickened raw sludge (THS) was produced by the DAFTs. Two large DAFTs and three small DAFTs were in service all month. DAFT3 remained out of service all month. 16,500-lbs of polymer were added to DAFT feed sludge in September for an average dose of 6.0-lb active/dry ton THS or 3.2-lb

active/dry ton DAFT feed solids (173 tpd dry). Polydyne WE-1531 was the polymer used. The solids loading rate (SLRs) averaged 28-lbs./d/ft² for the larger DAFTs and 23-lbs./d/ft² for the smaller DAFTs. One of two fizz systems was in service for each small DAFT. Both fizz systems were used on each large DAFT until Sept. 15 when more load was shifted to the smaller DAFTs which allowed the larger DAFTs to operate with one fizz system per tank.

Anaerobic Digestion: Time and temperature requirements for Class B biosolids were met via digestion. All four primary anaerobic digesters were in service all month, fed equal amounts of THS, and each discharging to Digester 5. Volatile solids (VS) reduction averaged 60.8% and total solids (TS) destruction averaged about 53%. Digesters temperatures were held in the 98-101°F range. The primary digester VS loading rate averaged 0.11-lbs./day/ft³. The VS/TS percent entering and leaving the digestion process averaged 87.5% and 73.3%, respectively. The average digester detention time was 35-days, 3-days of which were provided by Digester 5. Digester 1-4 alkalinity levels were usually in the range of 7500-8300 mg/L as CaCO₃.

The gas and pumped mixing systems of the digesters operated in a “normal” mode. In other words, one of the two gas mixing compressors were in service per digester, and the “C-1” bottom-to-top pumped mixing system pumped directly to the top of the digesters (instead of into the “C-2” side-to-side pumped system). Air-spargers are available to control any accumulation of scum/sludge on the digester covers.

Dewatering/Biosolids: : 1091 dry-tons biosolids (4671 wet-tons at 23.4%TS) were hauled in September. The dry tons of digested solids produced was also 1091 dry tons since the digester inventory essentially stayed the same across the month. Biosolids wet ton distribution was about 1/3 to Eastern WA. agricultural sites and 2/3 to Western WA. forest lands. No biosolids went to Groco in September. An estimated 52,628 lbs.-active polymer were applied for dewatering, resulting in an average dose of 48 lb.-active/dry ton hauled. The polymer was Polydyne WE586, a 41.5% cationic emulsion solution.

Biosolids were dewatered every day. Dewatering operation was essentially 24-hour shifts on weekdays and half-day shifts on weekends. Centrifuge operation was usually two centrifuges in service at 140-160 gpm per centrifuge. Gas-scrubber-water was sent to the centrate sump to provide struvite control. Centrate was valved to the DAFTs.