Back River Wastewater Treatment Plant (WWTP) Progress Report
June 27, 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 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

- PSTs
    - 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.
    - **Currently, only two of the 11 PSTs are functioning.** MES has cleaned PST #7, and Baltimore City has issued contracts to clean five others. After cleaning, four of the PSTs will require various repairs.

- Current Status of PSTs:
    - PST #8 and PST #11 are currently working.
    - PST #9 and PST #10 are nonfunctional, but they are used as flow-through tanks for higher flows. There is minimal setting and no skimming in these PSTs. If flows exceed what the four PSTs can handle, the Headworks equalization tanks will be used to hold the incoming sewage and then metered into the influent channel.
        - **The expected dates to have PST #9 and PST #10 online are January 2023, and April 2023, respectively.**
    - PST #1 has been emptied with only a small amount of solids to be cleaned. The rakes, other parts, and equipment are working.
        - **PST #1 is scheduled to be online by August 2022.**
    - **PST #2 is scheduled to be cleaned by the end of August 2022, and back online by January 2023.**
    - PSTs #3 and PST #4 require equipment repairs.
        - **PSTs 3 and 4 are both scheduled to be online by August 2023.**
    - PST #5 and PST #6 are scheduled to be cleaned in the Fall of 2023 by a third-party contractor (Synagro), but **no scheduled completion date has been determined**.
    - The rakes are being fabricated for PST #7, and other parts are in order.
        - **PST #7 is scheduled to be online by August 2022.**

Secondary Treatment

- Biological Treatment Activated Sludge
    - **Newly constructed Activated Sludge Plant #4 is now online**.
        - Activator #4 is performing satisfactory and the mixed liquor concentration is in the target range of approximately 3,500 mixed liquor suspended solids. 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 Baltimore City Department of Public Works (DPW) to take the

poor performing reactors in Activator #2 and Activator #3 systems offline, one at a time, 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.
        - **The May 19, 2022 daily report from MES stated that some of the RAS and sludge pumps were 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 because of the problems with 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 backwashed frequently to remove the solids.

- Sand Filters
    - The treatment system has 26 functioning sand filters; **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.

Final Effluent

- **The analytical data has shown that there has been some measured progress made in getting the Back River WWTP into compliance with the discharge permit.**
    - The Total Suspended Solids (TSS) concentration has been a factor in creating high nutrient concentrations. Data fromApril 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.
        - **The data indicate progress toward the goal of removing the clogging solids from the treatment system.**

Biosolids Management

- Gravity sludge thickener #2 B is back in service. Gravity sludge thickener #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

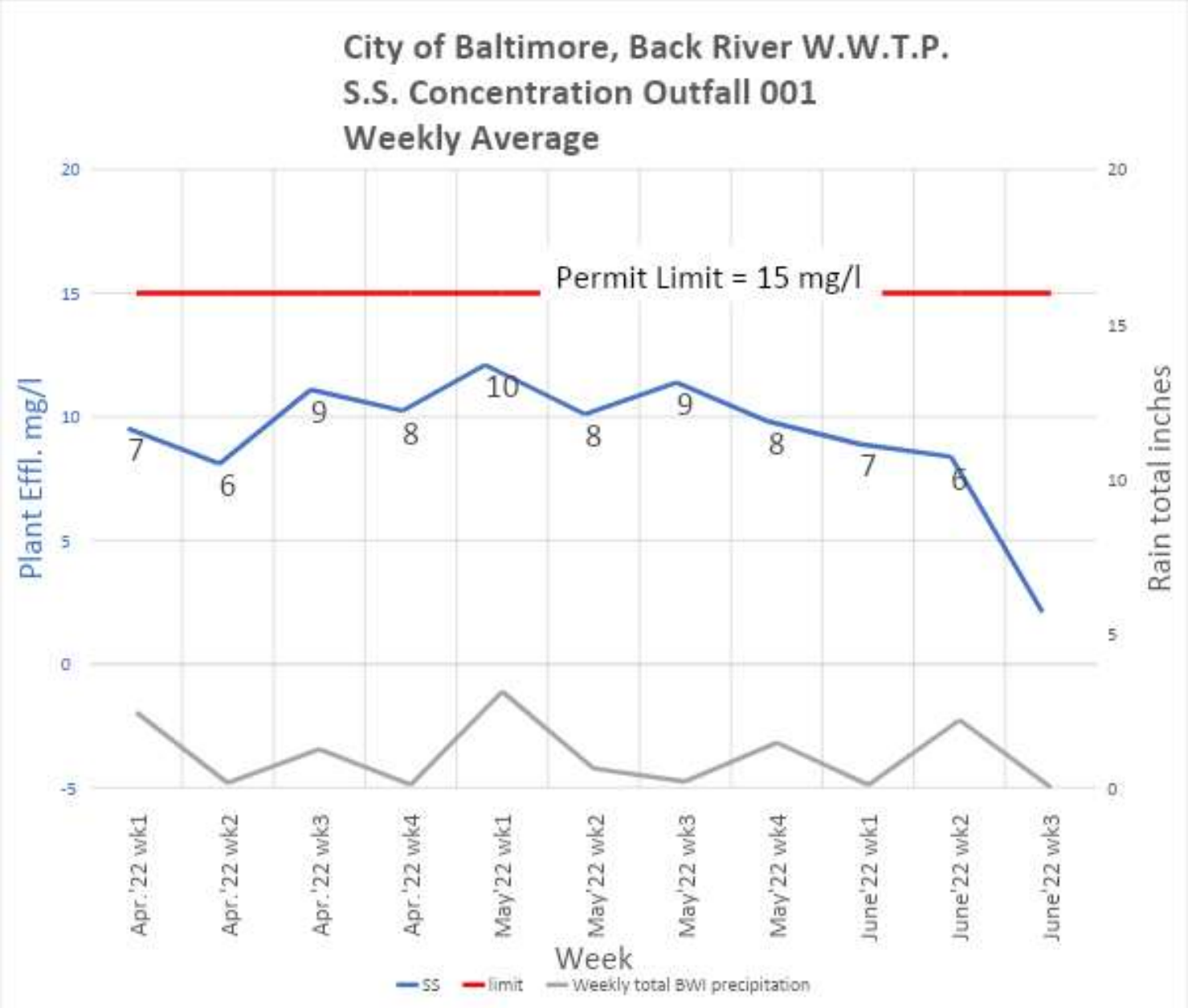
Staffing

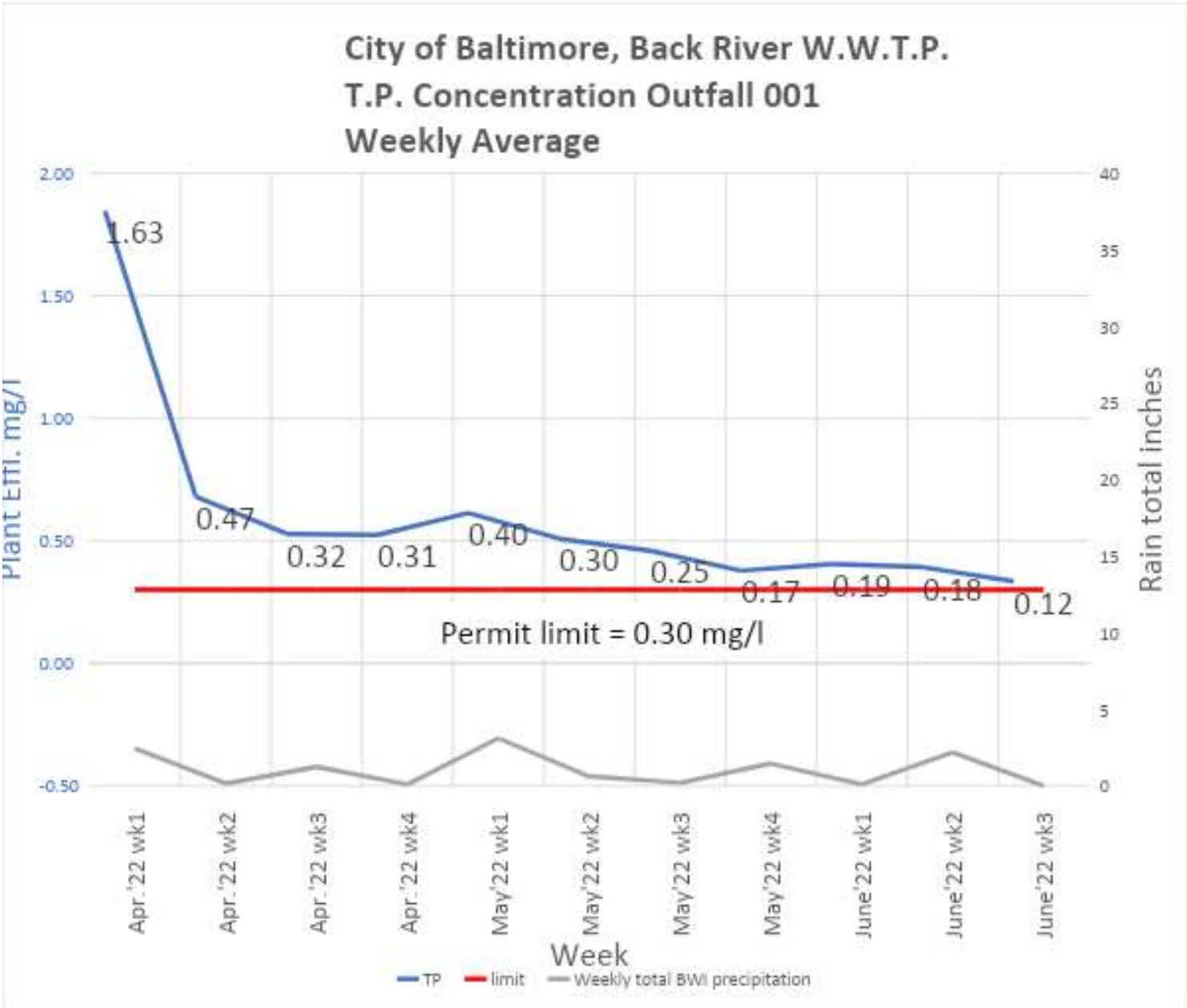
- **DPW is in process of hiring over 10 maintenance employees** to assist with routine maintenance.
    - Applicants will be hired on a temporary basis pending job performance evaluations.

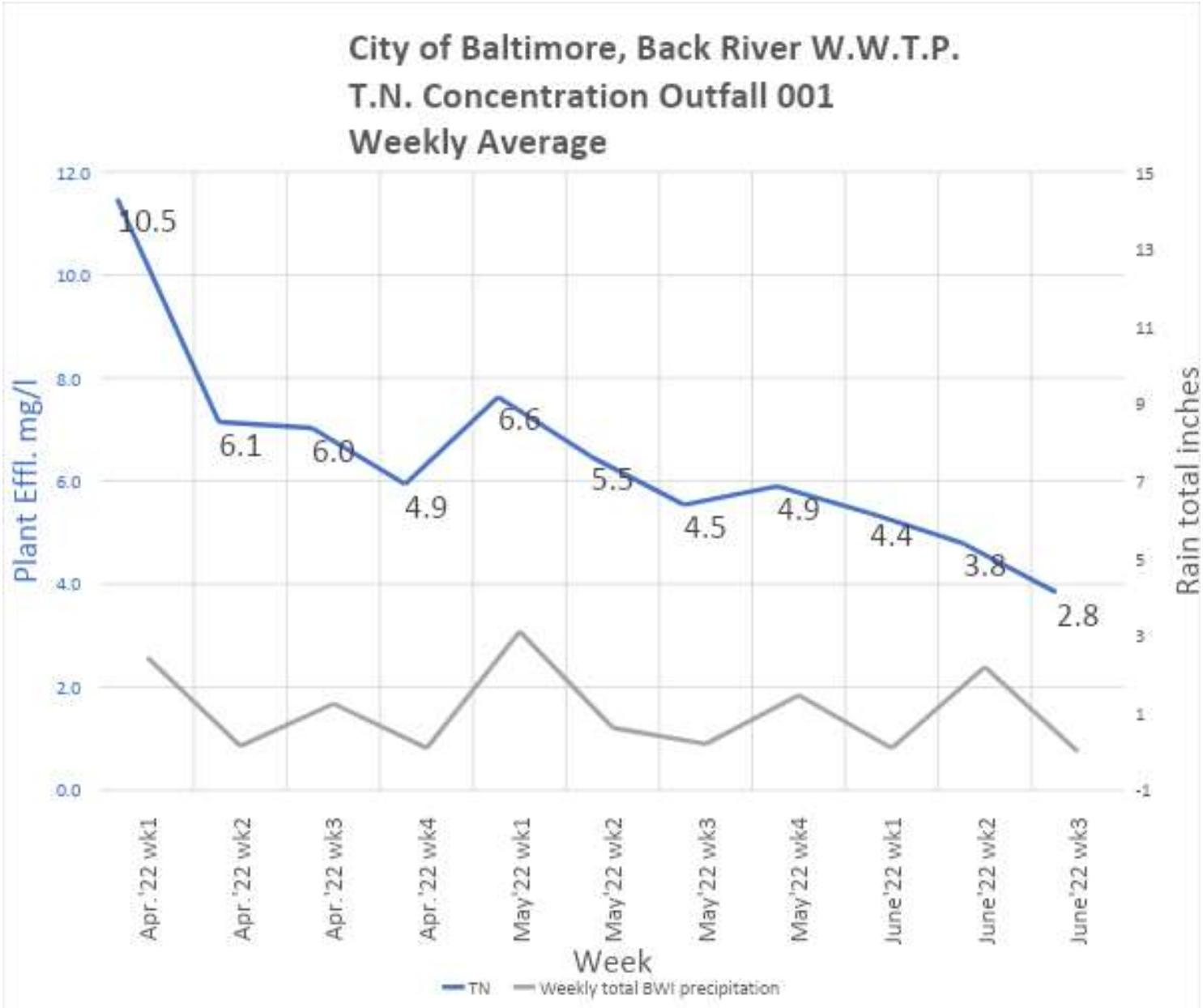
Final Effluent Analytical Results

- The results of recent effluent monitoring by the Maryland Department of the Environment (MDE) show **significant improvements in the quality of the final effluent.** See the chart 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
Plant Efft. mg/l
Rain total inches
2.00
1.50
1.00
0.50
0.00
-0.50
40
35
30
25
20
15
10
5
0
1.63
0.47
0.32
0.31
0.40
0.30
0.25
0.17
0.19
0.18
0.12
Permit limit = 0.30 mg/l
Apr.'22 wk1
Apr.'22 wk2
Apr.'22 wk3
Apr.'22 wk4
May'22 wk1
May'22 wk2
May'22 wk3
May'22 wk4
June'22 wk1
June'22 wk2
June'22 wk3
Week
TP
limit
Weekly total BWI precipitation


City of Baltimore, Back River W.W.T.P.
T.N. Concentration Outfall 001
Weekly Average
Plant Effl. mg/l
Rain total inches
12.0
10.0
8.0
6.0
4.0
2.0
0.0
15
13
11
9
7
5
3
1
-1
10.5
6.1
6.0
4.9
6.6
5.5
4.5
4.9
4.4
3.8
2.8
Apr.'22 wk1
Apr.'22 wk2
Apr.'22 wk3
Apr.'22 wk4
May'22 wk1
May'22 wk2
May'22 wk3
May'22 wk4
June'22 wk1
June'22 wk2
June'22 wk3
Week
TN
Weekly total BWI precipitation