Memorandum

September 15, 2017

TO: Historical Memo

FROM: Rick Butler, Process Control Supervisor

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

STP met all of its conventional permit limits for secondary effluent in August 2017. Flow averaged 61-mgd and the max-day flow was 63-mgd (August 9). Final effluent quality averaged 5-mg/L carbonaceous BOD ($cBOD_5$), 10-mg/L TSS and 13-mg/L total BOD_5. Respective removals were 98%, 97% and 96%. All flows received secondary treatment.

August was the second consecutive month with essentially no rain. The rainfall average for August is 0.88–inches with a historic record of 4.59-inches (1975). Daily high and low temperatures averaged about 5°F and 3°F warmer than normal, respectively: 81.5°F and 59.0°F. Over August, wastewater temperature increased from about 73°F to about 74°F.

Sampling and Analyses: All permit-required samples (influent and effluent) were collected and analyzed in August 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 194,000-lbs/day $TBOD_5$ and 177,000-lbs/day TSS, reflecting values what would be expected based on recent months' loads and flows, plant mass balances, and deicer loads.

Offsite Flows and Loads: An estimated 82 dry tons of thickened undigested sludge was hauled from West Point to South Plant during the first nine days of August (in response to digester foaming issues). This accounted for about 3.3% of sludge fed to STP's digesters. There was no deicer loads. Raw sewage flow from the Brightwater service area to STP via York P.S. averaged 3.3-mgd in August (or 5.5% of STP's flow). This flow transfer facilitated aeration tank repairs at Brightwater. Southern Transfer flows from the MLK/Henderson/ Norfolk CSO system averaged 3.7-mgd, accounting for 6.2% of STP's flow. A total of 2.51-MG of septage was received in August, accounting for 8% of STP's influent solids load.

STP Facilities Status: STP was in full summer operational mode with several process tanks out of service for scheduled PMs. The secondary process did not nitrify. The boiler provided process heat all month (using natural gas). The gas scrubbing system was essentially in

service all month though at limited capacity for about 1/3 of the month, with much of the scrubbed gas production going to the waste gas burners during that time due to gas sampling and analysis issues. Cogen only operated to exercise the equipment.

Eight of 12 primary sedimentation tanks were usually in service all month. S. Primary tanks 1-4 returned to service near mid-month when S. Primary tanks 5-8 went out of service for scheduled maintenance. Three of four aeration tanks were in service all month; AT1 was out of service for repairs on the air delivery system and diffusers. 12 of 24 secondary clarifiers were in service all month. PODs 1, 2 and 3 were out of service for maintenance. Both chlorine contact channels was in service. The reclaimed water facility operated with one filter (Filter 1). All six DAFTs (two large and four small) were in service. Four of five anaerobic digesters were in service; Digester-2 was out of service all month for the contractor to finish coating the digester cover. Dewatering operated every day; centrate was valved to the DAFTs all month. On August 31, STP operated with 8 of 12 primary tanks, 3 of 4 aeration tanks, 12 of 24 secondary clarifiers, 6 of 6 DAFTs and 4 of 5 digesters.

New raw sewage pumps (RSPs) 1 and 4 were essentially the only RSPs in service in August, operating on their own. New RSP6 was occasionally in service. The new RSPs are more energy efficient than the "Classic" RSPs except when operating near their full capacity.

Secondary Treatment: The secondary system did not nitrify. 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). Three of four aeration tanks were in service; AT1 was out of service for repairs to its aeration/diffuser system. The secondary system's solids retention time (SRT) was usually 3.5-4 days with the MLSS concentration of 2200-2700 mg/L. The RAS return rate was always 40% of the secondary influent flow. Aeration tank air use averaged 64 million-ft^3/day, ranging from 55 to 77 million-ft^3/day. Air use increased slightly from June to August primarily due to increased water temperature, with a small impact from the additional Brightwater flows. Biomass settling characteristics were good; the sludge volume index (SVI) ranged from 115 to 170 mL/g (<120 mL/g is highly desirable).

Nitrogen (N) removal averaged 29% and phosphorus (P) removal averaged 59%. Effluent NH_3-N averaged 48-mg/L, effluent NO_2+NO_3 averaged <0.2-mg/L as N, and effluent total-P averaged 3.9-mg/L. The effluent NH_3-N load was similar to recent months, averaging 24,814-lbs/day. Effluent pH was usually pH 7.0-7.2 and effluent alkalinity was usually 270-300 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, though effluent P levels were higher than usual with an active PAO biomass.

Disinfection: 39,460 gallons of 12.5% sodium hypochlorite (NaOCl) were used to disinfect STP's final effluent in August. This resulted in an average dose of 2.5-mg/L as Cl_2 based on effluent flow. Daily hypochlorite use was usually in the 1100-1400 gpd range. Historically, the Cl_2 disinfection dose has been 1.5-2.0 mg/L during winter 2.0-3.0 mg/L in the summer.

Both the South and North chlorine contact channels (CCC) was 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.

NaOCl was frequently added to the influent for odor control (due to high H_2S inlet levels). 15,281-gallons of 12.5% NaOCl was added on 21-days, resulting in an average of 728-gpd. Also, about 10-mgd of chlorinated secondary effluent was recirculated into the plant influent during Aug. 17 – 24 to reduce inlet H_2S levels. The calculations of STP's % TSS and BOD removals were adjusted to account for this recycle flow.

DAFT: An average of 85 dry tons/day of thickened raw sludge (THS) were fed to the digesters. It's estimated that West Point thickened sludge accounted for 3% of the monthly average. THS flow averaged 0.37-mgd with a solids concentration of 6.2% TS. All six DAFTs, both large DAFTs (5&6) and the four small DAFTs (1-4), were in service all month. 14,850-lbs/month of polymer were added to 170-dry tons/day of DAFT feed sludge for an average polymer dose of 2.8-lb active/dry ton feed. Polydyne polymer WE-1531 was used in August.

Anaerobic Digestion: Time and temperature requirements for Class B biosolids were met via the digesters. Volatile solids (VS) and total solids (TS) reductions averaged 61.2% and 53%, respectively. Average detention time was 27-days, 3-days of which were provided by Digester 5. Digester temperatures were held in the 94-100°F range. The VS/TS content entering and leaving the digesters averaged 86.9% and 72.0%, respectively. Digester alkalinity levels were usually in the 6700-7500 mg/L range. All primary digesters were operating in parallel and fed equal amounts of THS. The digester VS loading rate averaged 0.15-lbs./day. Digester 2 remained out of service so its cover can be recoated. The gas and pumped mixing systems for all digesters operated in a "normal" mode.

Dewatering/Biosolids: 6883-wet tons of biosolids (1422-dry tons) were beneficially reused in August. 71% of all dry tons (4561 wet tons @ 22.2%TS) were applied to Eastern WA agricultural sites. 29% of dry tons (2322 wet tons @ 17.6%TS) were hauled to Western WA forest sites. Digested sludge production was closer to 1435-dry tons since STP's digester inventory increased by about 13 dry tons in August. The amount of biosolids hauled in August was about 150-250 dry tons greater usual because most of Digester 2's content was dewatered, hauled and beneficially reused in August.

A total of 68,853 lbs.-active polymer was applied for dewatering, resulting in an average polymer dose of 48.4 lb.-active/dry ton hauled. The applied polymer was Polydyne WE586, a 41.5% cationic emulsion solution. Centrifuge feed rates were 145-150 gpm to produce biosolids for Eastern WA. sites and 180-gpm for Western WA. sites. Dewatering operated every day in August.