Back River Wastewater Treatment Plant (WWTP) Progress Report: June update

July 2023

Note: If you would like additional information on Back River, please go to the Maryland Department of the Environment's (Department) Back River website that includes inspection reports, previous progress reports, previous sampling results, and previous legal actions.

Treatment Plant Overview

- One of the primary concerns at the WWTP is the processing and management of biosolids and the removal of solids from process equipment. The efficacious removal of biosolids is essential to maintaining total nitrogen (TN) and phosphorus (P) effluent concentrations within permit limitations. In addition to the solids that are generated daily, any buildup of solids within the treatment system must be removed.
- The Maryland Environmental Service (MES) has helped accelerate the timeline of certain maintenance and repair projects at Back River to get process operations functioning to the desired levels.
    - Note: MES is limited in their presence at the Back River WWTP; MES is currently finishing projects previously assigned under contract.

Primary Treatment

- The primary settling tanks (PSTs) allow the solid material within the wastewater to be easily separated by settling to the bottom or floating to the surface for removal.
    - Currently, 4 PSTs (#1, #7, #8, and #11) of the 11 PSTs are functioning as designed.
        - For PST #3, the concrete repairs are scheduled to be completed in September 2023 with the parts and equipment for the repairs onsite. The estimated date to complete the project is November 2023.
        - With regards to PST #4, concrete repairs, including effluent channel repairs and coating, are to be completed in September 2023. The parts and equipment necessary to complete the repairs are scheduled to be delivered in July 2023. PST #4 is estimated to be operational by January 2024.
        - PST #5 has been cleaned and the necessary parts to get the unit back online have been ordered. Once the parts have been received, a timeline for getting this PST back online can be determined. However, the estimated time frame is Fall 2023. PST #5 is currently being used as a flow through.
        - PST #6 cleaning is being delayed until the odor masking system is received.
            - As of August 19, 2022, the contractor is adding wood chips to the sludge as a bulking material to reduce/eliminate odors.
                - There has not been concerns with PST #6, but there was a recent odor complaint investigated on June 21, 2023. Odor was coming off near PSTs 8-11.
                - Baltimore City submitted their odor control plan on June 30, 2023.
        - PST #9 has been drained and an assessment has determined that the skimmer arm is bent, and the rake arm is not oriented properly. Repairs to PST #9 were delayed due to additional work required to get PST #7 back online. Concrete repairs and mechanical repairs, including the installation of a Westech drive, are now being scheduled for PST #9. PST #9 is now scheduled to be in service sometime in July 2023.
        - PST #10 is expected to be online by September 2023, and two PSTs (#3 and #4) are expected to be online by November 2023 and January 2024.

Secondary Treatment

Biological Treatment Activated Sludge

- There are 3 activated sludge plants to reduce organic material and solids.
- Newly constructed Activated Sludge Plant #4 is online, and all reactors and clarifiers are online.
    - The facility is sending 50-60% of the flow through Activator #4 due to better treatment performance and efficacy.
    - DPW has plans soon to take the older activator plants offline - one at a time - to remove the accumulation of solids from the tanks and perform maintenance and equipment repairs.

- DO probes for biological reactors are still not functional. DO equipment is expected to arrive in August 2023.

Secondary Clarifiers

- Each Activated Sludge Plant #2, #3, and #4 has 12 secondary clarifiers, with a total of 36 secondary clarifiers.
  - 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 cause a buildup of solids in the treatment system.
  - RAS and sludge pumps are being evaluated and repaired in the Activated Sludge Plant #3, and two pumps are on order.
- The secondary clarifiers #5B, #7A, #16A, and #16B associated with Activated Sludge Plant #2 are not in service.
- Secondary clarifier #12B associated with Activated Sludge Plant #3 are not in service.
- A third-party contractor is cleaning and removing the vegetation from the secondary clarifiers and affected reactors. The vegetation was removed from all secondary clarifiers as of 6/14/2023.
  - The sludge blankets on the secondary clarifiers have gone from 10 to 2 feet, which signifies a reduction in the amount of solids within the secondary treatment phase.
- MES installed a scum arm scraper plate and placed clarifiers #13A and #16A back into service.
  - Clarifier #13A operates in manual mode.
- MES installed a scum pump motor and placed secondary clarifier #11A back into service.
  - Clarifier #11A operates in manual mode.
- Maintenance issues regarding algae/vegetation growth of 7 secondary clarifiers were observed.

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) TN. Currently, all 51 of 52 filters are in, or available for, service.
  - Parts were ordered for a repair of an air valve for filter #11.

Sand Filters

- DPWs Sand Filter Operational Status report dated March 20, 2023, identifies 32 sand filters in service (#1-5, #7-17, #19-21, #23, #25-32, #38, #39, #41, and #43,).
  - Sand filters (#24, #37, #42, #46, and #47) are scheduled to be returned into service in late 2024 with repairs to be completed under a capital improvement rehabilitation project.
  - Sand filters #6 and #18 have wash water pump issues that have delayed repairs. These filters are expected to be back in service sometime in June 2023.
  - Sand filters #36 is scheduled to be in service by March 2023, and sand filters #33-35, #40, and #44 are scheduled to be in service by July 2023.
- No specific violations were found on the June 14 inspection.

Biosolids Management

- Back River WWTP has 4 centrifuges for dewatering of the biosolids and 3 of the 4 centrifuges are operational as described below. However, there have been issues with the polymer pumps and now the polymer system requires calibration for efficient operation. According to the plant manager, arrangements have been made to recalibrate the system.
  - Centrifuges #1 and #3 have been in use before the explosion and are functional.
  - Centrifuge #2 has a wire problem; however, according to the Plant Manager, #2, can still function. Parts are now on order for #2.
  - Centrifuge #4 requires further evaluation and parts before it will be functional.
- Three temporary centrifuges have been installed outside of the centrifuge building to process the additional solids.
- Equipment, such as the centrifuge feed pumps, flushing water booster system, and centrate pumps, have operational problems that need to be addressed.
- Only two of the eight polymer pumps used for polymer addition are functional. The other six need to be replaced.
- The Department is now awaiting the submission of a Centrifuge Maintenance Plan, which was specified in previous inspection reports.
- The latest biosolids processing data reviewed on 3/22/23 show that the centrifuges operated by the Back River WWTP are routinely processing 16 - 20 dry tons/day.
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Gravity Belt Thickeners

- There are 8 GBTs and currently there are 5 online (#3, #5, #6, #7, and #8). 6 GBTs are needed for current flows and 7 for design capacity.

Gravity Sludge Thickeners

- There are six Gravity Sludge Thickeners (GSTs). At the current design with the average flow of 130 million gallons per day (MGD), only one GST is required.
    - Three GSTs are fully operational. (#1, #3 and #5)
    - The remaining GST's 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 PSTs brought online.

Staffing

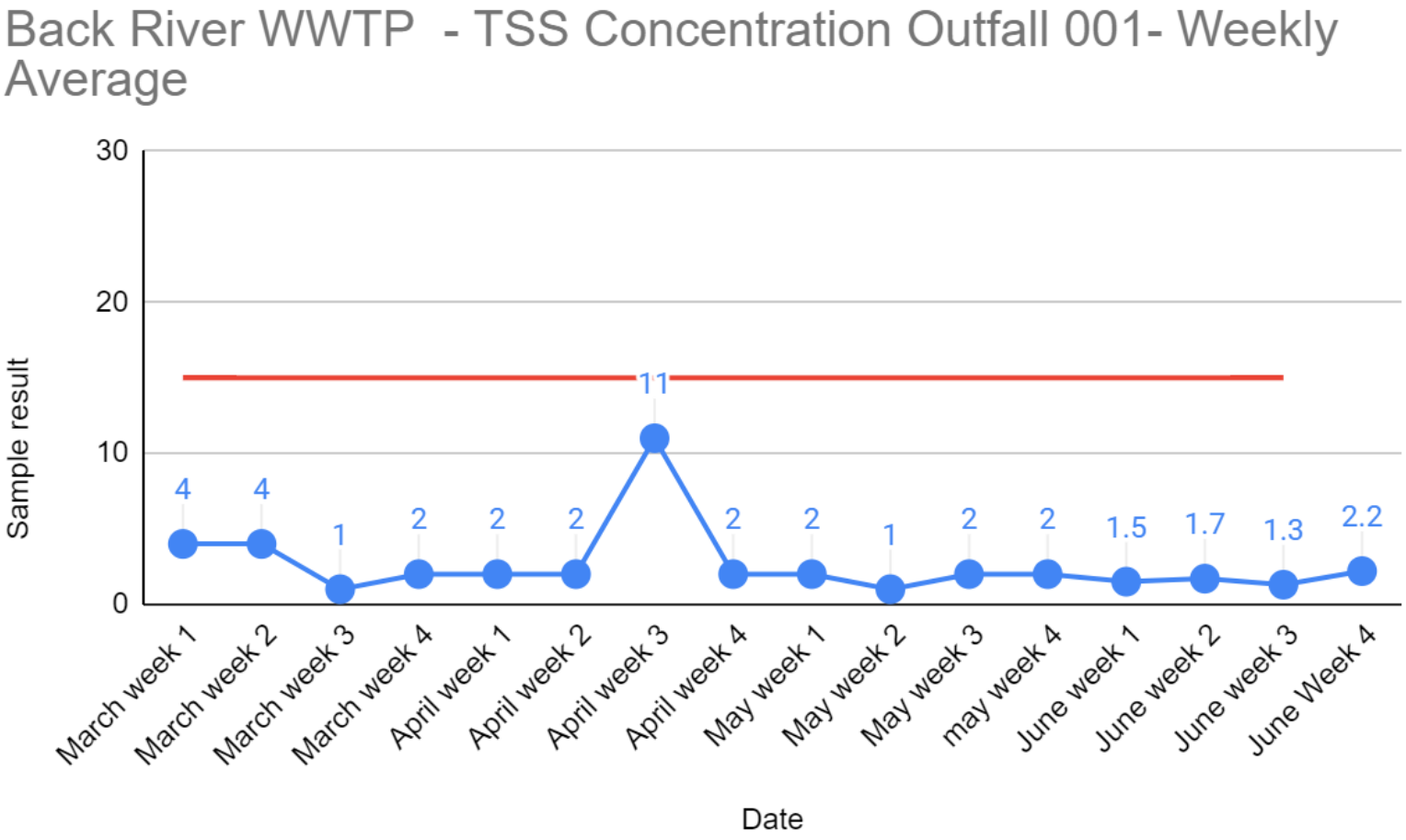
- DPW reviewed staff roles and stressed the necessity for communication, teamwork, and cooperation between Contractors and DPW.
    - DPW is in the process of hiring additional maintenance technicians.
    - The City's latest monthly report states that the city is advancing their efforts to utilize idle staff time and improve efficiency of operations. In December 2022, the city reported 96 total vacancies (44 operators and 52 maintenance staff).
    - The Department has requested that the Back River WWTP submit a staffing plan to assess and address current and future staffing requirements. As of June 2023, the Department has not received this plan to date.

Monitoring Results

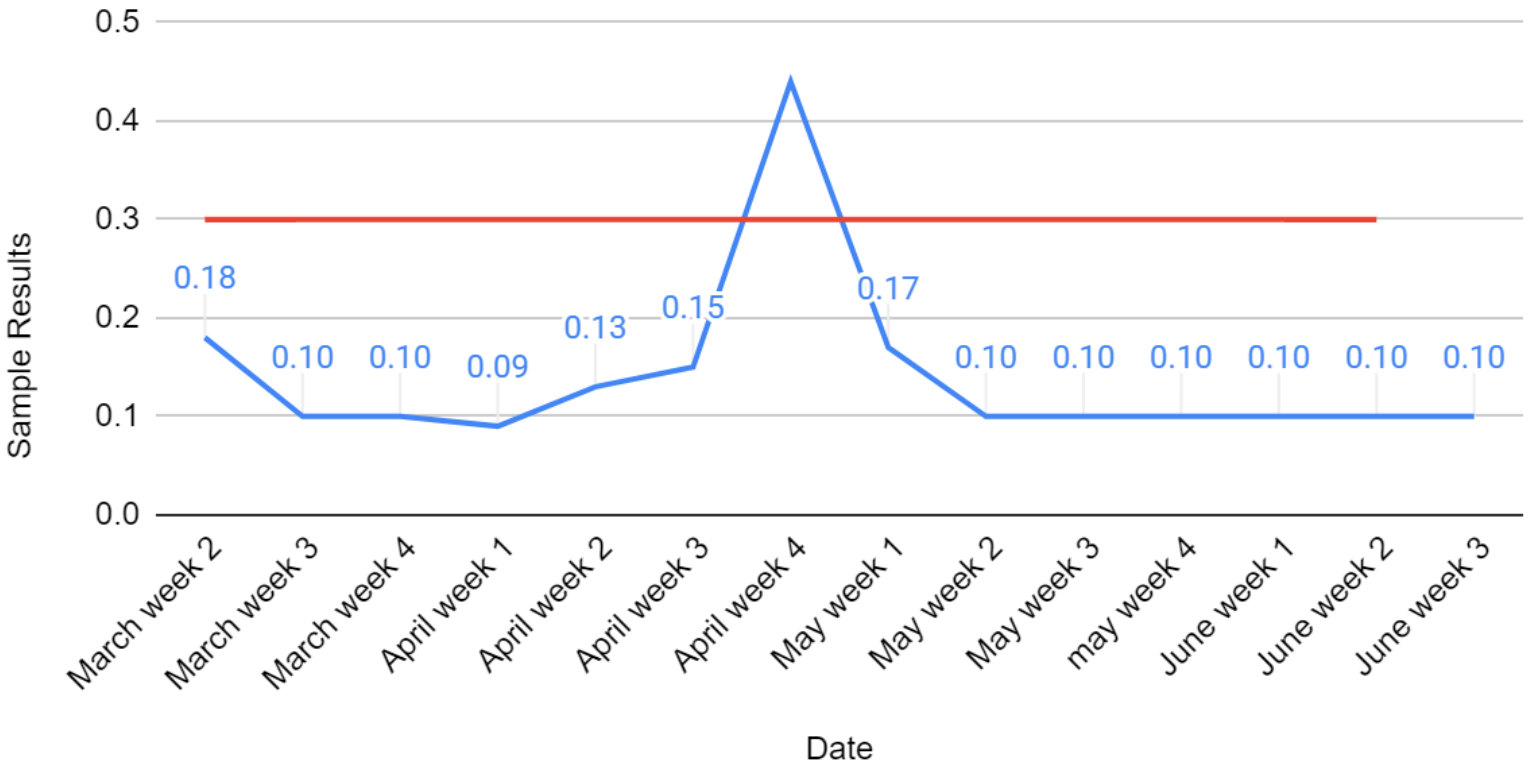
- The analytical data demonstrates that there has been some measured progress made toward getting Back River into compliance with its discharge effluent permit limits.
- No violations of Total Phosphorus for June 2023. Total nitrogen levels are below ENR benchmarks of 4.0 mg/l.
- The Total Suspended Solids (TSS) concentration has been a factor in creating high nutrient concentrations.
    - For June, the weekly TSS concentration at discharge point Outfall 001 were 1.5 mg/l, 1.7 mg/l, 1.3 mg/l, and 2.2 mg/l, with an average of 1.675.
        - The data compared to June 2022 last year (4 mg/l) indicates progress toward the goal of removing the accumulation of solids from the treatment system.

Note: The Department receives previous month's data at the end of every month.

Graphs Showing Reported Final Effluent Concentrations and Loading Performance

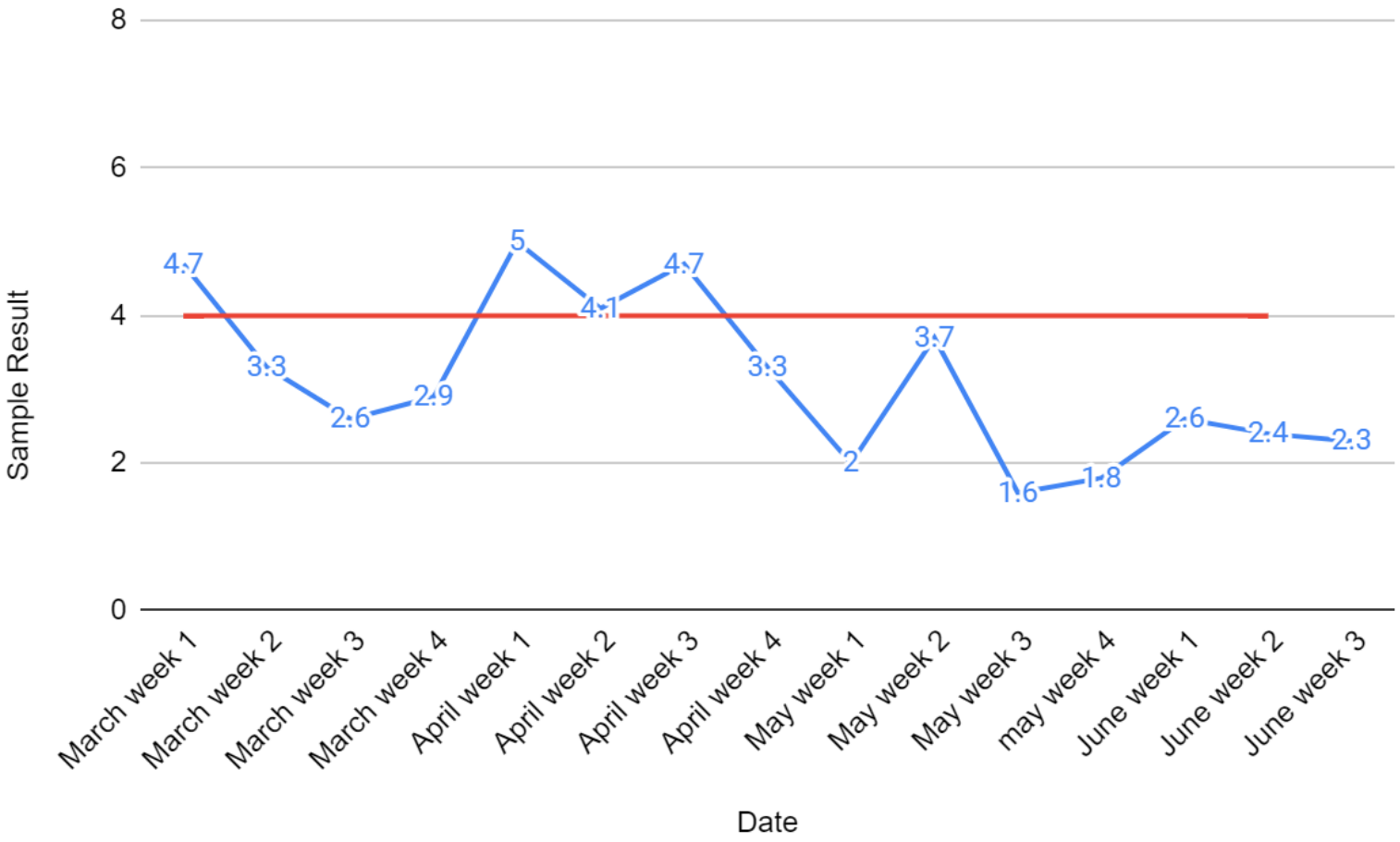


Back River WWTP TP Concentration Outfall 001 - Weekly Average



*TSS and TP concentrations elevated due to heavy rainfall of 1.73” on 4/29/23

Back River WWTP TN Concentration Outfall 001 Weekly Average



*4.0 mg/l Floating Cap is an ENR performance standard and not a permit limit.