

Memorandum

April 12, 2021

TO: Historical Memo

FROM: Rick Butler, Process Control Supervisor

SUBJECT: South Treatment Plant at Renton (STP)
March 2021 Operating Record

Operations in March 2021 was characterized by lower flows, dry weather, warming wastewater, good effluent quality, no nitrification, low deicer loads, essentially no flow/load from the Brightwater service area, scrubbed gas sales all month, and limited offsite reclaimed water application.

The STP met all of its conventional permit limits for secondary effluent. Final effluent quality averaged 5-mg/L carbonaceous BOD (cBOD₅), 7-mg/L TSS and 11-mg/L total BOD₅. Respective removals were 98%, 98% and 97%.

Flow averaged 73-mgd, with 0.2-mgd of that total from the Brightwater service area. The max-day flow was 92-mgd on March 25. All flows received secondary treatment, i.e., no flows were diverted around the secondary process.

March precipitation totaled 2.61-inches with a max-day rainfall of 0.55-inches on Mar. 25. March's historic rainfall average is 3.72-inches; the highest recorded March rainfall is 9.44-inches (2014). Daily high and low air temperatures averaged 53°F and 38°F which are 0.5°F and 1.5°F colder, respectively, than long-term averages. The wastewater temperature increased nearly 2.5°F across the month from 58°F to 60.5°F

Offsite Flows and Loads: 2.63-MG of septage were received at South Plant in March, accounting for about 7% of STP's influent solids load. Southern Transfer (aka Allentown) flow averaged 6.8-mgd with max-day flow of 12.8-mgd on Mar. 25. York P.S. flow (i.e., Brightwater based flow) averaged 0.2-mgd with a max-day flow of 1.3-mgd on Mar. 2. York/BW flows accounted for <1% of the influent TSS load at the STP. Deicer was sent to the STP on 13 days in March with an average BOD load near 4 tons/day on those days. The total monthly deicer BOD load was approximately 50 tons, which accounted for about 2% of STP's influent BOD load in March.

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

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other day. Measured influent loads averaged 91-tons/day BOD₅, 81-tons/day cBOD₅, and 96-tons/day TSS. These values seem slightly higher than would be expected with the conditions of March, i.e., normal septage loads, lower deicer loads and low loads from Brightwater. 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: In March, most process tanks were in service to handle winter flows/loads. The secondary process was operated to avoid nitrification and to handle higher flows. The gas scrubbing system operated slightly below full capacity but was in service all month; all scrubbed gas was injected into the PSE pipeline. Process heat was provided by the solids boiler (fueled by natural gas) and the two electric boilers in the main control and maintenance buildings. There was limited offsite application of Class-A reclaimed water (RW) with the RW facility producing Class-A quality RW all month. RW was used for internal process applications all month.

10 of 12 primary clarifiers, 4 of 4 aeration tanks (ATs), 22 of 24 secondary clarifiers, and 2 of 2 chlorine contact channels (CCC) were in service all month. North Primary Tanks 1 and 2, along with Secondary Clarifiers 3 and 20, remained out of service all month for repairs. Five of six DAFTs were in service to start the month; DAFT₃ remained out of service for repairs. DAFT₄ was taken out of service Mar. 8 due to mechanical issues; it remained out of service. All five anaerobic digesters were in service. Dewatering operated every day. On March 31, STP operated with 10 primary tanks, 4 ATs, 22 secondary clarifiers, two CCCs, 4 DAFTs and all 5 digesters.

Primary Treatment: 10 of 12 primary tanks were in service all month. Primary effluent TSS and BOD averaged 81-mg/L and 172-mg/L, respectively, with average monthly TSS and BOD removals of 74% and 46%. The hydraulic loading rate (HLR) averaged 1324-gpd per ft² of tank surface area. The max-day HLR was only 1660-gpd per ft².

Secondary Treatment: The secondary process was operated to grow phosphorus accumulating organisms (PAOs) and to avoid nitrification. Four ATs were in service all month. The ATs were operated in plug flow mode (i.e., AT feed gates open only in Pass-1). A ½-pass un-aerated zone in Pass-1 was maintained throughout the month. 22 of 24 secondary clarifiers were in service all month.

The MLSS concentration averaged 2800-mg/L over the month, with values usually in the 2600-3000 mg/L range. The solids retention time (SRT) was in the 4.0 - 4.5 day range early in the month and consistently near 5.5-days later in the month. The RAS return rate was 40% all month. Biomass settling improved substantially over the month, with the sludge volume index (SVI) dropping from 180-200 mL/g to 100-120 mg/L. Aeration tank air use averaged 60 million-ft³/day for the month, with daily use usually in the 57-62 million-ft³/day range. D.O. setpoints were always 2.25-mg/L and 2.75-mg/L for Passes 1&2 and Passes 3&4, respectively.

Nutrient Removal. Nitrogen (N) removal averaged 25%. Effluent ammonia (NH₃) averaged 37-mg/L as N and 22,064-lbs/day. Effluent nitrite plus nitrate (NO₂+NO₃) averaged <0.6-mg/L as N. Phosphorus (P) removal averaged 73%. Effluent Total-P averaged 1.8-mg/L and 1,086-lbs/day. Effluent alkalinity was in the range of 140,000 - 146,000 lbs/day as CaCO₃. Analyses for N and P constituents were usually performed once per week (Tuesday samples only). NH₃ analysis was also performed on Sunday samples.

Disinfection: 28,123 gallons of 12.5% sodium hypochlorite (NaOCl) were used to disinfect STP's final effluent in March. This resulted in an average dose of 1.5-mg/L as chlorine (Cl₂) based on effluent flow. Daily hypochlorite use was usually in the 800-1100 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 <0.50-mg/L. Dechlorination (via sodium bisulfite) was not required. RAS chlorination was not practiced. Both the south and north CCCs were in service all month.

Prechlorination: Prechlorination was practiced throughout March to provide an additional layer of protection for the staff working in STP. About 22,750 gallons of 12.5% sodium hypochlorite (NaOCl) was applied to the influent over the month. The pre-chlorination dose was usually 2.5 gallons per MG of wastewater flow. Prechlorination has historically been practiced only for odor issues which can occur in the latter half of summer. Prechlorination was stopped during special influent sampling (e.g., priority pollutant sampling) to avoid potential impacts to the raw sewage characteristics.

DAFT: An average of 101 dry-tons/day (0.42-mgd at 6.0% TS) of thickened raw sludge (THS) was produced by the DAFTs. Two large DAFTs and three small DAFTs were in service to start the month. DAFT4 subsequently went out of service Mar. 8 due to mechanical issues. 16,500-lbs of polymer (Polydyne WE-1531) were added to DAFT feed sludge in March for an average dose of 5.3-lb active/dry ton THS or 3.3-lb active/dry ton DAFT feed solids. The solids loading rate (SLR) averaged 26 lbs./d/ft² and 29 lbs./d/ft² for the larger and smaller DAFTs, respectively. One of two fizz systems per DAFT was in service until Mar. 8 when two fizz systems were operated on DAFTs 1, 2 and 5; DAFT6's second fizz system was not available.

Anaerobic Digestion: Time and temperature requirements for Class B biosolids were met via digestion. All four primary anaerobic digesters were in service, fed equal amounts of THS, and each discharging to Digester 5. Volatile solids (VS) reduction averaged 63.9% and total solids (TS) destruction averaged about 56%. Digesters temperatures were held in the 98-100°F range. The primary digester VS loading rate averaged 0.13-lbs./day/ft³. The VS/TS percent entering and leaving the digestion process averaged 87.3% and 71.3%, respectively. The average digester detention time was 31-days, 5-days of which were provided by

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Digester 5. Digester 1-4 alkalinity levels were usually in the range of 7500-8000 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: 1263 dry-tons biosolids (5176 wet-tons at 24.4%TS) were hauled in March. The dry tons of digested solids produced was closer to 1243 dry tons since the digester inventory decreased by about 22 dry tons over the month. Biosolids were distributed between Eastern WA. agricultural sites and Western WA. forest lands in a 60:40 split (wet tons). An estimated 63,333 lbs.-active polymer were applied for dewatering, resulting in an average dose of 50 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, with two centrifuges usually in operation and the third centrifuge brought on-line occasionally, especially during the second half of the month. Centrifuge feed rates were usually 160-170 gpm per centrifuge early in the month and 140-150 gpm later in the month. Gas-scrubbing water was sent to the centrate sump to provide struvite control. Centrate was valved to the DAFTs.