



Maryland Department of Environment
Water and Science Administration
Compliance Program
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Inspector: Christopher Lepadatu
AI ID: 8449

Site Name: Back River WWTP
Facility Address: 8201 Eastern Ave, Baltimore, MD 21224
County: Baltimore County

Start Date/Time: December 20, 2023 09:30 AM
End Date /Time: December 20, 2023 11:30 AM
Media Type(s): NPDES Municipal Major Surface Water

Contact(s): Andrea Buie – Chief of ERCS, Baltimore City DPW
Scott Moffatt – Policy Analyst, Baltimore City DPW
Chris Kroen – Back River WWTP
Rayford McEachern – Back River WWTP

NPDES Municipal Major Surface Water

Permit / Approval Numbers: 15DP0581
NPDES Numbers: MD0021555
Inspection Reason: Follow-up
Site Status: Active
Compliance Status: Compliance
Site Condition: Additional Investigation Required
Recommended Action: Continue Routine Inspection
Evidence Collected: Photos or Videos Taken, Record Review, Visual Observation
Delivery Method: Email
Weather: Clear, Breezy, Good

Inspection Findings:

Introduction:

Back River Wastewater Treatment Plant (WWTP) is operated by Baltimore City DPW. Some areas of the WWTP are subcontracted and operated by ProStart. These areas include the Headworks, Denitrification Building, and Centrifuges. The facility is authorized to discharge treated effluent through Outfalls 001 and 002. Outfall 001 discharges to Back River, a designated Use II waterway. Use II waterways support estuarine and aquatic life and shellfish harvesting. Outfall 002 discharges to Tradepoint Atlantic who then discharge via three (3) outfalls under their industrial discharge permit (#05DP0064) to Bear Creek and the Patapsco River which is also designated as a Use II waterway. Final effluent discharge is split at a junction box and a large portion of the flow (up to 130.0 MGD) goes to Outfall 001 via a step cascading aeration system and the remaining portion (up to 50.0 MGD) goes to Outfall 002.

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The current permit has been administratively extended since it expired on April 30, 2023. A revised permit renewal application (#22DP0581) was received by MDE on May 26, 2023.

Back River WWTP is an activated sludge process sewage treatment plant with biological nutrient removal by Modified Ludzack-Ettinger process, ferric chloride for phosphorous removal, denitrification filters for enhanced nutrient removal (ENR), polishing sand filters, chlorination, and dichlorination.

On this day, I met with the individuals listed above for an opening conference followed by a site walk and closing conference.

Consent Decree:

As of November 2023, Baltimore City and the Department signed a Consent Decree, Case No. 24-C-22-00386, which establishes specific goals and objectives related to the operation and maintenance of the Patapsco WWTP. As a result, maintenance items observed during the site inspection will be notated in the relevant areas of the inspection report and not itemized in the Violation(s) section as in previous inspection reports. The goals and objectives in the Consent Decree are noted below for monitoring and tracking progress. My updates during this inspection are indicated in red text.

Back River WWTP Consent Decree (CD) Overall Progress Tracking Summary				
CD Paragraph Reference	Activity	CD Deadline	Actual Date Completed	Compliance Status (11/25/23)
132-BR	Replace H2S Sensors * unable to verify – 12.20.23 CL	12/15/2023	5/16/2023	Complete
133(a)-BR	Clean and complete repairs on at least 8 PSTs to ensure they are fully functional and capable to operate as designed. * 5 units in service	1/1/2024		62.5%
133(b)-BR	Clean and complete repairs to all 11 PSTs to ensure they are fully functional and available for use.	12/31/2025		45%
134-BR	Baltimore City to have and maintain an adequate supply of Dissolved Oxygen (“D.O.”) probes.	12/31/2025		98%
135-BR	Baltimore City shall maintain Activated Sludge Plants No. 2 & 3 as well as their associated clarifiers.	Ongoing		Compliant
135(a)-BR	Submit for review and Department approval the standard operating procedure (SOP) for removal of vegetative growth in the final clarifiers.	1/15/2024		98%
135(b)-BR	Implement vegetative growth plan.	Upon approval of 135(a)-BR		95%
135(c)-BR	Maintain average sludge blanket depth of 2 to 4 feet in final clarifiers.	Ongoing		Compliant
135(d)-BR	Maintain manual operations until Activated Sludge PLCs are updated and set up for automatic operation.	Ongoing		Compliant
136(a)-BR	Complete evaluation of sand filters. Within 10 days of sand filter evaluation, request approval for change of use of the approved sand filter, OR	4/30/2023		20%
136(b)-BR	Submit plan and schedule for implementation of sand filter improvements (Sand Filter Improvement Plan). Immediately upon approval City shall implement the approved Sand Filter Improvement Plan.	5/10/2024		20%
137-BR	Repair all Gravity Belt Thickeners (GBTs) to operate as designed.	6/30/2024		10%
138-BR	Repair and install one of the three non-operational Dissolved Air Flotation (DAF) systems and thickened sludge pumps. * unit 1 in service, unit 2 online soon	12/31/2023		10%
139-BR	Issue Notice to Proceed (NTP) with contract for rehabilitation of the egg-shaped digesters. Complete rehabilitation of egg-shaped digesters.	8/16/2023 (NTP)		100%
		9/16/2027 (Rehab)		4%
140-BR	Create and submit a Centrifuge Maintenance Plan to the Plaintiffs for review and the Department’s approval.	12/15/2023		10%
141-BR	Complete repairs and installation of Centrifuge #4 to operate as designed. * delays on parts	12/31/2023		55%
142-BR	Submit Staffing Plan	12/31/2023		98%
143-BR	City to have, maintain, and make available to the Department the formal written operation and maintenance procedures (Back River WWTP SOP)	6/30/2024		20%
144-BR	City to submit a report that identifies what processes are currently automated and conduct a feasibility study for automation of additional processes, with a plan and schedule for future automation.	5/13/2023		60%
145-BR	Baltimore City shall have, maintain, and update a Computerized	Not Specified		85%

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	Maintenance Management System (CMMS) as a functional work order system to ensure that the plant and its equipment operate as designed.			
146-BR	Complete a condition assessment and inventory of existing assets in order to develop an asset management program. Complete development and begin implementation of asset management program within 90 days of assessment and inventory.	11/15/2024 (Assessment) 2/12/2025 (Commence Implementation)		70% 0%

The table above will be updated during future facility inspections.

Site Walkthrough:

After the opening conference, we toured the facility beginning with the headworks.

Headworks

Raw sewage enters the plant at the mechanical screen building where there are four (4) coarse screening units. Each unit is rated for flows up to 200 million gallons per day (MGD). During normal flows, one coarse screening unit is sufficient to treat the average daily flow. In general, they rotate which coarse screening unit is in operation every week.

Effluent from coarse screening flows into two (2) deep wet wells that are over 50 feet deep. The headworks influent pumping station has eight (8) lift pumps installed to pump the screened wastewater from the wet wells to the Fine Screening System. During periods of high flow, screened wastewater can be pumped to two (2) above ground storage tanks each with a capacity of 18 million gallons. The two tanks are connected by two 14- to 16-inch pipes near the top of the tanks to allow one to overflow into the other as needed.

The Fine Screening System features six (6) fine screening units rated for flows up to 100 MGD each. No issues were reported with the fine screening units.

Effluent from the fine screening system travels to the Grit Removal System. Eight (8) grit channels equipped with traveling bridges remove grit from the fine-screened wastewater. Each grit channel and traveling bridge has an 80 MGD capacity. Under normal flow conditions, two grit channels are necessary for satisfactory grit removal. The traveling bridges move back and forth along the grit channel using a submersible pump / suction plate system to remove settled grit from the channels and transfer the grit to classifiers for further dewatering. The classified grit is then dried and transported off-site for disposal. No issues were reported with the grit removal system.

Odor control systems A, B, and C were reported to be in service with no issues.

Prior to the date of the inspection, heavy rainfall resulted in excessive flow which was directed to the EQ Tanks. During the inspection, the facility was pulling the stored volume from the EQ Tanks resulting in higher-than-normal flow conditions throughout the plant. This was most noticeable at the final effluent cascade from the chlorine contact chambers.

Primary Settling

Effluent from the Grit Removal System flows to a junction box then to the Primary Settling Tanks (PSTs). Primary Settling is the first stage of treatment where solids and sludge are allowed to settle by gravity and any floating scum or fats, oils, and grease (FOG) is removed. Generally, PSTs are designed to remove a large percentage of the total suspended solids (TSS) and reduce the biochemical oxygen demand (BOD) of the wastewater.

There are eleven (11) PSTs at the facility. During the site inspection, the following observations were made:

- Units 3 & 4 are under construction.
- Unit 5 is operating as a flow-thru (waiting for future repairs following completion of construction on other units).
- Unit 8 is operating as a flow-thru while repairs are being completed to a suction line.

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- Unit 10 is out for adjustments / repairs.
- Units 2, 7, 8, 9, and 11 were in service. No issues were observed or reported with their operation.
- At the time of the site inspection, crews were cleaning the scum troughs and pumps of units 8, 9, and 11, reportedly as a result of the excessive rain flow conditions.



Image 01: PST #8.

Sludge Handling / Processing

GST Units 5 and 7 were in service. Unit 1 was on standby. Unit 3 was drained for repairs. Unit 6 and 8 were out of service long-term in need of more extensive repairs.



Image 02: GST #5.

GBTs use gravity and a porous drainage belt to dewater and thicken sludge. The WWTP has 8 GBTs in total. Four (4) GBTs were in service (Units 1, 3, 6, and 8). It was reported that Unit 5 should be up and running by the end of the week. Units 4 and 7 are out of service, undergoing more involved repairs. Unit 2 is down long-term due to a motor-stator repair issue which is delayed due to delays in parts / supplies.

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The WWTP has four (4) Dissolved Air Flotation Units (DAFs) installed. A DAF unit is designed to remove TSS, FOG, and BOD from wastewater. DAFs are ideal for processing particles and floc that are of neutral density, slow-settling, or buoyant. DAF 1 was in service. DAF 2 was down for a waterline repair. DAF 3 and 4 are drawn down and out of service for repairs / refurbishment.

From the GSTs, GBTs, and DAF units, sludge is transferred to sludge holding tanks #1 or #26 which are located near the centrifuge building and drying facility. At the time of the site inspection, it was reported that they are trying not to use Tank #1 for storage and instead rely on Tank #26. Tank #26 appeared to have a stored volume at ¾ of the tank capacity.

The facility has four (4) centrifuges in total, three (3) of which are operational. The fourth unit is down and in the process of being rebuilt. No issues were observed or reported. It was reported that sludge processing depends on the volume of sludge available as well as the dry storage capacity. Sludge Production and Disposal reported for the month of October 2023 is provided in the table below.

Sludge Production and Disposal, October 2023				
Date	Total Sludge Production (dry tons)	Centrifuge Sludge Disposal (to compost) (dry tons)	Pelletech Pellets Disposal (dry tons)	Total Sludge Disposal (dry tons)
10/1	73.8	NA	0	0
10/2	79.6	NA	0	0
10/3	88.6	26.2	0	26.2
10/4	76.7	26.3	0	26.3
10/5	90.3	25.09	0	25.1
10/6	45.9	25.45	0	25.5
10/7	53.0	NA	0	0
10/8	52.4	NA	0	0
10/9	52.4	NA	0	0
10/10	69.8	43.27	0	43.3
10/11	71.1	42.51	0	42.5
10/12	56.2	34.04	0	34.0
10/13	67.8	26.22	0	26.2
10/14	80.8	NA	0	0
10/15	45.7	NA	0	0
10/16	65.1	32.09	0	32.1
10/17	63.2	35.48	0	35.5
10/18	47.5	8.04	0	8.0
10/19	72.9	20.26	0	20.3
10/20	101.8	19.11	0	19.1
10/21	104.1	NA	0	0
10/22	88.4	NA	0	0
10/23	52.2	20.92	0	20.9
10/24	50.1	24.93	0	24.9
10/25	60.9	24.51	0	24.5
10/26	80.8	41.93	0	41.9
10/27	50.7	32.33	0	32.3
10/28	46.8	NA	0	0
10/29	44.6	NA	0	0
10/30	41.5	22.95	0	23.0
10/31	46.0	23.71	0	23.7
Total	2,020.9	555.38	0	555

Activated Sludge Plants (ASPs)

Effluent from Primary Settling flows to a flow distribution building to one (1) of three (3) Activated Sludge Plants (ASPs) numbered 2, 3, and 4. The ASPs each contain six (6) biological reactors for nitrogen removal. ASPs 2 and 3 have a three-pass train designated A, B, and C for each reactor while ASP 4 is a two-pass system. There are twelve (12) secondary clarifiers associated with each ASP for a total of thirty-six (36) secondary clarifiers at the facility.

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The ASPs were not observed during this inspection. No issues were reported with their operation. It was reported during a previous site inspection that efforts were focused on maintaining ASPs 2 and 4. A capital improvement project is planned in the near future for ASP 3 which will take ASP 3 off-line for repairs. Chris Kroen shared the ASP Process Control Sheet which indicates the status of the different ASP facilities – whether the reactor is online, standby, or out of service.

ASP Process Control Sheet		
Reactor	Pass A	Pass B
ASP 2		
5	Online	Online
6	Standby	Standby
7	Online	Online
8	Online	Online
9	Standby	Standby
10	Online	Out of Service
ASP 3		
11	Out of Service	Online
12	Out of Service	Out of Service
13	Out of Service	Standby
14	Standby	Standby
15	Online	Online
16	Out of Service	Standby
ASP 4		
17	Online	Online
18	Online	Online
19	Online	Online
20	Online	Online
21	Online	Online
22	Online	Online

Denitrification Filters (DNFs)

At the DNF building, there are four filter quads with each quad containing 13 Tetra Denitrification Filters with a total of 52 filters. It was reported that all 52 filters were functional and in operation at the time of the site inspection. No issues were reported.

Sand Filters

The sand filters at the facility are used to polish the wastewater coming from the DNF building. There are 48 total filters. 36 filters were observed to be in service at the time of the site inspection.

Chlorination / De-chlorination Facility and Final Outfalls

The final effluent at the step aeration system was observed to be clear and without any noticeable foam, solids, or odor. No visible floating scum or solids were observed in the chlorine contact chambers at the facility. The temperature of the composite sampler for Outfall 001 was observed to be 1°C. The temperature of the composite sampler for Outfall 002 was observed to be 3.75°C.

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Image 03: Step Aeration system, final effluent.

I reviewed the lab located at the Chlorination / De-chlorination Facility. All pH buffers were current. No violations were observed with the logbooks. Copies of the pH and DO calibration records were provided to me for review.

While at the final outfall, we walked to the end of the pier to confirm the installation of a sign and light to notify the public of bypasses at the facility. At the end of the pier, I observed the sign and light to be installed as required.



Image 04: Bypass Sign at end of pier.

Closing Conference:

After the Chlorination / Dichlorination Facility, we returned to the administration building for an exit conference.

Records Review:

Following the site inspection, laboratory reports and calibration records were reviewed. DMRs for October 2023 were reviewed. No violations were observed in the DMR submission, pH, and DO calibration records. No violations were observed in the laboratory analysis reports.

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Non-Compliance Report(s) / Bypass Events

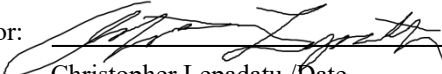
Heavy rainfall in the Baltimore area on Sunday, December 10, 2023, resulted in high influent flow at the Back River WWTP. The Department received notice that the operators at the DNF facility engaged in a partial bypass of the treated activated effluent in response to the high flows. In a letter received by the Department on December 15, 2023, the following was reported.

“The bypass started at 9:30am (on Monday, December 11, 2023) and ended at 5:30pm. 15MG passed through the DNF facility, so during the eight hour period, it is estimated that 5MG of flow bypassed the DNF facility and made its way to the sand filters for further treatment. There was no other feasible alternative to partial bypass.”

During the site inspection, no adverse conditions were observed related to this event. The bypass condition was stopped as reported in the letter. No issues were reported or observed in the areas associated with this event.

As of November 2023, Baltimore City and the Department have signed a Consent Decree – Case No. 24-C-22-00386 which establishes specific goals and objectives related to the operations and maintenance of the Back River WWTP. As a result, maintenance items observed during the site inspection will be notated in the relevant areas above and not itemized in the Violation(s) section as in previous inspection reports.

Regular inspections will continue.

Inspector:  1/5/2024 Received by: _____
Christopher Lepadatu /Date Signature/Date
christopher.lepadatu@maryland.gov
410-537-3521 Print Name