



King County

Wastewater Treatment Division

Department of Natural Resources and Parks

Wastewater Treatment Division

South Treatment Plant

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<http://www.kingcounty.gov/environment/wtd.aspx>

September 19, 2017

Shawn McKone

Washington State Department of Ecology

NRWO Water Quality Program

3190 160th Avenue Southeast

Bellevue, Washington 98008-5452

Dear Mr. McKone:

Attached is the August 2017 monthly NPDES performance report for the Brightwater Treatment Plant (Permit No. WA0032247). The Phase I Initial Condition Plant Monitoring Report and a four page memo are included that summarize performance and operational conditions. All effluent quality permit conditions were met in August. All permit-required samples were collected and analyzed in August. Effluent flow averaged 11.3-mgd with an average effluent quality of <1.4-mg/L BOD and <2.0-mg/L TSS.

If you have any questions about these submittals, please feel free to contact me at 206-263-1751.

Sincerely,

Richard Butler

Process Control Supervisor

Attachments

cc: Mark Isaacson, Director, Wastewater Treatment Division (WTD),
Department of Natural Resources and Parks (DNRP)
Bruce Kessler, Deputy Director, WTD, DNRP
Despina Strong, Environmental Programs Manager, WTD, DNRP
Jeff Lafer, Project Manager, WTD, DNRP

Memorandum

September 19, 2017

TO: Historical Memo

FROM: Carol Nelson
Peter Carter

SUBJECT: Brightwater Treatment Plant
August 2017 Operating Record

All discharge permit requirements were met in August at the Brightwater Treatment Plant (BWTP). Effluent BOD and TSS averaged <1.4-mg/L and <2.0-mg/L, respectively, and removals were both > 99%. The monthly and maximum geomeans for Fecal Coliform results were both less than 1-cfu/100-mL. Effluent pH was maintained between 6.8 and 7.2. Continuous dosing of caustic soda (25% NaOH solution) was required to assure permit compliance. All wastewater received secondary membrane filtration.

Effluent flow to Puget Sound averaged 11.3-MGD while raw sewage flow from the BWTP service area averaged 15.3-mgd. An average of 3.3-MGD and 0.2-MGD of raw sewage was redirected to South Plant and West Point, respectively, because one aeration basin was out of service for repairs. In addition, 0.51-MGD of reclaimed water (RW) on average was distributed offsite and 0.04-MGD RW on average was sent to South Plant (via York P.S.) as part of BWTP's RW control system.

Influent flow averaged 12.6-MGD. Influent flow was restricted to no more than 14-MGD because one aeration basin was out of service. An average of approximately 0.5-MGD of effluent was also recirculated to the influent pump station (IPS).

Warm, dry weather continued in August. Rainfall totaled 0.12-inches this month (local rain gauges). Rainfall at SeaTac Airport was recorded as 0.02 inches, 0.86-inches below normal.

All permit-required samples were collected. Test results for the influent samples from August 22, 23 and 31 were rejected because the samples were not representative, e.g., unusually low TSS values which is often the result of a plugged sampling system. The influent sampler is checked and back-flushed on a routine basis.

Influent Pumping: Influent flow was restricted to 14-MGD or less to accommodate work in the aeration basins. This required a fairly consistent flow to the IPS. The North Creek Connector Gate was throttled to provide that consistent flow during most of the month. "Excess" flow was then sent to the North Creek P.S. and on to South Plant via the York P.S. For the last week, the Hollywood Diversion Structure was used to send "excess" flow directly to the York P.S. During the higher flow periods of the day, the lower Swamp Creek flows were directed to West Point. During low-flow periods of the day, RW was recirculated to the IPS to operate the raw sewage pumps continuously (requires flows of 12-MGD or greater), and to supply pump station processes. During extended periods of low flow, grease began to accumulate at the influent screens and in the wet well. The influent screen channels will require cleaning in September.

Primary Treatment: Three of the five primary clarifiers were in service most of the month. Primary Clarifiers No. 1 and Primary Clarifier No. 3 were out of service for process reasons.

Staff continued to clean the primary effluent screens once a month. Staff continued to troubleshoot electrical trips for the grit pumps.

Secondary Treatment: Two of the three aeration basins (AB) were in service all month. AB1 was out of service until August 24 while aeration piping was replaced and sprays for the scum and foam control were installed. On August 25, AB1 returned to service and AB2 was taken out of service for similar work. The new aeration-piping should be more resistant to the high temperatures generated by the aeration blowers. Similar work will be completed on AB3; work on all three ABs should be completed by early October.

The mixed liquor suspended solids (MLSS) and mean cell residence time (MCRT) averaged near 3700-mg/L and 14-days, respectively, in August. The lower MLSS concentration helped to maintain sufficient D.O. for complete nitrification, e.g., the D.O. in the second aerated zones was >1-mg/L during the entire month. Lower MLSS and lower MCRT are also associated with poorer filterability. However, maintaining good filterability was a lower priority this month because of the low flows.

Full nitrification was achieved all month, while denitrification was incomplete. Effluent ammonia-nitrogen ($\text{NH}_3\text{-N}$) averaged <0.1-mg/L while nitrite/nitrate ($\text{NO}_2\text{+NO}_3$) averaged 37-mg/L as N. Total-N removal only averaged 27%. Influent TKN concentrations continued to be high, averaging 59-mg/L.

High and continuous doses of caustic soda to the secondary process were required to ensure minimum effluent pH permit conditions were continuously met, and to achieve complete nitrification. The caustic soda dose averaged 4760-gallons per day of 25% NaOH solution or 377 gallons/MG of influent. Influent alkalinity in August was similar to July's, averaging 209-mg/L as CaCO_3 .

MLSS filterability was adequate for August flows. Membrane capacity ranged from 30 to 36 MGD this month. The maximum flux was 14-gfd (i.e., gallons per day per square foot of membrane surface) to start the month and near 12-gfd at the end. The table below shows the variations in trans-membrane pressure (TMP), membrane permeability, and MCRT over the month. The design instantaneous peak hourly flow rating for one membrane train is 4950-gpm.

Parameter	Aug 7	Aug 14	Aug 21	Aug 28
TMP before backpulse, average psi	0.7	0.8	0.9	1.0
TMP before backpulse, peak flow test, psi	8.0	8	8	8
Permeability temperature-corrected ¹ , gfd/psi	1.6	1.5	1.4	1.4
Flow target for peak flow test, gpm	4950	4950	4950	4950
Flow average during peak flow test, gpm	3117	2981	2775	2705
ME temperature, degrees F	71.5	71.9	71.8	72.1
MLSS, mg/l	3506	3287	3900	3613
MCRT, days	6.5	20.4	12.6	16.6

¹ Temperature-corrected Permeability based on Peak Flow Test.

Effluent turbidity of membrane trains ranged from 0.05-NTU to 0.07-NTU. The membranes were primarily in "relax" mode during the first week and "backpulse" mode during the rest of the month. Membrane air scour operated in 10-sec ON/30-sec OFF mode during most of the month; 10s/10s mode was used during peak flow tests. Approximately 3115-gallons of 12.5% sodium hypochlorite (NaOCl) were used for weekly maintenance cleans this month.

Disinfection: 13,625 gallons of NaOCl was used for final effluent disinfection, reclaimed water disinfection, and process water at IPS. This is equal to an average dose of 4.7-mg/L as Cl_2

based on effluent flow (i.e., recirculated and Puget Sound bound). Hypochlorite was applied through the backup diffuser since the "water champ" mixer was out of service. Effluent Cl_2 residual at the outfall (aka Point Wells) met both the monthly and max-weekly permit limits. The monthly average and maximum weekly residuals were $<0.05\text{-mg/L Cl}_2$.

Thickening: Thickening performed well in August. All three gravity belt thickeners (GBTs) were rotated in service this month. The GBTs thickened feed sludge from an average of 1.3% total solids (TS) to 5.4% TS, with an average solids capture of 90%. Thickened sludge production totaled 601 dry tons. The polymer dose for thickening averaged 11.8 pounds active polymer per dry tons solids processed.

Anaerobic Digestion: The digestion process met time and temperature requirements for Class B biosolids production. All three Digesters and the blended storage tank were in service in August. In the active digesters, the solids retention time averaged 47-days, temperature averaged 99°F , and volatile solids (VS) destruction averaged 61.7%. TS concentration in the active digesters averaged 2.54% with a volatile solids (VS) fraction of 80.2 % VS/TS. The digester VS load averaged 0.065 lbs.-VS/cu-ft./d. Monthly gas production is estimated to be 9.7 million ft^3 (based on an estimated 304 tons of VS destroyed).

Dewatering/Biosolids: 1121 wet tons of biosolids (217 dry tons at 19.4% TS) were produced and 1271 wet tons (246 dry tons) were hauled in August. Solids recovery in the dewatering process averaged 91.9%. Polymer dosage averaged 62.6 lbs.-active per dry ton processed. Dewatering operated 29 days in August using both Centrifuges No. 1 and No.3. Centrifuge feed quality averaged 2.39% TS at 79.5% VS/TS. Centrifuge 1 biosolids averaged 19.4% TS at 82.2% VS/TS. Centrifuge 3 biosolids averaged 19.1% TS at 82.5% VS/TS. The dewatering strategy generally continues to be: operate mostly during day shift and only one centrifuge at a time to avoid sending a large ammonia return load to the secondary process (via the centrate).