

# Memorandum

May 14, 2020

TO: Historical Memo

FROM: Rick Butler, Process Control Supervisor

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

*Operations in April 2020 was characterized by dry weather, lower flows, warmer wastewater temperatures, very good effluent quality, no nitrification, essentially no deicer, notable flow/load from the Brightwater service area, full scrubbed gas sales, and on-going offsite demand for reclaimed water after the first week.*

*April 2020 saw the continuation of the COVID-19 pandemic and the societal changes that include the “Stay Home, Stay Healthy” order, closure of non-essential businesses, telecommuting for many County employees, etc. Operations at South Plant were essentially normal, including the ability to get necessary deliveries of chemicals and supplies (though future delivery times will be longer for some chemicals and supplies). One notable exception is the increased hypochlorite use to provide pre-chlorination as a preventive measure for staff working at the treatment plant. There were few, if any, signs that influent flows or loads – including septage - had changed due to the “Shelter in place” order.*

The STP met all its conventional permit limits for secondary effluent. Final effluent quality averaged 4-mg/L carbonaceous BOD (cBOD<sub>5</sub>), 6-mg/L TSS and 9-mg/L total BOD<sub>5</sub>. Respective removals were 98%, 98% and 97%.

Flow averaged 63-mgd. The max-day flow was 74-mgd (Apr. 1). All flows received secondary treatment, i.e., no flows were diverted around the secondary process.

April was relatively dry with only 1.70-inches of rain. April’s historic average rainfall is 2.71-inches; the highest recorded is 6.53-inches (1991). The max-day rainfall was 0.59-inches on Apr. 25. Daily high and low air temperatures averaged 61°F and 44°F, respectively, which are 2.5°F to 1.4°F warmer than normal. Wastewater temperatures increased nearly 4°F over the month from 60.3°F and 64.4°F.

**Offsite Flows and Loads:** 2.24-MG of septage were received in April, accounting for 8% of STP’s influent solids load. The Southern Transfer (aka Allentown) flow averaged 5.2-mgd with a max-day flow of 7.7-mgd on Apr. 25. York P.S. flow (i.e., Brightwater based flow)

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averaged 2.6-mgd with a max-day flow of 4.5-mgd on Apr. 12. Deicer flowed from Seatac Airport to STP on one day with a BOD load of less than 0.5-tons.

**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 170,000-lbs/day BOD<sub>5</sub>, 125,000-lbs/day cBOD<sub>5</sub>, and 160,000-lbs/day TSS. These loads are in range of values expected this time of year with some Brightwater flow/load and essentially no deicer. The effluent chlorine (Cl<sub>2</sub>) at the ETS outfall was below the 0.75-mg/L daily average and 0.5-mg/L monthly average limits.

On April 18, South Plant experienced a short-term spike in the effluent TSS when the RAS was inadvertently dosed with hypochlorite. The effluent TSS – as measured by on-line TSS meters at the secondary clarifiers - jumped from around 10-mg/L to around 50-70 mg/L within 3-hours, then dropped to 20-30 mg/L after four more hours, and then returned to near 10-mg/L over the following 8-10 hours. Based on this information, the 24-hour composite effluent TSS should have been in the 20-30 mg/L range but only measured 9-mg/L. In the past, there have been occasional issues with maintaining adequate sample flow to the final effluent sampler. We will continue to check the sampler for these issues. The Clarifier TSS values and the 24-hour composite TSS values were very close before and after the incident.

**STP Facilities Status:** In April, STP transitioned out of wet weather mode with some process units coming out of service. The secondary process was operated to avoid nitrification. The gas scrubbing system operated at full capacity all month; all scrubbed gas was injected into the PSE pipeline for RINs sales. Process heat was provided by the boiler (fueled by natural gas) only; the electric boilers were turned off. Reclaimed water was applied off-site essentially every day after the first week; it was also used all month for internal process applications.

11 of 12 primary tanks, all 4 aeration tanks, 20 to 23 of 24 secondary clarifiers, and both chlorine contact channels (CCC) were in service all month. South Primary Tank 1 remained out of service for repairs. Secondary Clarifier 5 remained out of service for repairs to the collector. The remainder of POD2 (Clarifiers 5 - 9) went out of service mid-month for scheduled PMs. Five of six DAFTs were in service all month. DAFT1 remained out of service for PMs. All five anaerobic digesters were in service. Dewatering operated every day but two. On April 30, STP operated with 11 primary tanks, all 4 aeration tanks, 20 of 24 secondary clarifiers, both chlorine contact channels, 5 of 6 DAFTs and all 5 digesters.

**Primary Treatment:** 11 of 12 primary tanks were in service all month. South Primary Tank 1 was out of service for repairs. Primary effluent TSS and BOD averaged 83-mg/L and 155-mg/L, respectively. Average monthly TSS and BOD removals were 71% and 52%, respectively. The hydraulic loading rate (HLR) averaged 1111-gpd per ft<sup>2</sup> of tank surface area.

**Secondary Treatment:** The secondary process was operated to grow phosphorus accumulating organisms (PAOs) and avoid nitrification all month. All four aeration tanks and 20 to 23 of 24 clarifiers were in service. The aeration tanks were always 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.

The MLSS concentration was usually in the 2800-3000 mg/L range, and the solids retention time (SRT) was usually in the 4.0 - 5. day range. D.O. setpoints were always 1.75-mg/L or 2.0-mg/L and the RAS return rate was always 40%. Biomass settling was very good over the month with the sludge volume index (SVI) usually between 80 and 100 mL/g. Aeration tank air use averaged 56 million-ft<sup>3</sup>/day for the month; it was usually in the 50-55 million-ft<sup>3</sup>/day range for the month's first half and 55-60 million-ft<sup>3</sup>/day range for the month's second half. The increase in aeration was due to warming water temperatures and additional load from Brightwater via York P.S.

Nitrogen (N) and phosphorus (P) removal averaged 27% and 74%, respectively. Effluent ammonia (NH<sub>3</sub>-N) and nitrite plus nitrate (NO<sub>2</sub>+NO<sub>3</sub>) averaged 39-mg/L and <0.2-mg/L, respectively. Effluent Total-P averaged 1.7-mg/L for the month. Effluent alkalinity levels were usually in the range of 120,000-150,000 lbs/day as CaCO<sub>3</sub>.

**Disinfection:** 32,010 gallons of 12.5% sodium hypochlorite (NaOCl) were used to disinfect STP's final effluent in April. This resulted in an average dose of 2.0-mg/L as Cl<sub>2</sub> based on effluent flow. Daily hypochlorite use was in the 900-1100 gpd. Higher 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. The daily Cl<sub>2</sub> residual at the outfall was always <0.1-mg/L. Dechlorination (via sodium bisulfite) was not required. RAS chlorination for SVI control was not practiced in April, except inadvertently on Apr. 18.

Both the north and south Cl<sub>2</sub> Contact Channels (CCC) all month. A gate located between the north and south CCCs at POD4 forced POD1-4 effluent to flow westward in the north CCC and to be disinfected with the west hypochlorite system. POD5-6 effluent flowed westward in the south CCC and was disinfected with the east hypochlorite dosing system.

**Prechlorination:** Prechlorination was practiced throughout April as an additional layer of protection for the staff working in the treatment plant. A total of 32,680-gallons of 12.5% sodium hypochlorite (NaOCl) was applied for pre-chlorination. 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 84 dry-tons/day (0.37-mgd at 5.4% TS) of thickened raw sludge (THS) was produced by the DAFTs. Two large DAFTs and three small DAFTs were in service all month. DAFT1 remained out of service. 14,850-lbs of polymer (Polydyne WE-1531 and WE-1963) were added to DAFT feed sludge in April for an average dose of 5.9-lb active/dry ton

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THS or 3.0-lb active/dry ton DAFT feed solids. The solids loading rate (SLRs) averaged 26-lbs./d/ft<sup>2</sup> for the larger DAFTs and 22-lbs./d/ft<sup>2</sup> for the smaller DAFTs. One of two fizz systems was usually in service per DAFT.

**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 64% and 55%, respectively. The digestion detention time averaged 32-days; 4-days were provided by Digester 5. Digester temperatures were in the 97-100°F range. The VS/TS content entering and leaving the digesters averaged 86.6% and 70.2%, respectively. Digester alkalinity levels were usually in the range of 7500-8000 mg/L as CaCO<sub>3</sub>. 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, with one gas mixing compressor in service per digester.

**Dewatering/Biosolids:** 5020 wet tons of biosolids (1183-dry tons @ 23.6%TS) were beneficially reused in April. The dry tons of digested solids produced was closer to 1192 dry tons since the digester inventory increased by 9 dry tons across the month. About 25% of the wet tons were applied to Eastern WA agriculture sites, and 75% were applied to forest sites in Western WA.; no biosolids were used to produce compost. An estimated 50,376 lbs-active polymer were used for dewatering, resulting in an average polymer dose of 49 lb.-active/dry ton hauled. The applied polymer was Polydyne WE586, a 41.5% cationic emulsion solution. Biosolids were dewatered every day but two. Centrifuge feed rates were usually around 150-gpm with three centrifuges for the month’s first half and 180-200 gpm with two centrifuges for the last half. Gas-scrubber-water was sent to the centrate sump to provide struvite control when available. Centrate was valved to the DAFTs all month.