

Back River Wastewater Treatment Plant (WWTP) Progress Report July 8, 2022

Treatment Plant Overview

One of the primary concerns is the processing and management of biosolids and the removal of solids from process equipment. Sludge is now being sent to the Baltimore City Department of Public Works (DPW)-managed Quarantine Road Landfill, which has opened up a new source of disposal, and the Maryland Environmental Service (MES) has helped accelerate the timeline of certain projects to clean Primary Settling Tanks (PSTs).

Primary Treatment

- The PSTs allow the solid material within the wastewater to be easily separated by settling to the bottom or floating to the surface for removal.
 - Schedule:
 - Currently, only two PSTs (#8 & #11) of the 11 are functioning.
 - **Two more PSTs (#1 & #7) are on schedule to be online by August 2022.**
 - MES has cleaned PST #7 and parts are being ordered for PST #1.
 - Two PSTs (#2 & #9) are expected to be online by January 2023.
 - One PST (#10) is expected to be online by April 2023.
 - Two PSTs (#3 & #4) are expected to be online by August 2023.
 - Completion dates for two PSTs (#5 & #6) are to be determined.

Secondary Treatment

- Biological Treatment Activated Sludge.
 - **Newly constructed Activated Sludge Plant #4 is online and performing satisfactorily**
 - The facility is sending 50 to 60% of the flow through the Activator #4 system due to better treatment performance and efficacy.
 - This will allow DPW to take the poor-performing reactors in Activator #2 and #3 offline for maintenance and repair.
 - . Once completed, this project will improve nitrogen removal and lower solids concentrations in the biological reactors
- Secondary Clarifiers
 - There are 36 secondary clarifiers.
 - Twelve are associated with Activated Sludge Plant #4, which was just put into service
- A third-party engineering assessment determined that the **Return Activated Sludge (RAS) pumps and wasting pumps require replacement.** RAS pump failure would cause poor performance of the biological reactors and wasting pump failure would prevent the wasting of sludge, which would cause a buildup of solids in the treatment system.
 - Certain RAS and sludge pumps are being evaluated and repaired in the Activated Sludge Plant #3, and two other pumps are on order.

Tertiary Treatment

- Denitrification Filters (DNFs)
 - The facility has 52 DNFs designed to achieve effluent nitrogen concentrations at or below 3 milligrams per liter (mg/l) total nitrogen.
 - **The Back River WWTP is experiencing problems with the DNFs due to excess solids.** The solids are clogging the filter media causing many of the filters to either not function properly or not function at all. In addition, there are mechanical and control system problems that have to be repaired. DPW has engaged ProStart Inc. to manage and operate the DNF system.
 - MES has performed an evaluation of malfunctioning level transducers and control units, and there are plans for more comprehensive evaluations of the DNF system once equipment needs are confirmed.
 - Once completed, the filters can be back washed frequently to remove solids.
- Sand Filters
 - The treatment system has 48 sand filters. Currently, 26 are functioning sand filters, and **22 are not functioning** due to various equipment failures, insufficient sand and mechanical issues.
 - MES is in the process of evaluating the sand filters and their mechanics are replacing and repairing components.
 - There are 10 pumps for the sand filters on order.
 - The June 30 and July 6, 2022 daily reports from MES stated that repairs to Sand Filters #11 and #29 have been completed and the sand filters have been placed back into service.
 - Repairs to sand filters #17, #19, #42, #31 and #14 are underway.

Biosolids Management

- Dewatering. Sludge dewatering is handled through a centrifuge.
 - **Two of four centrifuges are currently operational.**
 - Centrifuge #3 is out for rehabilitation and the other centrifuge is being scavenged for parts (to keep the two centrifuges in operation).
 - A minimum of two centrifuges are required to meet the current average conditions. Reliability and redundancy of centrifuges are necessary to perform dewatering operations. Equipment such as the centrifuge feed pumps, flushing water booster system, and Centrate pumps have operational problems that need to be addressed. The polymer system in the dewatering building is in need of replacement.
 - The July 5, 2022 daily report from MES stated that Centrifuges #1 and #2 are in service.
 - Trucks are transporting sludge to the Veolia compost facility.
- Gravity Belt Thickeners (GBTs)
 - There are a total of eight GBTs.
 - At the current average daily flow conditions, six GBTs are required.
 - **Currently, only four GBTs are in working condition, the remaining four GBTs have missing parts, instrumentation issues, and motor issues.**
 - The June 30, 2022 MES report stated that repairs to the GBT #6 were completed and the GBT Belt #6 was placed back into service.

- Gravity Sludge Thickeners
 - There are six Gravity Sludge Thickeners (GSTs).
 - At the current design average flow of 130 MGD one GST is required.
 - Two GSTs are fully operational.
 - The remainder can feed flow and draw solids, but the gravity thickening mechanism is not functional. DPW should achieve reliability and redundancy on GST operation in conjunction with the primary settling tanks brought online.
 - GST#2B is back in service while GST #6 is empty and being repaired.
 - Synagro is contracted to evaluate the three centrifuges owned by DPW.
 - Synagro's pelletizer is back online and processing 36.69 tons/day.

Staffing

- DPW is in process of hiring over 10 maintenance employees.
 - Applicants will be hired on a temporary basis pending job performance evaluations.
 - MES' June 28, 2022 daily report states that MES met with DPW supervisors to discuss equipment status. DPW reviewed staff roles and stressed the necessity for communication, teamwork, and cooperation between MES and DPW

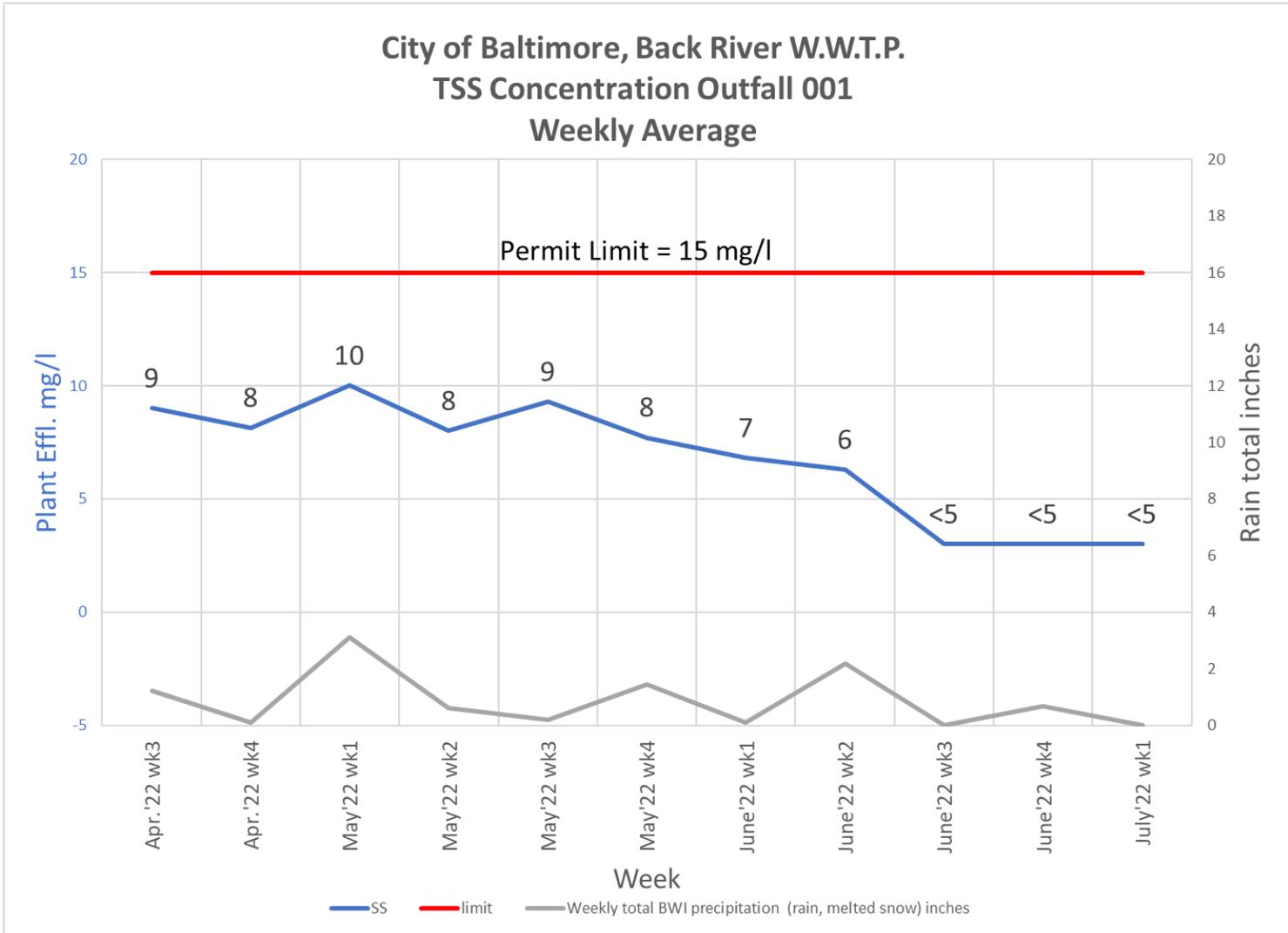
Monitoring Results

- The analytical data demonstrates that there has been **some measured steady progress** made in getting the Back River WWTP into compliance with its discharge permit.
 - The Total Suspended Solids (TSS) concentration has been a factor in creating high nutrient concentrations.
 - Data from April and May 2022 show that the average TSS concentration at discharge point Outfall 001 is 9 mg/L compared to 21 mg/L for January 2022, and 17.5 mg/L for February 2022, and 14.2 mg/L for March 2022.
 - Data indicates progress toward the goal of removing the clogging solids from the treatment system.

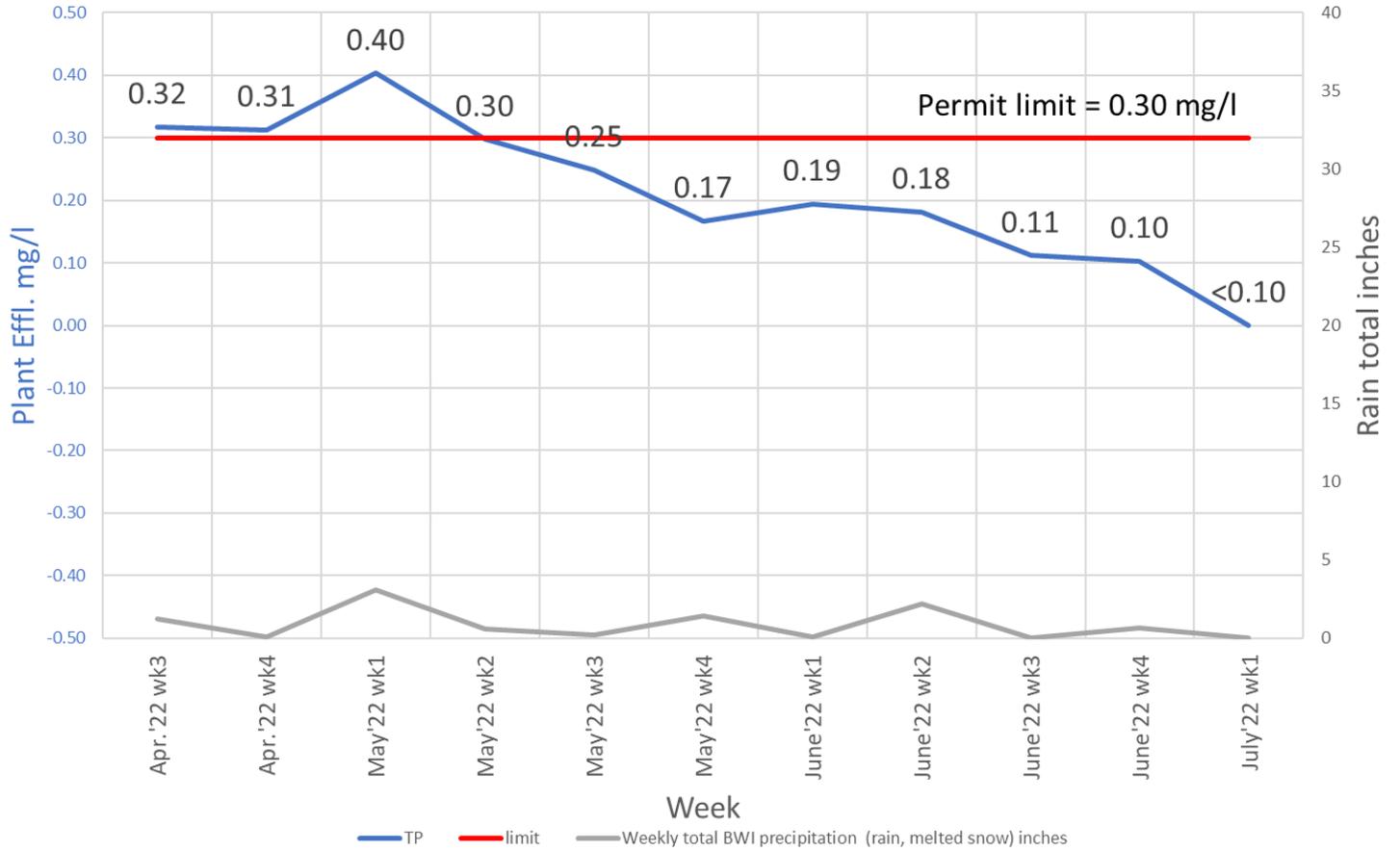
Final Effluent Analytical Results

- The results of recent effluent monitoring by the Maryland Department of the Environment **show significant improvements in the quality** of the final effluent.
 - All three indicating parameters (TSS; total phosphorus; and total nitrogen) are **below permit limits**. See the graphs below:

Graphs Showing Final Effluent Concentrations and Loading Performance for 2022



City of Baltimore, Back River W.W.T.P. T.P. Concentration Outfall 001 Weekly Average



**City of Baltimore, Back River W.W.T.P.
T.N. Concentration Outfall 001
Weekly Average**

