Memorandum

November 14, 2017

TO: Historical Memo

FROM: Rick Butler, Process Control Supervisor

SUBJECT: South Treatment Plant at Renton (STP)
October 2017 Operating Record

STP met all of its conventional permit limits for secondary effluent in October 2017. Flow averaged 60-mgd and the max-day flow was 91-mgd (October 19). Final effluent quality averaged 5-mg/L carbonaceous BOD ($cBOD_5$), 8-mg/L TSS and 13-mg/L total BOD_5. Respective removals were 98%, 97% and 96%. All flows received secondary treatment.

A notable amount of rain, 4.8-inches total, finally fell in October after three and a half months of dry weather. Most of October's rain fell Oct. 18 – 21, with the max-day rain of 1.61-inches falling on Oct. 21. The historic average rainfall for October is 3.48–inches; the monthly record is 10.05-inches (2016 – yes, last year). Daily average high and low temperatures - 61.1°F and 45.3°F - were near historic averages. The wastewater temperature decreased substantially across October, from 71.7°F to 67.6°F.

Offsite Flows and Loads: 2.17-MG of septage was received in October, accounting for 8% of STP's influent solids load. Raw sewage flowed from the Brightwater service area to STP nearly all month (via York P.S.), averaging 3.2-mgd or 5% of STP's flow. This flow transfer, which stopped Oct. 24, was necessary to facilitate aeration tank repairs at Brightwater. Southern Transfer flows from the MLK/Henderson/Norfolk CSO system averaged 4.5-mgd (or 7.5% of STP's flow) with a max-day flow of 14.6-mgd on Oct. 19. An estimated 21 tons BOD of deicer waste was sent from Seatac Airport to STP on 14 days. No sludge was hauled from West Point to South Plant this month.

Sampling and Analyses: All permit-required samples (influent and effluent) were collected and analyzed in October 2017. 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 maximum daily limit of 0.75-mg/L and the monthly average limit of 0.5-mg/L. Influent loads averaged 86-tons/day $TBOD_5$ and 74-tons/day TSS, reflecting values that would be expected based on recent months' loads and flows, plant mass balances, and deicer loads.

STP Facilities Status: STP transitioned into winter operational mode in October with most process tanks in service by the end of the month. The secondary process did not nitrify. The boiler provided process heat all month (using natural gas), cogen did not run, and the gas scrubbing system was in service all month essentially at full capacity.

8 of 12 primary sedimentation tanks were in service until Oct. 12 when south primary tanks 5-8 returned to service. Three of four aeration tanks were in service until Oct. 26 when AT1 returned to service after repairs to the aeration and diffuser system. 16 of 24 secondary clarifiers were in service until Oct. 7 when the four clarifiers of POD2 and Clarifier No. 2 in POD1 returned to service. Clarifier No. 2 went out of service later in the month. Both chlorine contact channels were in service. The RW facility was out of service for major modifications; it will be out of service until spring 2018.

Five of six DAFTs (two large and three small) were in service. Four of five anaerobic digesters were in service all month. Digester-3 was out of service for follow-up contractor repairs to the digester cover. Dewatering operated every day; centrate was valved to the DAFTs. Cogen did not operate. On October 31, STP operated with 12 of 12 primary tanks, 4 of 4 aeration tanks, 20 of 24 secondary clarifiers, 5 of 6 DAFTs and 4 of 5 digesters.

New raw sewage pump (RSP) 1 or 4 was usually in service, operating individually. New RSP6 was occasionally in service. RSPs 2, 3 and 5 were only operated briefly to exercise them. The new RSPs (1, 4, 6) are more energy efficient (especially when operated singularly) than the "Classic" RSPs (2, 3, 5) with eddy current clutches, except when the Classic RSPs operate near their full capacity.

Secondary Treatment: The secondary process was operated in plug flow mode with a ½-pass un-aerated zone in Pass-1 to grow phosphorus accumulating organisms (PAOs). The secondary system did not nitrify. Three of four aeration tanks were in service until Oct. 26 when AT1 returned to service. The secondary system's solids retention time (SRT) was near 3.5 days during the month's first half with a MLSS near 2200-mg/L. The SRT for the month's second half was increased to 4.5 days with a MLSS near 2400-mg/L. The RAS return rate was 40% of the secondary influent flow all month. Aeration tank air use averaged 62 million-ft^3/day, ranging from 54 to 72 million-ft^3/day. Biomass settling characteristics were good; the sludge volume index ranged from 80 to 115 mL/g (<120 mL/g is highly desirable).

Nitrogen (N) removal averaged 22% and phosphorus (P) removal averaged 58%. Effluent NH_3-N averaged 45-mg/L, effluent NO_2+NO_3 averaged <0.2-mg/L as N, and effluent total-P averaged 3.2-mg/L. The effluent NH_3-N load was similar to recent months without nitrification, averaging 22,430-lbs/day. Effluent pH was usually pH 6.9-7.1 and effluent alkalinity was usually 240-300 mg/L as $CaCO_3$. All of these values indicate the absence of nitrifiers and the presence of an active PAO biomass in the secondary process, although effluent P levels were higher than usual with an active PAO biomass.

Disinfection: 34,368 gallons of 12.5% sodium hypochlorite (NaOCl) were used to disinfect STP's final effluent in October. This resulted in an average dose of 2.2-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 1.5-2.0 mg/L during winter and 2.0-3.0 mg/L in summer.

Both the South and North chlorine contact channels (CCC) were in service. A gate placed near POD4 separated the two CCCs. Thus, POD1-4 effluent flowed in the North CCC and POD5-6 effluent flowed in the South CCC. The CCCs, ETS effluent pipeline, and ETS outfall structure were usually disinfected with slug doses of hypochlorite every two weeks. RAS chlorination was not practiced.

12.5% NaOCl was sometimes added to the influent for odor control (due to high H_2S levels). 7,770-gallons of 12.5% NaOCl was added on 16-days, resulting in an average dose of 485-gpd. Chlorinated secondary effluent was not recirculated into the plant influent during October.

DAFT: An average of 89 dry tons/day of thickened raw sludge (THS) were fed to the digesters. THS flow averaged 0.36-mgd with a solids concentration of 5.9% TS. Five of six DAFTs were in service - both large DAFTs (5&6) and three small DAFTs (1,3,4). 11,550-lbs/month of polymer were added to 178-dry tons/day of DAFT feed sludge for an average polymer dose of 2.1-lb active/dry ton feed. Polydyne polymer WE-1531 was used in October.

Anaerobic Digestion: Time and temperature requirements for Class B biosolids were met via the digesters. Volatile solids (VS) and total solids (TS) reductions averaged 58.2% and 50%, respectively. The detention time averaged 27-days; four of those days were provided by Digester 5. Digester temperatures were held in the 97-100°F range. The VS/TS content entering and leaving the digesters averaged 86.2% and 72.3%, respectively. Digester alkalinity levels were usually in the 7300-8000 mg/L range. All primary digesters were operating in parallel and fed equal amounts of THS. The digester VS loading rate averaged 0.14-lbs./day. Digester 3 remained out of service for recoating of its cover. The gas and pumped mixing systems for all digesters operated in a "normal" mode.

Dewatering/Biosolids: 5671-wet tons of biosolids (1266-dry tons) were beneficially reused in October. 75% of all dry tons (3943 wet tons @ 24.1%TS) were applied to Eastern WA agricultural sites. 25% of dry tons (1729 wet tons @ 18.2%TS) were hauled to Western WA forest sites. Digested sludge production was closer to 1231-dry tons since STP's digester inventory decreased by about 35 dry tons in October.

A total of 54,381 lbs.-active polymer was applied for dewatering, resulting in an average polymer dose of 43.0 lb.-active/dry ton hauled. The applied polymer was Polydyne WE586, a 41.5% cationic emulsion solution. Centrifuge feed rates were usually 140-150 gpm to produce biosolids for Eastern WA. sites and 180-gpm for Western WA. sites. Dewatering operated every day in October.