pennsylvania DEPARTMENT OF ENVIRONMENTAL PROTECTION

SOUTHWEST REGIONAL OFFICE
CLEAN WATER PROGRAM

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| Application Type | **Renewal** | **NPDES PERMIT FACT SHEET ADDENDUM 1** | Application No. | **PA0027481** |
| Facility Type | **Industrial** | | APS ID | **759641** |
| Major / Minor | **Major** | | Authorization ID | **894532** |

## Applicant and Facility Information

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| Applicant Name | **Energy Harbor Generation LLC** | Facility Name | **Little Blue Run Disposal Area** |
| Applicant Address | 168 East Market Street<br>Akron, OH 44308 | Facility Address | 128 Ferry Hill Road<br>Shippingport, PA 15077 |
| Applicant Contact | Glenn Truzzi, P.E. | Facility Contact | Mark Wagner |
| Applicant Phone | (330) 730-9321 | Facility Phone | (724) 462-6972 |
| Applicant Email | gtruzzi@energyharbor.com | Facility Email | markwagner@energyharbor.com |
| Client ID | 119409 | Site ID | 239163 |
| SIC Code | 4911; 4953 | Municipality | Shippingport Borough |
| SIC Description | Trans. & Utilities - Electric Services; Refuse Systems | County | Beaver |
| Date Published in PA Bulletin | August 11, 2018 | EPA Waived? | No |
| Comment Period End Date | September 25, 2018 (extended) | If No, Reason | NPDES Major |

Purpose of Application: Renewal of an NPDES permit for discharges from a coal-fired, steam electric power-generating plant.

## Internal Review and Recommendations

On August 11, 2018, DEP published a draft NPDES permit for the Bruce Mansfield Power Plant ("Plant") and associated Little Blue Run Disposal Area ("LBR"). Pursuant to a December 14, 2012 Consent Decree, disposal of the Plant's coal combustion byproducts ("CCBs") at LBR ceased as of December 31, 2016 after forty years of operation. The Plant remained operable until November 7, 2019.

At the request of the Environmental Integrity Project, the public comment period for the draft permit was extended by 15 days from September 10, 2018 to September 25, 2018.

By email dated August 31, 2018, the U.S. Environmental Protection Agency ("EPA") indicated that it had no comments on the draft NPDES permit.

By letter dated September 10, 2018, Sierra Club provided comments on the draft NPDES permit.

By letter dated September 25, 2018, FirstEnergy Generation LLC ("FirstEnergy") provided comments on the draft NPDES permit.

A public hearing was held on November 28, 2018 at the request of various interested parties. Responses to testimony recorded at the public hearing and responses to additional comments submitted to DEP up to ten days after the hearing are available in a separate Comment/Response Document.

<u>Background Information</u>

On January 10, 2018, a fire at the Plant caused significant damage to the scrubber and related equipment for Units 1 and 2.

| Approve | Deny | Signatures | Date |
|---|---|---|---|
| X | | Ryan C. Decker, P.E. / Environmental Engineer | November 16, 2022 |
| X | | Michael E. Fifth, P.E. / Environmental Engineer Manager | November 17, 2022 |

## Internal Review and Recommendations

On March 31, 2018, FirstEnergy Solutions Corp. and six affiliated debtors—including FirstEnergy Generation LLC—each filed a voluntary petition for relief under Chapter 11 of the US Bankruptcy Code in the US Bankruptcy Court for the Northern District of Ohio.

On February 5, 2019, Units 1 and 2 at the Plant were deactivated.

On April 12, 2019, the Best Available Technology Economically Achievable ("BAT") limits for combustion residual leachate in 40 CFR § 423.13(l) were vacated and remanded to EPA for reconsideration pursuant to a decision by the U.S. Court of Appeals for the Fifth Circuit (*Southwestern Electric Power Company et al. v. U.S. Environmental Protection Agency et al.* Docket No. 15-60821) ("*SWEPCO*"). In accordance with 40 CFR § 125.3(c)(1), the Fifth Circuit Court's *SWEPCO* decision renders the § 423.13(l) BAT limits for combustion residual leachate inapplicable to discharges of combustion residual leachate regulated by the Steam Electric Power Generating Point Source Category Effluent Limitations Guidelines ("Steam Electric ELGs"). The Best Practicable Control Technology Currently Available ("BPT") limits for combustion residual leachate in § 423.12(b)(11) were not challenged in *SWEPCO* and remain in effect.

On November 7, 2019, Unit 3 at the Plant was deactivated. The Plant ceased all power generating operations at that time. Pursuant to the cessation of power generation, the Plant and LBR were no longer subject to 40 CFR Part 423 – Steam Electric Power Generating Point Source Category Effluent Limitations Guidelines after November 7, 2019. However, discharges from the Plant and LBR are subject to the terms and conditions of administratively extended NPDES Permit PA0027481—including any limits imposed in that permit based on the Steam Electric ELGs—until the terms and conditions of that permit are modified by a DEP permitting action or actions.

On February 27, 2020, FirstEnergy Solutions Corp. emerged from bankruptcy as an independent company named Energy Harbor. FirstEnergy Generation LLC was renamed to Energy Harbor Generation LLC ("EHG") and maintained ownership of the Plant and LBR.

On March 5, 2020, DEP received an application from EHG for a permit amendment to document the name change from FirstEnergy Generation LLC to Energy Harbor Generation LLC.

On April 7, 2020, EHG submitted a Coal Pile Decommissioning Plan to clean up the coal pile at the Plant. DEP provided comments on the plan by email dated April 21, 2020.

On July 6, 2020, EHG submitted a revised Coal Pile Decommissioning Plan and proceeded to implement the plan when DEP indicated it had no further comments.

On March 2, 2021, EHG notified DEP that Phase 1 of the revised Coal Pile Decommissioning Plan was substantially complete including removal of remaining coal down to the clay layer across the 90-acre coal yard and grading of the coal yard so that it slopes to the existing perimeter channels. The perimeter channels drain to the Plant's existing Low Dissolved Solids (LDS) Pond from which water is pumped to the stilling basin at LBR for discharge through Outfall 022. Vegetating of the former coal yard proceeded under Phase 2 of the Coal Pile Decommissioning Plan. During a site visit on June 1, 2022, DEP observed that the coal yard was mostly covered with vegetation.

On October 13, 2021, on behalf of EHG, Civil & Environmental Consultants, Inc. submitted a Benthic Macroinvertebrate Sampling Plan to DEP with the intention of demonstrating to DEP that 1) the receiving water for Outfall 022 is the Ohio River (via Ohio River backwater flow into Mill Creek) and not Mill Creek. On October 18, 2021, DEP provided comments to CEC on the sampling plan. DEP's understanding is that CEC completed its proposed benthic macroinvertebrate sampling, but EHG did not submit the results of that sampling to DEP. EHG later stated that it would not pursue its claim regarding the identification of Outfall 022's receiving water as the Ohio River.

On June 1, 2022, Shippingport Industrial Park, LLC ("SIP")—a subsidiary of Frontier Industrial Corporation ("Frontier")—acquired the Plant from Energy Harbor Generation LLC. At the time of this writing, LBR is still owned by Energy Harbor Generation LLC.

On June 21, 2022, DEP, EHG, SIP, and Frontier entered into a First Amendment to the November 23, 2010 Consent Order and Agreement. The November 23, 2010 Consent Order and Agreement ("2010 COA"), originally entered into by DEP and FirstEnergy Generation Corp. (the predecessor to EHG), imposed obligations on FirstEnergy Generation Corp. relating to groundwater contamination at the Plant from historical spills of #2 fuel oil. The First Amendment transferred EHG's obligations (as FirstEnergy Generation Corp.'s successor) under the 2010 COA to SIP and Frontier and modified those obligations to allow

**Internal Review and Recommendations**

SIP and Frontier to cease operating the groundwater recovery system due to the system's effectiveness. SIP and Frontier are required to continue groundwater monitoring and to implement control measures pursuant to DEP's Land Recycling Program ("Act 2") if monitoring shows that pollutant concentrations exceed Act 2's cleanup standards (Medium Specific Concentrations or "MSCs"). The First Amendment also covers the potential to cease groundwater monitoring after eight consecutive quarters of results below Act 2's MSCs.

On September 2, 2022, following discussions with DEP, EHG submitted an updated NPDES permit renewal application to remove Plant outfalls from PA0027481 consistent with SIP's acquisition of the Plant and the attendant legal separation of LBR from the Plant. As an exception, SIP will continue to pump storm water that collects in the Plant's LDS Pond to LBR through an existing pipeline that was used to transport coal combustion byproducts from the Plant to LBR for disposal. The pipeline currently routes flow to the secondary spillway at LBR, thus bypassing the disposal impoundment which is not approved to receive any additional wastes. Water in the secondary spillway flows to the stilling basin at the base of the disposal impoundment dam for treatment. Effluent from the stilling basin discharges through Outfall 022. During the forthcoming permit term, SIP will develop a plan to manage and discharge storm water at the Plant so that the pumping of water from the LDS Pond to LBR ceases. In the interim, EHG will be responsible for all wastewater discharges at Outfall 022, including wastewater contributions pumped from the Plant by SIP.

On September 14, 2022, SIP submitted an application for a new NPDES permit (PA0285013) for discharges from the Plant.

Based on the September 2, 2022 application update from EHG and the September 14, 2022 application from SIP, PA0027481 will be renewed to exclude Plant Outfalls 001, 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012, 013, and 014, and Internal Monitoring Points 107, 307, 407, 507, and 607. Those outfalls and IMPs will be permitted by new NPDES Permit PA0285013. Outfall 707 was proposed in the 2018 draft permit but will not be permitted by PA0285013 because the alternative power plant operating conditions and discharges it would have permitted do not apply following deactivation of the Plant. Since PA0027481 is currently in effect under administrative extension, DEP intends to take simultaneous permitting actions to renew PA0027481 and to issue PA0285013 to avoid a lapse in permit coverage or duplicate permit coverage for discharges from LBR and the Plant.

On October 27, 2022, EHG submitted an application to transfer PA0027481 and Water Quality Management Permit 0474204 from Energy Harbor Generation LLC to LBR Acquisition Company, LLC. The transfer application was submitted pursuant to a change in ownership of the LBR site to LBR Acquisition Company, LLC planned to occur on or about December 20, 2022. NPDES Permit PA0027481 will be published for public comment under the name Energy Harbor Generation LLC (as the current owner), but the public notice for the draft NPDES permit will state that LBR Acquisition Company, LLC will be the new owner of the site and will be identified as the permittee when the NPDES permit is issued.

Comment Responses

DEP's responses to Sierra Club's September 10, 2018 comments (see **Attachment B**) are provided below.

**DEP's Response to Sierra Club Comment A. Technology-Based Effluent Limits Are Needed for Key Outfalls:** Effluent limits imposed at Outfalls 021, 023, 024, 026, 028, 030, 031, 032, 033, 034, 035, 36, 037, 038, 039, 040, and 041 in the draft NPDES permit were consistent with national standards of performance established by EPA. Pursuant to 40 CFR § 125.3(c)(2), case-by-case TBELs are not considered when EPA-promulgated effluent limitations apply. However, circumstances have changed since the permit was published for public comment in August 2018.

The applicability section of Part 423 in 40 CFR § 423.10 states:

> "The provisions of this part apply to discharges resulting from the operation of a generating unit by an establishment whose generation of electricity is the predominant source of revenue or principal reason for operation, and whose generation of electricity results primarily from a process utilizing fossil-type fuel (coal, oil, or gas), fuel derived from fossil fuel (e.g., petroleum coke, synthesis gas), or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium. This part applies to discharges associated with both the combustion turbine and steam turbine portions of a combined cycle generating unit."

The second part of the first sentence in the applicability section says that the establishment's generation of electricity "*is*" (i.e., currently) the predominant source of revenue. LBR is undergoing closure and is not associated with an active power-generating establishment. Since Part 423 applies to combustion residual leachate discharges from CCB disposal sites

**Internal Review and Recommendations**

associated with active coal-fired power plants and those same leachate discharges are not regulated by Part 423 once the associated coal-fired power plants permanently cease generating electricity, permit writers must use Best Professional Judgement (BPJ) to develop case-by-case TBELs for combustion residual leachate discharges from inactive or closed CCB disposal sites as required by 40 CFR § 125.3(c)(2).

On February 3, 2021, Scott Wilson, the U.S. Environmental Protection Agency's (EPA's) Energy Permitting Coordinator in the Industrial Permits Branch of EPA's Office of Wastewater Management, confirmed to DEP that Part 423 does not apply to steam electric power-generating facilities after the facilities permanently cease generating electricity. The September 2015 "Technical Development Document for the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category" (2015 TDD) also states the following in regard to EPA's analysis to identify pollutants of concern for combustion residual leachate: "EPA excluded data from retired or closed units for use in this analysis because combustion residual leachate from retired units is not regulated in the final rule."

After coal-fired power generation ceases, CCB disposal sites become legacy liabilities for their owners with the operation of pollution control technologies for ongoing, post-shutdown combustion residual leachate discharges depending on sources of revenue other than the generation of electricity from the former coal-fired generating units.

LBR was approved by DEP's Waste Management Program to accept CCBs from the Bruce Mansfield Plant until December 31, 2016. After December 31, 2016, LBR became an inactive CCB disposal site with closure required by December 31, 2028. Later, after the deactivation of Unit 3 on November 7, 2019, LBR was no longer part of an operating establishment whose generation of electricity is the predominant source of revenue or the principal reason for operation. Due to the retirement of LBR as a disposal site and the deactivation of the power-generating units associated with LBR, both the Plant and LBR are not subject to 40 CFR Part 423.

Pursuant to DEP's BPJ, and in the absence of any applicable ELGs, the ELGs for combustion residual leachate in 40 CFR Part 423 and related rulemaking documentation were consulted for guidance. Refer to the section of this Fact Sheet Addendum after the comment responses for DEP's evaluation of BAT for discharges of combustion residual leachate from LBR.

**<u>DEP's Response to Sierra Club Comment B. The Final Permit Must Be Amended to Remove the Automatic ELG Rescission Language</u>:** When the Plant was operating, Outfall 022 could have received FGD wastewaters by way of a line break in the FGD system with any leaked FGD wastewater anticipated to flow into a Spill Abatement NPDES Sump near the FGD thickeners. The sump discharged into the LDS Pond from which water was (and still is) pumped to the secondary spillway at LBR through the existing pipeline between the Plant and LBR. That was the only potential pathway for FGD wastewaters to be discharged from the Plant. No FGD wastewater discharges actively occurred or were expected to occur.

The Plant is shut down and no longer generates any wastewaters regulated by the Steam Electric ELGs and is no longer subject to regulation by the Steam Electric ELGs. Therefore, compliance deadlines for new limits on discharges of FGD wastewater do not apply and will be removed from the permit.

Generally, discharges from the Plant will be regulated by new NPDES Permit PA0285013. PA0027481 will regulate discharges from LBR. As an exception, SIP will continue to pump storm water that collects in the LDS Pond at the Plant to LBR through an existing pipeline. EHG will be responsible for discharges of that storm water at Outfall 022 in combination with other wastewaters generated at LBR that discharge at that location.

**<u>DEP's Response to Sierra Club Comment C. The Draft Permit Improperly Contemplates an Unwarranted ELG Extension for Coal Ash Transport Water</u>:** The Plant is shut down and no longer generates any wastewaters regulated by the Steam Electric ELGs and is no longer subject to regulation by the Steam Electric ELGs. Therefore, compliance deadlines for new limits on discharges of bottom ash transport wastewater do not apply and will be removed from the permit.

**<u>DEP's Response to Sierra Club Comment D. The Final Permit Must Include TBELs for Bromide</u>:** As explained in DEP's Response to Sierra Club Comment B, when the plant was operating, the only potential source of FGD wastewater discharges was in the event of a line break within the FGD system. No FGD wastewater discharges actively occurred or were expected to occur, so requiring the use of evaporation technologies to treat bromides in a transient wastewater source that would only discharge under hypothetical conditions would have been unreasonable.

The Plant is shut down and no longer generates any wastewaters regulated by the Steam Electric ELGs and is no longer subject to regulation by the Steam Electric ELGs. There are no discharges of FGD wastewaters that require the imposition of effluent limits for bromides.

**Internal Review and Recommendations**

By letter dated September 25, 2018, FirstEnergy Generation LLC ("FirstEnergy") provided comments on the draft NPDES permit (see **Attachment A**). DEP's responses to comments are provided below.

**DEP's Response to Comment 1. Oil and Grease Monitoring for Mansfield Plant/LBR:** A permit condition allowing the use of Method 1664 "Cu" was considered for the draft permit but was ultimately omitted because use of alternative analytical methods that are not in 40 CFR Part 136 must be approved by EPA. To date, EPA has not approved the use of Method 1664 "Cu" at the Plant or LBR. EHG can collect samples using both Method 1664 "Cu" and Method 1664B, but the results reported on Discharge Monitoring Reports must be from an approved method. If a violation arises from use of Method 1664B, then EHG will have the other result to demonstrate that it would have complied using the "Cu" method that addresses the interference.

**DEP's Response to Comment 2. IMP 307, 407, 507 Aluminum and Copper Monitoring:** IMPs 307, 407, and 507 and Outfall 007 were located at the Plant, which is now owned by SIP/Frontier. PA0027481 will be renewed to cover discharges from LBR and storm water pumped from the LDS Pond at the Plant that discharges through Outfall 022 at LBR. IMPs 307, 407, and 507 and Outfall 007 will be removed from PA0027481 because EHG will not be responsible for the wastewaters discharged at those locations. Storm water and groundwater sources that continue to discharge at those locations will be permitted by NPDES Permit PA0285013 issued to SIP.

**DEP's Response to Comment 3. IMP 307, 407, 507 Fecal Coliform Monitoring:** Refer to DEP's Response to Comment 2.

**DEP's Response to Comment 4. Outfall 007 Copper Limit:** Refer to DEP's Response to Comment 2.

**DEP's Response to Comment 5. Outfall 009 Fecal Coliform Summer Season Monthly Average Limit:** Outfall 009 was located at the Plant, which is now owned by SIP. PA0027481 will be renewed to cover discharges from LBR and storm water pumped from the LDS Pond at the Plant that discharges through Outfall 022 at LBR. Outfall 009 will be removed from PA0027481 because EHG is no longer responsible for the wastewaters discharged at that location. Treated sanitary wastewaters that continue to discharge at that location will be permitted by NPDES Permit PA0285013 issued to SIP.

**DEP's Response to Comment 6. Outfall 009 Fecal Coliform Daily Max Limit:** Refer to DEP's Response to Comment 5.

**DEP's Response to Comment 7. Outfall 009 Monitoring Frequencies:** Refer to DEP's Response to Comment 5.

**DEP's Response to Comment 8. Outfall 009 TRC Limits:** Refer to DEP's Response to Comment 5.

**DEP's Response to Comment 9. Outfall 009 Dissolved Oxygen Instantaneous Minimum Limit:** Refer to DEP's Response to Comment 5.

**DEP's Response to Comments 10, 11, 12, 13, 14, and 15. Outfalls 021 to 043 Osmotic Pressure, Hexavalent Chromium, Nitrite, Free Cyanide, Bromide, and Hardness Monitoring:** DEP already accommodated FirstEnergy by setting most of the sampling requirements for the seep outfalls equal to the Solid Waste Permit's sampling requirements (parameters and measurement frequencies). The Fact Sheet stated that the reporting requirements for the seeps were drawn primarily from those that appear on both the NPDES permit application and Form 14Rs. However, the analytical requirements of DEP's Waste Management Program do not overlap perfectly with those of the Clean Water Program. The additional parameters are discussed below in the order FirstEnergy identified them in Comments 10, 11, 12, 13, 14, and 15.

Osmotic Pressure: There is another component to DEP's reasonable potential analyses that was not captured by FirstEnergy's multiple discharge wasteload allocation, but that was considered by DEP. The final step for imposing WQBELs in a permit was described on page 68 of the Fact Sheet and applies generally to water quality analyses. That step is:

> Compare the actual WQBEL from PENTOXSD with the maximum concentration reported on DMRs or the permit application. Use WQN data or another source to establish the existing or background concentration for naturally occurring pollutants, but generally assume zero background concentration for non-naturally occurring pollutants.
>
> - Establish limits in the draft permit where the maximum reported concentration equals or exceeds 50% of the WQBEL. Use the average monthly and maximum daily limits for the permit as recommended by PENTOXSD. Establish an IMAX limit at 2.5 times the average monthly limit.

| Internal Review and Recommendations |
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- For non-conservative pollutants, establish monitoring requirements where the maximum reported concentration is between 25% - 50% of the WQBEL.
- For conservative pollutants, establish monitoring requirements where the maximum reported concentration is between 10% - 50% of the WQBEL.

The PENTOXSD model was replaced by DEP's Toxics Management Spreadsheet in 2020, but the limit calculations and thresholds are the same.

The relevant portion of the reasonable potential analysis for osmotic pressure is the third bullet because osmotic pressure—expressed in DEP's regulations in units of osmolality (mOs/kg)—is a conservative pollutant by way of its relationship to dissolved ions. If a maximum reported concentration is between 10% and 50% of a WQBEL, then monitoring is required. Based on the multiple discharge analysis tables, the osmotic pressure (osmolality) of the seep discharges fit the criteria listed above for monitoring. Therefore, osmotic pressure monitoring is required at the seeps.

Hexavalent Chromium: The Form 14R reporting of total chromium was broken out into trivalent and hexavalent chromium for the NPDES permit because Pennsylvania does not have water quality criteria for total chromium. Separate water quality criteria for trivalent and hexavalent chromium are provided in DEP's regulations (25 Pa. Code § 93.8c). Therefore, the speciation of chromium in the seeps is important for determining whether discharges have a reasonable potential to violate water quality criteria. DEP can conservatively assume that results for total chromium are composed entirely of hexavalent chromium, which has the more stringent of the chromium species' water quality criteria (depending on stream hardness), but this does not work in EHG's favor if hexavalent chromium is not the dominant chromium species. Additionally, permit application data show that hexavalent chromium is present in some of the seeps (Outfalls 030 and 034). Since Form 14R reporting for the Solid Waste Permit only provides results for total chromium and data on chromium speciation are limited, DEP is requiring analyses for both trivalent and hexavalent chromium in the NPDES permit.

Nitrate+Nitrite as N: EPA identified Nitrate+Nitrite as N as a pollutant of concern for FGD wastewaters, which could have discharged through Outfall 022 in some rare circumstances before the Plant shut down. Since the Plant is shut down and FGD wastewaters are not generated, there is no potential for FGD wastewaters to discharge through Outfall 022, so Nitrate+Nitrite as N reporting will be removed from Outfall 022.

Separately, Nitrate+Nitrite as N was not identified by EPA as a pollutant of concern for combustion residual leachate. Therefore, the reporting requirements for Nitrate+Nitrite as N will be removed from all seep outfalls (021 – 043).

Nitrate as N reporting will be maintained consistent with existing analyses performed for Form 14R.

Free Cyanide: DEP has no water quality criteria for Total Cyanide, but there are water quality criteria for Free Cyanide. Total and dissolved cyanide are the only forms of cyanide reported on Form 14R. DEP can conservatively assume that results for Total Cyanide are composed entirely of Free Cyanide, but this does not work in EHG's favor if cyanide, when present, is not present in a "free", bioavailable form. Similarly, Dissolved Cyanide does not necessarily represent only Free Cyanide as dissolved species also may include complexed forms of cyanide. Therefore, DEP is requiring analyses for both Total Cyanide and Free Cyanide in the NPDES permit.

Bromide: DEP ended its monitoring initiative for TDS and its constituents (including bromide) in 2021. Therefore, the reporting requirements for bromide will be removed from all seep outfalls (021 – 043) and Outfall 022.

Total Hardness: Water quality criteria for several metals are hardness dependent. DEP is requiring hardness reporting for future evaluations of the seeps' reasonable potential to violate water quality criteria for those parameters that have hardness-dependent criteria in Chapter 93.

**DEP's Response to Comment 16. Outfall 029 Typographical Error:** The 13.2 mg/L maximum daily limit for iron was not a typographical error. Attachment B to the Fact Sheet shows a different value because Attachment B is from FirstEnergy's analysis. DEP independently verified FirstEnergy's analytical results by replicating its calculations. DEP calculated a slightly different limit for iron. That FirstEnergy's iron limit was different was an oversight by DEP when attachments were incorporated into the Fact Sheet.

DEP calculated effluent limits using formulas and multipliers in EPA's "Technical Support Document For Water Quality-based Toxics Control" (pp. 102-103). For the maximum daily limit ("MDL"), the calculations are as follows:

| Internal Review and Recommendations |
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$LTA_{chronic} = WLA_{chronic} \times e^{\wedge}[0.5\sigma_4^2 - z\sigma_4]$

$MDL = LTA \times e^{\wedge}[z\sigma - 0.5\sigma^2] = WLA \times e^{\wedge}[0.5\sigma_4^2 - z\sigma_4] \times e^{\wedge}[z\sigma - 0.5\sigma^2]$

where:
LTA = long-term average concentration
WLA = wasteload allocation
$e^{\wedge}[0.5\sigma_4^2 - z\sigma_4]$ = chronic WLA multiplier (0.581 for the 99th percentile and a coefficient of variation of 0.5)
$e^{\wedge}[z\sigma - 0.5\sigma^2]$ = LTA multiplier (2.68 for the 99th percentile and a coefficient of variation of 0.5)

With FirstEnergy's wasteload allocation of 8.5 mg/L for iron at Outfall 029, the iron limit was calculated as:

$MDL = [WLA \times e^{\wedge}[0.5\sigma_4^2 - z\sigma_4]] \times e^{\wedge}[z\sigma - 0.5\sigma^2] = [8.5 \text{ mg/L} \times 0.581] \times 2.68 = 13.23518 \text{ mg/L}$

The limit was rounded down to 13.2 mg/L. Rounding up allocates a higher concentration than what is necessary to maintain compliance with water quality criteria in-stream.

**DEP's Response to Comment 17. Outfall 035 Part A Table:** DEP's understanding of the basis for FirstEnergy's request is that because sampling of a discharge is difficult and/or because discharges from Outfall 035 are unpredictable and infrequent, DEP should not require sample analyses for parameters that are only subject to reporting at Outfall 035 and should allow representative sampling for parameters that are subject to TBELs. FirstEnergy goes on to state that "available data shows that recorded overflows from the suction vault upstream of Outfall 035 occurred three percent of the time at an average discharge flow rate of 96 gpm."

Precipitation-induced discharges can be unpredictable and infrequent, yet DEP requires such discharges to be sampled and permittees can and do collect samples. Also, FirstEnergy has collected information indicating how frequently overflows from the Laughlin Collection System occur and at what flow rates. DEP reasons that, since FirstEnergy has engineered the Laughlin Collection System and has information concerning the conditions under which Outfall 035 discharges (whether from design or operating data), removing monitoring requirements and specifying representative sampling is not warranted. To the extent that automated sampling of Outfall 035 may be infeasible, a discharge that occurs 3% of the time (about 11 days per year) occurs during a narrow set of conditions that EHG can evaluate to determine when it is appropriate to attempt to sample Outfall 035. For example, if data indicate that Outfall 035 generally discharges after a certain design storm or greater, then EHG can deploy sampling personnel to Outfall 035 after rainfall data indicate that such a storm event occurred.

**DEP's Response to Comment 18. Outfall 022 Compliance Schedule Description:** Outfall 027 was not listed in the description because DEP's understanding is that Outfall 027 is already tied into Outfall 022 downstream of the Outfall 022 sampling location, so extension of the Outfall 022 pipeline also would redirect Outfall 027. The other listed outfalls (021, 042, and 043) are not already tied into the Outfall 022 discharge pipeline, which is why they were specifically named. For clarity, the description will be updated to include Outfall 027.

**DEP's Response to Comment 19. Outfall 022 Schedule of Compliance:** The twenty-five-month allowance was not a typographical error. The schedule in Part C, Condition III of the draft permit requires EHG to cease discharging from Outfall 022 to Mill Creek within fifty-nine months of the permit effective date. The intent of this requirement is to ensure that Outfall 022 is relocated within the five-year permit term and that the requirement to relocate is enforceable under the terms and conditions of the renewed permit. FirstEnergy originally proposed a schedule for designing, permitting, and constructing the pipeline and diffuser lasting 60 months (i.e., through permit expiration) DEP removed one month from the final schedule item so that the end date for construction coincides with the 59-month deadline. DEP understands that this month doesn't necessarily have to be made up during construction, so Part A.4 of the schedule will be modified to allow 26 months for construction of the Outfall 022 pipeline and diffuser. EHG will need to make up a month somewhere in its schedule to comply with the 59-month deadline to cease discharges from Outfall 022 to Mill Creek.

The 59-month deadline also aligns with eDMR reporting periods so that limits can be imposed within this permit term on discharges from Outfall 022 that continue after the end of the schedule. Limits cannot take effect on the expiration date of the permit and the minimum reporting period for limits to be imposed is one month. If the permit is administratively extended again, then the limits necessary to protect the Ohio River after Outfall 022 is relocated will be in effect during that administrative extension.

**Internal Review and Recommendations**

**DEP's Response to Comment 20. Toxics Reduction Evaluation (TRE) Description:** Outfall 007 was located at the Plant, which is now owned by SIP and will be permitted by PA0285013. PA0027481 will be renewed to cover discharges from LBR and not the Plant, so Outfall 007 and Part C, Condition VI, which imposes TRE requirements for copper at Outfall 007 will be removed from PA0027481.

**DEP's Response to Comment 21. 316(b) Requirements:** The cooling water intake structure is located at the Plant, which is now owned by SIP and falls under the regulatory purview of new NPDES Permit PA0285013. Therefore, Part C, Condition X, which imposes requirements for the Plant's cooling water intake structure will be removed from PA0027481. DEP's understanding is that SIP currently has no plans to use the intake structure, but the intake structure may be maintained for future use. Refer to documentation for PA0285013 for additional information.

**DEP's Response to Comment 22. 316(b) Requirements:** Refer to DEP's Response to Comment 21.

**DEP's Response to Comment 23. 316(b) Requirements:** Refer to DEP's Response to Comment 21.

**DEP's Response to Comment 24. 316(b) Requirements:** Refer to DEP's Response to Comment 21.

**DEP's Response to Comment 25-1. Outfalls 001-006, 008, 010-014 Fact Sheet Description Typographical Error:** The Fact Sheet is part of the permit record and is not updated or modified. This Fact Sheet Addendum is used for that purpose and should be read in conjunction with the Fact Sheet to understand the complete record of decision for the NPDES permit. DEP acknowledges the referenced error—TBELs and WQBELs do not apply to the storm water outfalls listed above. Therefore, only monitoring requirements are imposed.

**DEP's Response to Comment 25-2. Outfall 022 Fact Sheet Description Typographical Error:** DEP acknowledges its error identifying Seep S-19AC as Seep S-19C in the Fact Sheet.

**DEP's Response to Comment 26-1. Outfall 022 Point of First Use:** DEP acknowledges FirstEnergy's and, subsequently, EHG's disagreement. DEP reserves the right to alter its prior determinations based on new information such as DEP's April 2015 Cause and Effect Stream Survey. The biologist in the Clean Water Program reviewed FirstEnergy's comment letter and respectfully disagrees with FirstEnergy's assessment. The Clean Water biologist followed DEP's protocols for sampling streams. The results of DEP's sampling found chemical constituents within Mill Creek that are indicative of impacts from LBR.

Irrespective of the survey results and regardless of whether the receiving water for existing Outfall 022 is named in the permit as the Ohio River, Ohio River backwater, and/or Mill Creek, WQBELs at the existing discharge location are calculated based on the amount of stream flow available for mixing and dilution at the acute and chronic criteria compliance times (15 minutes and 12 hours, respectively, or the time until complete mixing if complete mixing occurs sooner). Any WQBELs calculated for the current Outfall 022 discharge location would appropriately reflect mixing and dilution with a $Q_{7-10}$ flow based on Mill Creek's flow rates and not the full regulated minimum flow of the Ohio River. That is, the permittee's contention that the receiving water is the Ohio River does not grant the permittee the benefit of mixing and dilution with the entire regulated minimum flow of the Ohio River.

Notwithstanding DEP's and EHG's disagreement, DEP recognizes that EHG intends to move Outfall 022 to the main channel of the Ohio River. The identification of Outfall 022's receiving water as Mill Creek will be updated to "Mill Creek (Ohio River backwater)" during the interim period. That change has no material effect on the need for EHG to relocate Outfall 022 to the main channel of the Ohio River as a means to avoid having to comply with WQBELs based on the limited mixing conditions near the mouth of Mill Creek.

**DEP's Response to Comment 26-2. Schedules of Compliance Typographical Error:** DEP acknowledges the referenced error. However, the timeframes shown in Figure 2 are no longer accurate due to shutdown of the Plant.

**DEP's Response to Comment 27. Outfalls 042 and 043 Language:** DEP acknowledges that Outfalls 042 and 043 may be eligible for removal from the permit as part of a minor permit amendment if those discharges are tied into the Outfall 022 discharge pipeline. The option to amend the permit if there is justification to do so is available regardless of whether DEP explicitly states as much in a Fact Sheet.

**Internal Review and Recommendations**

**Other Changes/Information**

Pursuant to a March 5, 2020 amendment application, the permittee is updated to Energy Harbor Generation LLC, 168 East Market Street, Akron, OH 44308. LBR Acquisition Company, LLC, 2105 West 1800 North, Ogden UT 84404 will be the permittee on the final permit.

Footnotes and Part C Conditions

Part A, Footnotes (3), (4), (10), and (11) in the draft permit regarding requirements for Outfalls 007, 707, and 009 and Internal Monitoring Points 107, 307, 407, 507, and 607 are removed from the permit because the monitoring points referenced in those footnotes will not be permitted by renewed PA0027481. Part C, Condition VI referenced in Footnote (4) regarding the Toxics Reduction Evaluation for copper at Outfall 007 will be removed from the permit because Outfall 007 will not be authorized by PA0027481. Part C, Condition XI referenced in Footnote (11) regarding schedule of compliance requirements for total residual chlorine at Outfall 009 also is removed from the permit because Outfall 009 will not be permitted by PA0027481.

Part A, Footnotes (5) and (6) in the draft permit regarding compliance requirements for discharges of FGD wastewater after November 1, 2020 and requirements for bottom ash transport water after December 31, 2023 are removed from the permit. With the shutdown of the Bruce Mansfield Power Plant and the elimination of FGD wastewaters and bottom ash transport water, the requirements in those footnotes do not apply.

Part C, Condition II regarding Solids Management for sewage sludge is removed from the permit because there will be no sewage discharges from LBR.

As explained in DEP's Response to Comment 21, Part C, Condition X in the draft permit regarding requirements for the Bruce Mansfield Power Plant's cooling water intake structure will be removed from the permit because the former power plant's intake structure is now owned and operated by Shippingport Industrial Park, LLC (see PA0285013).

The following conditions in the draft permit will be removed because they no longer apply:

- Part C, Condition I.E. regarding optimization of chlorine dosages
- Part C, Condition I.F. regarding 2°F stream temperature changes
- Part C, Condition I.G. regarding limitations on biocide discharges from generating units
- Part C, Condition I.H. regarding no net addition of pollutants to non-contact cooling water
- Part C, Condition I.K. regarding cooling tower blowdown requirements

Part C, Condition J regarding outfall markers required by ORSANCO will be updated to refer only to Outfall 022.

The following condition will be added to Part C of the permit as explained later in this Fact Sheet Addendum:

> The permittee shall cap and close the disposal area and implement any other necessary structural and non-structural controls, best management practices, and pollution prevention measures to minimize the generation of combustion residual leachate.

The remaining footnotes and Part C conditions are renumbered accordingly.

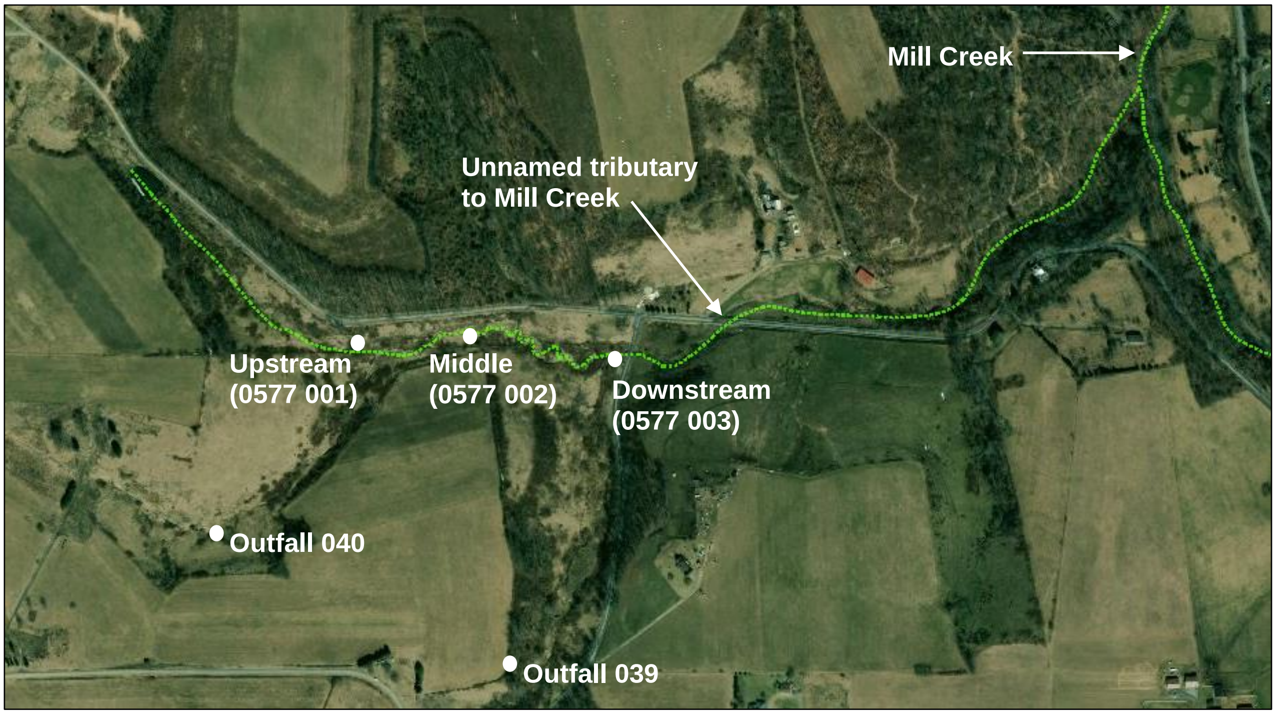
Outfalls 039 and 040

On p.100 of the Fact Sheet, DEP explained that Outfall 039 (Seep S-35P) and Outfall 040 (Seep S-35D) may need to be regulated by the NPDES permit if they exhibit a reasonable potential to cause or contribute to excursions above water quality criteria apart from any determination that the seeps are impacted by the impoundment. To evaluate whether the seeps are presently impacting unnamed tributary 33280 to Mill Creek, DEP proposed to conduct a stream survey.

On January 7, 2019, DEP collected samples for chemical analyses at three locations on unnamed tributary 33280 to Mill Creek, which receives effluent from Outfalls 039 and 040 combined with water from other springs and seeps. The sampling locations were: 1) upstream of where Outfall 040 discharges into the unnamed tributary; 2) between where Outfall 040 and Outfall 039 discharge to the unnamed tributary; and 3) downstream of where Outfall 039 discharges into the unnamed tributary. The approximate sampling locations and their Sample IDs are shown on Figure 1 below (upstream, middle, and downstream).

**Internal Review and Recommendations**

**Figure 1. Aerial Image of Unnamed Tributary**




Based on the analytical results (attached), DEP concludes the following:

- There is little impact from the S-35P and S-35D seeps (in combination with other flow in the small valleys in which those seeps are located) on the water quality of unnamed tributary 33280.
- The seeps will be permitted as NPDES discharges subject to the same TBELs and monitoring requirements as the other seeps to Mill Creek. No WQBELs will be imposed at Outfalls 039 and 040.

As explained in the Fact Sheet, FirstEnergy sought a determination from DEP's Waste Management Program that Seeps S-35P and S-35D no longer show impacts from the impoundment. DEP's Clean Water Program notes that its conclusions above do not confirm whether S-35P and S-35D are 'impacted by the impoundment'.

DEP further notes that there was insufficient space to conduct both upstream and downstream biological sampling of the unnamed tributary, so no biological survey was performed. However, based on information previously collected by DEP (i.e., not based on the January 2019 sampling), it is likely that the unnamed tributary is supporting its designated uses.

WQBELs Below Quantitation Limits

Total Mercury will be removed from the Part C condition relating to WQBELs below quantitation limits because more sensitive analytical methods exist (e.g., EPA Method 1631, Revision E).

ORSANCO Requirements for Mercury

25 Pa. Code Chapter 93.2(b) states: "When an interstate or international agency under an interstate compact or international agreement establishes water quality standards regulations applicable to surface waters of this Commonwealth, including wetlands, more stringent than those in this title, the more stringent standards apply."

ORSANCO is an interstate agency created under an interstate compact that has established water quality standards regulations (Pollution Control Standards) applicable to surface waters of this Commonwealth. Therefore, ORSANCO's requirements are implemented to the extent that they are more stringent than Pennsylvania's requirements.

**Internal Review and Recommendations**

Chapter 3, Section 3.1 of ORSANCO's 2019 Pollution Control Standards include a non-carcinogenic human health criterion for Total Mercury of 0.000012 mg/L (12 nanograms/liter). Pursuant to Chapter 4.F.6 of ORSANCO's Standards, mercury is a bioaccumulative chemical of concern (BCC). Chapter 4.F.1 of ORSANCO's Standards states that facilities with discharges which were in existence on or before October 16, 2003, must have mixing zones eliminated for any BCC as soon as practicable. Chapter 4.F.4 of ORSANCO's Standards states that mixing zones shall continue to be prohibited for BCCs for discharges from facilities that came into existence after October 16, 2003.

LBR is a facility with discharges which were in existence on or before October 16, 2003, so the requirements of Chapter 4.F.1 apply. Sections F.1 and F.2 in Chapter 4 of ORSANCO's Standards state:

1. Facilities with discharges which were in existence on or before October 16, 2003 will have mixing zones eliminated for any bioaccumulative chemical of concern (BCC) as soon as is practicable, as determined by the permitting authority, considering the following criteria:

    i. Measures taken during the current permit cycle and an evaluation of those measures proposed to be taken during the next permit cycle to reduce or eliminate the necessity of a mixing zone for each BCC;

    ii. The concentration and duration of the discharge, bioaccumulation factors and exposure considerations for each BCC for which the mixing zone is sought to be continued.

2. The necessity for continuation of a mixing zone for a BCC shall be evaluated and determined by the permitting authority during each permit renewal and reissuance utilizing the criteria above in subparagraph 1.i. and 1.ii.

The Pennsylvania Clean Streams Law and DEP's regulations do not define mixing zones, but DEP's policies allow "criteria compliance times" (CCTs), which function similarly to mixing zones. DEP's water quality modeling programs (the Toxics Management Spreadsheet and, formerly, PENTOXSD) do not assume instantaneous complete mixing between a discharge and receiving stream. Therefore, it is necessary to define the mixing characteristics of a discharge. In doing so, the point of compliance with the water quality criteria must be established, which is accomplished by assigning different CCTs for each criterion. The CCTs establish the locations where compliance with water quality criteria are expected to occur. Maximum CCTs used by DEP to develop water quality-based effluent limitations (WQBELs) are shown in the following table.

| Water Quality Criteria | Maximum Criteria Compliance Time |
|---|---|
| Acute Fish Criteria (AFC) | 15 minutes |
| Chronic Fish Criteria (CFC) | 12 hours |
| Threshold Human Health (THH) | 12 hours, or travel time to the nearest downstream water supply |
| Cancer Risk Level (CRL) | 12 hours |

Measures that will be undertaken by the permittee during the next permit cycle include:

- Capping the impoundment and eliminating surface infiltration that contributes to leachate generation and the leaching of mercury from CCBs disposed in the impoundment;

- Constructing additional wastewater management facilities including seep collection and rerouting, and a pipeline with diffuser into the main stem of the Ohio River;

- Posting financial assurance for capping the impoundment and for wastewater management facilities at or above current regulatory requirements for such financial assurance; and

- Discontinuing the routing of storm water from the LDS Pond at the former Bruce Mansfield Plant.

The average concentration of Total Mercury at Outfall 022 based on updated analytical data is 0.071 µg/L. Discharges from Outfall 022 are continuous, but, as stated above, leachate volumes and the discharge loadings of mercury and other toxic metals are expected to decrease significantly as capping proceeds. Discharge volumes also will decrease once SIP stops pumping storm water from the LDS Pond at the Plant to LBR.

**Internal Review and Recommendations**

After Outfall 022 is relocated to the Ohio River and a diffuser is installed, mixing is expected to be rapid. Exposure to elevated mercury concentrations should be limited due to the rapid mixing, but bioaccumulation of mercury in fish tissues over the long-term would still lead DEP to recommend the eventual elimination of a mixing allowance consistent with ORSANCO's Standards. Mixing will be allowed for this permit term consistent with DEP's consideration of the factors in Chapter 4, Section F.1 of ORSANCO's Standards (see above). DEP will evaluate the necessity for continuation of a mixing zone for Total Mercury with the next renewal. To facilitate that evaluation and the availability of meaningful results relative to ORSANCO's 12 ng/L criterion, sampling for Total Mercury will be required 2/month using grab sampling during the post-relocation period and the use of low-level analytical methods will be required for Total Mercury (e.g., EPA Method 1631, Revision E). In addition, a condition will be included in the permit that requires the permittee to report measures that would be taken to reduce or eliminate the need for a mixing zone after capping is complete and Outfall 022 is extended to the main stem of the Ohio River.

Outfalls 021, 042, and 043 currently discharge to the remaining section of Little Blue Run (what is left of the stream below the dam) and Outfall 027 discharges into the Outfall 022 discharge pipeline downstream of the Outfall 022 sampling point. Discharges at Outfalls 021, 042, and 043 will be routed to Outfall 022 as part of the Outfall 022 relocation. Samples of Outfall 022's effluent upstream of the tie-in points for those outfalls will not capture the effect of those discharges on Outfall 022's effluent at the point of discharge since they will flow into the discharge pipeline downstream of where Outfall 022's samples are collected. Therefore, the sampling location for Outfall 022 for the post-relocation period will be updated as follows:

> "at Outfall 022, downstream of Outfalls 021, 027, 042 (S-66), and 043 (S-89)"

Low-level analyses also will be required for Total Mercury at those outfalls.

<u>TSS and Oil & Grease Limits at Outfall 022</u>

The daily maximum limit for TSS at Outfall 022 was adjusted downward for the 2018 draft permit to account for a more stringent maximum TSS limit of 50 mg/L for coal pile runoff from 40 CFR § 423.12(b)(9). Runoff from the cleaned coal pile area still discharges through Outfall 022, but the coal pile is gone, so coal pile runoff no longer discharges through Outfall 022. Therefore, the daily maximum TSS limit will revert to the unadjusted concentration of 100 mg/L.

Effluent limits for Oil & Grease at Outfall 022 were adjusted downward for the 2018 draft permit because discharges of coal pile runoff and industrial storm water routed to that outfall are not authorized to contain and should not contain Oil & Grease at concentrations up to 15 mg/L or 20 mg/L. For the purposes of calculating Oil & Grease limits at Outfall 022, the concentrations in coal pile runoff and storm water were 5 mg/L, which is DEP's target quantitation limit for Oil & Grease. Coal pile runoff no longer exists, but storm water runoff from the former coal pile area also should not contain detectable concentrations of Oil & Grease. Therefore, the Oil & Grease limits at Outfall 022 will remain unchanged.

<u>Water Quality Criteria Updates</u>

Pursuant to EPA's approval of Pennsylvania's 2017 Triennial Review of Water Quality Standards and corresponding regulatory changes published in the *Pennsylvania Bulletin* on July 11, 2020, new water quality criteria apply to waters of the Commonwealth. The modified criteria do not require any changes to the WQBELs calculated for LBR's discharges.

<u>Standard Language in Parts A and B of the Permit</u>

The standard language in Parts A and B of the permit is updated to be consistent with DEP's most recent permit template.

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By email dated August 31, 2018, EPA provided the following comments on the draft permit:

> EPA has chosen to perform a limited review of the draft permit based on the implementation dates set forth in Part 423 of the Title 40 of the Code of Federal Regulations (CFR). As a result of our limited review, we will not be providing any comment related to the requirements above. If for any reason, the draft permit is modified from the version that was submitted to us on August 1, 2018, please forward a copy of the new draft permit to us for review before issuance.

EPA's comments do not prompt any changes to the permit.

| Internal Review and Recommendations |
| --- |
| A public hearing was held on November 28, 2018 at the request of various interested parties. Responses to testimony recorded at the public hearing and to additional comments submitted to DEP up to ten days after the hearing are provided in a separate Comment/Response Document. The responses in that Comment/Response Document do not result in any changes to the final NPDES permit. |
| No other comments were received on the draft permit. Due to the significant changes made to the draft permit, the permit will be published in draft for a second 30-day comment period. |

**<u>Combustion Residual Leachate</u>**

As discussed in DEP's Response to Sierra Club Comment A, BAT limits for combustion residual leachate in 40 CFR Part 423 were vacated and remanded to EPA for reconsideration by the Fifth Circuit Court's opinion in *SWEPCO*. EPA's 2020 Reconsideration Rule did not establish new BAT limits for combustion residual leachate. In addition, as discussed in the introductory section of this Fact Sheet Addendum, LBR is no longer regulated by 40 CFR Part 423 because the associated power-generating units at the Bruce Mansfield Plant were permanently deactivated and the LBR disposal area is a retired disposal unit that is currently undergoing closure. EPA-promulgated effluent limits under 40 CFR Part 423 are inapplicable. Also, DEP analyzed whether other ELGs apply and did not find other applicable ELGs. Therefore, DEP is obligated by 40 CFR §§ 125.3(c)(2) (incorporated by reference in DEP's regulations at 25 Pa. Code § 92a.3(b)(4))[1] to consider case-by-case technology-based effluent limits (TBELs) using Best Professional Judgement (BPJ).

Notwithstanding the inapplicability of 40 CFR Part 423 to discharges from LBR, pursuant to DEP's BPJ, the ELGs for combustion residual leachate in 40 CFR Part 423 are considered as part of DEP's development of permit requirements for combustion residual leachate discharges from LBR during LBR's post-retirement/post-closure period.

The BPT limits in § 423.12(b)(11) that apply to combustion residual leachate are still in effect following the Fifth Circuit Court's decision in *SWEPCO* and will be adopted as BPT limits for discharges of combustion residual leachate from LBR. When establishing BPT limits in § 423.12(b)(11), EPA considered the same regulatory factors as those that must be considered when setting case-by-case BPT limits under 40 CFR § 125.3(d)(1), so EPA's consideration of those factors substitutes for DEP's consideration of those factors. Section 125.3(c)(2) also requires consideration of the following:

(i) The appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information; and

(ii) Any unique factors relating to the applicant.

The primary factor that is unique to LBR (i.e., the factor that differs from the factors EPA considered when establishing BPT for combustion residual leachate) is that LBR is retired and undergoing closure. The cessation of coal-fired power generation and the retirement of a CCB disposal site alters the economics of treatment because the operation of treatment technologies for ongoing, post-shutdown combustion residual leachate discharges depends on sources of revenue other than the generation of electricity. That has more of an impact on BAT than BPT because BPT's cost considerations are based on a cost-benefit comparison (the benefit being pollutant removal), which would not change for leachate discharges after generating units permanently cease operating, even if there is no longer any revenue from power generation used to fund wastewater treatment (more on this later).

<u>Existing and Anticipated Management of Combustion Residual Leachate</u>

Supernatant generated in the LBR disposal area is controlled by a pH neutralization system and discharges through the LBR dam's secondary spillway to an equalization pond at the base of the dam (see CEC Figure No. 1). The equalization/settling pond is referred to as the Stilling Basin. Wastewaters currently treated by the Stilling Basin include:

- Supernatant/leachate from the LBR Impoundment (pretreated by a pH neutralization system)

[1] 40 CFR § 125.3(c) ***Methods of imposing technology-based treatment requirements in permits.*** Technology-based treatment requirements may be imposed through one of the following three methods:

(1) Application of EPA-promulgated effluent limitations developed under section 304 of the Act to dischargers by category or subcategory. These effluent limitations are not applicable to the extent that they have been remanded or withdrawn. However, in the case of a court remand, determinations underlying effluent limitations shall be binding in permit issuance proceedings where those determinations are not required to be reexamined by a court remanding the regulations. In addition, dischargers may seek fundamentally different factors variances from these effluent limitations under § 122.21 and subpart D of this part.

(2) On a case-by-case basis under section 402(a)(1) of the Act, to the extent that EPA-promulgated effluent limitations are inapplicable. The permit writer shall apply the appropriate factors listed in § 125.3(d) and shall consider:

(i) The appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information; and

(ii) Any unique factors relating to the applicant.

[*Comment:* These factors must be considered in all cases, regardless of whether the permit is being issued by EPA or an approved State.]

(3) Through a combination of the methods in paragraphs (d) (1) and (2) of this section. Where promulgated effluent limitations guidelines only apply to certain aspects of the discharger's operation, or to certain pollutants, other aspects or activities are subject to regulation on a case-by-case basis in order to carry out the provisions of the Act.

- Storm water pumped to the secondary spillway from the Low Dissolved Solids (LDS) Pond.
- Discharges from the Upper Freeport Collection System, Lawrenceville Collection System, Laughlin Collection System, and Cove M Collection System
- Stormwater runoff from the Facility
- The LBR Dam's Toe Drain discharge
- Right and Left Abutment Area spring discharges


**Image by DEP. February 26, 2013.**

The Stilling Basin and the LDS Pond at the former Bruce Mansfield Power Plant are surface impoundments that allow suspended solids to settle. The Stilling Basin discharges through Outfall 022.

Outfall 027 ties into the Outfall 022 discharge pipeline downstream of the Stilling Basin, so discharges from Outfall 027 do not receive treatment. All other discharges receive no treatment.

Leachate generation and management during closure and post-closure were described in Attachment 17R-1 of the Closure Plan as follows:

> Leachate generation includes contact water and drainage form the toe drain at the dam. Impacted water from seeps from the Lawrenceville, Laughlin and Upper Freeport collection systems and the Cove M collector trench and groundwater pumping well also discharge to the impoundment until final closure is completed. Leachate generation will also include impacted water pumped from groundwater pumping wells to be installed upgradient of Laughlin Valley and Lawrenceville. The contact water and impacted water are managed through the impoundment and the pH-adjustment facility. The secondary spillway discharges to the stilling basin through piping and open channels. The toe drain at the dam discharges to a surface water channel which flows to the stilling basin. The stilling basin is discharged under NPDES Permit PA0027481 through Outfall 022. Average flows are measured using a Parshall Flume at the NPDES Outfall 022 Sampling Location. […]

Supernatant (referred to as leachate) leaving the disposal facility passes through the secondary spillway which is an 18-inch diameter pipe through the right abutment. The leachate first enters a concrete inlet structure and the passes through the pH monitoring vault. Depending on the pH, a sulfuric acid or sodium hydroxide/lime drip system is added to the discharge at the inlet structure in order to maintain the pH of the discharge to within permit limits. Should either the pH monitoring system or the pH adjustment system malfunction, or should the pH adjustment system lose electrical power, valves on both the leachate discharge and the acid addition systems automatically close, stopping the discharge of leachate from the impoundment. An alarm is transferred via phone lines to the Bruce Mansfield Plant notifying the waste disposal area control room that the discharge from the impoundment has been interrupted.

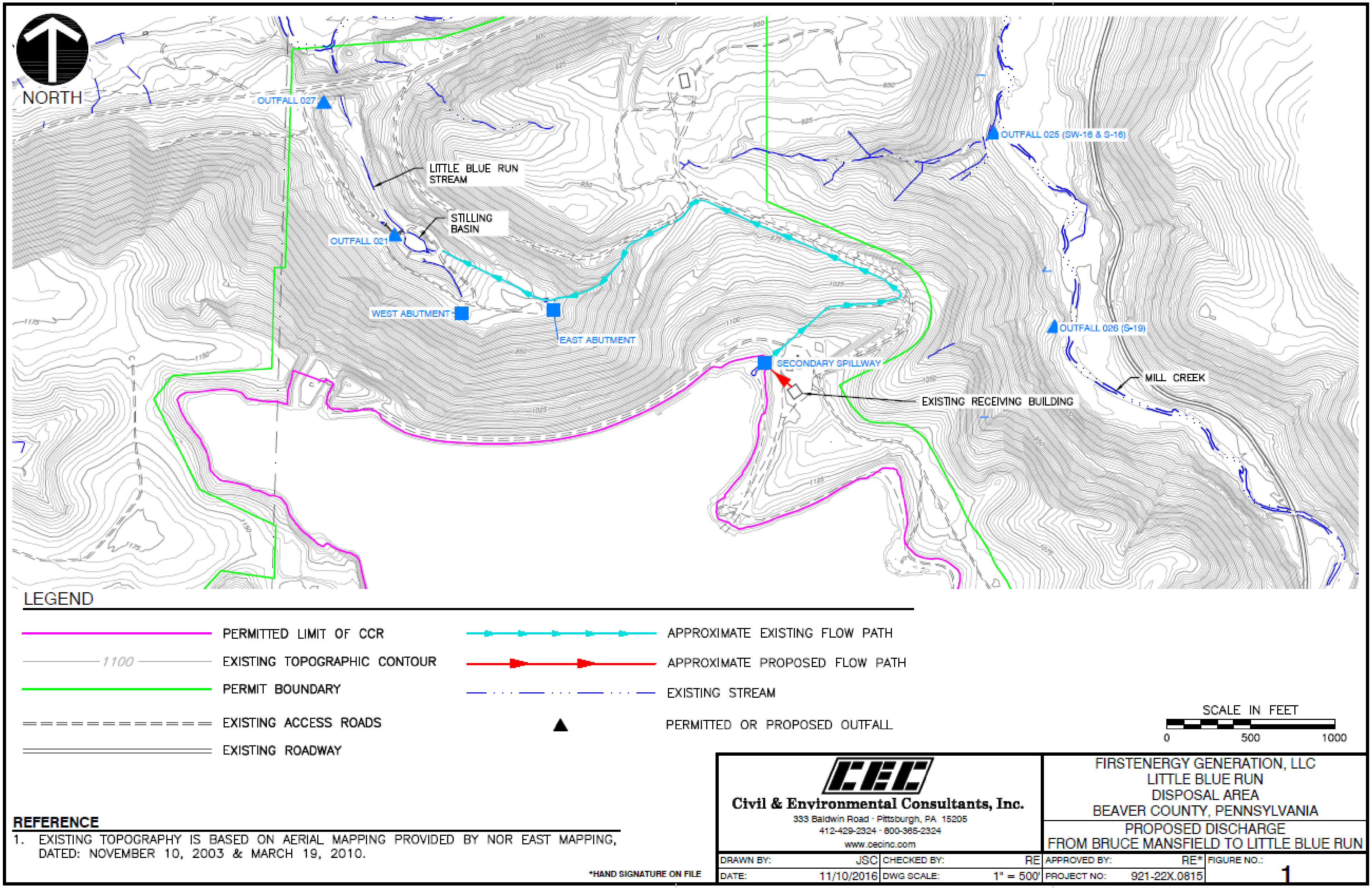
The seep collection systems were installed to address seeps emanating from the outer slopes of the impoundment. The collection systems consist of perforated gravity drains in collector trenches, drop inlets, collection sumps, valve vaults, pumps and forcemain piping. The Lawrenceville system includes several locations, including S-30, S-31, the former Byard property, and the Bodnar property. Additional existing seep collection systems include the Laughlin and upper freeport locations. Water collected by these systems is pumped to a combined collection sump and eventually route to the impoundment via a forcemain pipe. These systems will continue to operate during operations and the closure construction period. […]

During operations and the closure period, additional seep collection systems may be installed around the impoundment. These seeps will be routed back to the impoundment and treated when discharged through the secondary spillway structure. All water discharged through the secondary spillway structure will continue to be routed through the pH-adjustment facility and the stilling basin, and then sent to the Ohio River. […]

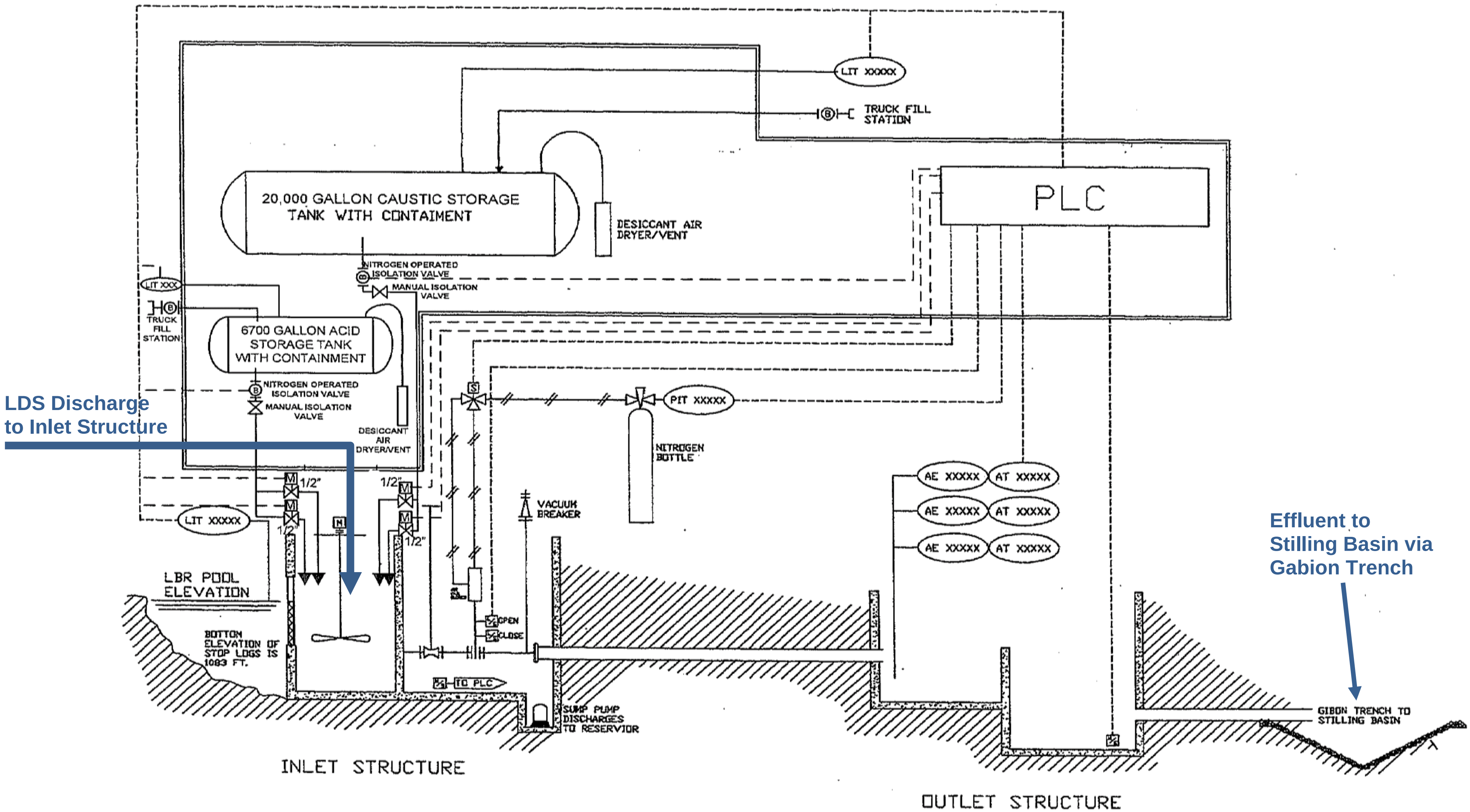
The seep collection systems currently discharge to the impoundment via forcemain pipe. During closure construction, the forcemain pipes that are currently installed within the CCB materials will be replaced with forcemain piping installed within the final cover system. After final closure is complete, the new forcemain pipe will connect all the forcemain piping from each seep collection system and the Cove M collector trench and pumping well. The forcemain piping will discharge to the secondary spillway and pH adjustment system. […]

The impacted water from the collection systems will discharge to the pool through the end of the closure period. After closure is complete, the impacted water from collection systems will discharge through a common forcemain to the secondary spillway and pH adjustment system on the east abutment of the dam. All flows discharged to the secondary spillway receive treatment on an automatic, as-needed basis with sulfuric acid or sodium hydroxide to adjust the pH of the outfall discharge. If the quality of water discharged from the pool area varies; the treatment changes as necessary to keep the pH within acceptable limits. Although the flow equalization in the current pool will not be present after closure, the water quality of the springs and seeps is expected to improve after closure to an almost neutral pH level. FG understands that this change in operations may require the pH adjustment system to be modified and may also require a revision to the NPDES Permit. […]

After closure construction is complete and during post-closure, the contact water volumes will no longer be present. The leachate generation will only include the toe drain at the dam and impacted water from the seep collection systems. Current water qualities as the toe drain and seep collection systems are provided in Attachment 17R-2. Although the seepage rates at the seep collection systems are expected to decline during closure activities, the water quality at these locations is anticipated to change little during the closure period. The water quality at the toe drain is a good representation of the post-closure seepage quality.


NORTH
OUTFALL 027
LITTLE BLUE RUN STREAM
STILLING BASIN
OUTFALL 021
WEST ABUTMENT
EAST ABUTMENT
OUTFALL 025 (SW-16 & S-16)
OUTFALL 026 (S-19)
SECONDARY SPILLWAY
MILL CREEK
EXISTING RECEIVING BUILDING
LEGEND
PERMITTED LIMIT OF CCR
1100
EXISTING TOPOGRAPHIC CONTOUR
PERMIT BOUNDARY
EXISTING ACCESS ROADS
EXISTING ROADWAY
APPROXIMATE EXISTING FLOW PATH
APPROXIMATE PROPOSED FLOW PATH
EXISTING STREAM
PERMITTED OR PROPOSED OUTFALL
SCALE IN FEET
0
500
1000
REFERENCE
1. EXISTING TOPOGRAPHY IS BASED ON AERIAL MAPPING PROVIDED BY NOR EAST MAPPING, DATED: NOVEMBER 10, 2003 & MARCH 19, 2010.
*HAND SIGNATURE ON FILE
Civil & Environmental Consultants, Inc.
333 Baldwin Road · Pittsburgh, PA 15205
412-429-2324 · 800-365-2324
www.cecinc.com
FIRSTENERGY GENERATION, LLC
LITTLE BLUE RUN
DISPOSAL AREA
BEAVER COUNTY, PENNSYLVANIA
PROPOSED DISCHARGE
FROM BRUCE MANSFIELD TO LITTLE BLUE RUN
DRAWN BY: JSC
CHECKED BY: RE
APPROVED BY: RE*
FIGURE NO.: 1
DATE: 11/10/2016
DWG SCALE: 1" = 500'
PROJECT NO: 921-22X.0815

## Little Blue Run pH Adjustment System



Evaluation of Best Available Technology Economically Achievable (BAT)

Pursuant to 40 CFR § 125.3(c)(2), case-by-case TBELs established using BPJ are to be developed considering the following factors for BAT as the level of technology-based control for which there are no EPA-promulgated effluent limitations to guide the permitting of LBR's discharges of combustion residual leachate.

General Considerations

(i) The appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information

(ii) Any unique factors relating to the applicant

Best Available Technology Economically Achievable (BAT); 40 CFR § 125.3(d)(3):

(i) The age of equipment and facilities involved

(ii) The process employed

(iii) The engineering aspects of the application of various types of control techniques

(iv) Process changes

(v) The cost of achieving such effluent reduction

(vi) Non-water quality environmental impact (including energy requirements).

*Available Treatment and Control Technologies*

In the 2015 TDD, based on information from the Steam Electric Survey, site visits, and industry profile information, EPA identified the following wastewater treatment technologies as wastewater treatment systems or management practices currently used, or considered, to treat and manage combustion residual leachate: surface impoundments, chemical precipitation, biological treatment (an anoxic/anaerobic system with fixed-film bioreactors), and constructed wetlands. For retired CCB disposal sites like LBR, DEP also identifies capping and closure as a control technology. Capping will reduce the volume of water percolating through the disposed wastes and consequently reduce both the volume of leachate generated and the gross pollutant loadings that discharge with that leachate. As stated on p. 5-16 of the "U.S. Environmental Protection Agency NPDES Permit Writers' Manual" [EPA-833-K-10-001, September 2010], "BAT limitations may be based on effluent reductions attainable through changes in a facility's processes and operations", so BAT does not necessarily require wastewater treatment.

Surface impoundments were rejected as BAT when the Fifth Circuit Court vacated and remanded BAT limits for combustion residual leachate, but the remaining technologies EPA identified are still available technologies for point source discharges of combustion residual leachate and may represent BAT for LBR's leachate discharges (if determined by DEP) or national BAT for combustion residual leachate (if determined by EPA as part of a rulemaking that modifies Part 423). Also, surface impoundments can be used in combination with other technologies as part of BAT.

For the 2015 Final Rule, EPA imposed New Source Performance Standards (NSPS) for combustion residual leachate by transferring the BAT limitations derived using data representing treatment of FGD wastewater via chemical precipitation. EPA is required by Section 306 of the Clean Water Act to develop NSPS considering the cost of achieving effluent reduction and non-water quality environmental impacts and energy requirements (only two of the six factors considered for BAT). As stated in Section 306(a)(1) of the Clean Water Act, NSPS reflect the "greatest degree of effluent reduction which the Administrator determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants." NSPS for combustion residual leachate were not challenged by the environmental petitioners in *SWEPCO*, so the NSPS for combustion residual leachate remain in effect. Therefore, the best demonstrated control technology for combustion residual leachate is chemical precipitation.

The level of technology-based control achieved by BAT is generally bounded by the BPT and NSPS levels of technology-based control with BPT for combustion residual leachate identified as surface impoundments and NSPS for combustion residual leachate identified as chemical precipitation. Since BAT is not surface impoundments (per *SWEPCO*), BAT could be identified as chemical precipitation if the additional factors considered for BAT beyond those considered for NSPS justify that determination for LBR's discharges. Additionally, if the best demonstrated control technology for combustion residual leachate is chemical precipitation, then more sophisticated treatment technologies are not implicated for BAT as a level of control employing a less-than-best-demonstrated control technology. That is, if new sources of combustion residual leachate are not regulated by Part 423 based on the use of chemical precipitation plus biological treatment or chemical precipitation plus evaporation, then existing sources of combustion residual leachate from retired CCB disposal sites reasonably would not be held to a higher standard of performance than those new sources. The factors that preclude the regulation of new sources of combustion residual leachate based on chemical precipitation plus biological treatment or chemical precipitation plus evaporation also would preclude the regulation of existing sources of combustion residual leachate, particularly for leachate from retired CCB disposal sites where those sites 1) are not associated with an active power-generating unit; 2) receive no new waste inputs that would increase the potential load of pollutants that could be leached and discharged; 3) generate less leachate than active disposal sites when capped and closed; and 4) generate leachate with lower pollutant concentrations as the Closure Plan anticipates for LBR's leachate.

**Table 1. BAT for Combustion Residual Leachate Over Time**

| Decision Basis | BPT | | BAT | | NSPS |
|---|---|---|---|---|---|
| EPA:<br>2015 Final Rule | Surface Impoundments | = | Surface Impoundments | | Chemical Precipitation |
| 5th Circuit Court:<br>*SWEPCO* | Surface Impoundments | ≠ | ?<br>[Vacated & Remanded] | | Chemical Precipitation |
| PADEP:<br>Potential Site-Specific BPJ | Surface Impoundments | | Chemical Precipitation? | =? | Chemical Precipitation |

Other than chemical precipitation, constructed wetlands also may be appropriate as site-specific BAT for combustion residual leachate because the treatment effectiveness of constructed wetlands is comparable to (or less than) the treatment effectiveness of chemical precipitation depending on the pollutant parameter. Capping also may be appropriate as site-specific BAT because capping will reduce the volume of leachate that could potentially require treatment. EPA's descriptions of chemical precipitation and constructed wetlands technologies from Sections 7.1.2 and 7.1.5 of the 2015 TDD are reproduced below for reference. DEP's description of capping is provided after the 2015 TDD citations.

**<u>Chemical Precipitation</u>**

In a chemical precipitation wastewater treatment system, plants add chemicals to the wastewater to alter the physical state of dissolved and suspended solids to help settle and remove them. The specific chemical(s) used depends upon the type of pollutant requiring removal. EPA identified 39 steam electric power plants using some form of chemical precipitation as part of their FGD wastewater treatment system. Powerplants commonly use the following three types of systems to precipitate metals out of FGD wastewater:

- Hydroxide precipitation (37 plants).
- Iron coprecipitation (35 plants).
- Organosulfide precipitation (27 plants).

In a hydroxide precipitation system, plants add lime (calcium hydroxide) to elevate the pH of the wastewater to a designated set point, helping precipitate metals into insoluble metal hydroxides that can be removed by settling or filtration. Sodium hydroxide can also be used in this type of system, but it is more expensive than lime and, therefore, not as common in the industry.

Thirty-five power plants use iron coprecipitation to increase the removal of certain metals in a hydroxide precipitation system. Plants can add ferric (or ferrous) chloride to the precipitation system to coprecipitate additional metals and organic matter. The ferric chloride also acts as a coagulant, forming a dense floc that enhances settling of the metals precipitate in downstream clarification stages.

Organosulfide precipitation systems use organosulfide chemicals (*e.g.*, trimercapto-s-triazine (TMT), Nalmet®1689, sodium sulfide) to precipitate and remove heavy metals, similar to the set of metals removed in hydroxide precipitation. Plants operating organosulfide precipitation systems typically use TMT-15®, Nalmet®1689, MetClear™, sodium sulfide, or other organosulfide chemicals in the system. The plants may test several different organosulfide chemicals to determine the one most appropriate for their treatment system. Based on discussions with system operators, EPA has determined that several plants switched from using TMT-15® when the treatment system started operation to using either Nalmet® 1689 or MetClear™ products. Plants made this switch from TMT-

15® products because when they started working on optimizing the operation of the system, they performed studies with several different organosulfide chemicals, and the results exhibited significantly lower effluent mercury concentrations with Nalmet® 1689 or MetClear™ products [ERG, 2014a;ERG, 2015b]. Organosulfide precipitation can also provide more optimal removal of metals with lower solubilities, such as mercury, than hydroxide precipitation or hydroxide precipitation with iron coprecipitation. The EPA sampling data suggest that adding organosulfide to the FGD wastewater can reduce dissolved mercury concentrations to less than 10 parts per trillion [ERG, 2012a]. Organosulfide precipitation is more effective than hydroxide precipitation in removing metals with low solubilities because metal sulfides have lower solubilities than metal hydroxides. Because organosulfide precipitation is more expensive than hydroxide precipitation, plants usually use hydroxide precipitation first to remove most of the metals, and then organosulfide precipitation to remove the remaining low solubility metals. This configuration overall requires less organosulfide, therefore reducing the expense for the bulk metals removal.

**Constructed Wetlands**

A constructed wetland treatment system is an engineered system that uses natural biological processes involving wetland vegetation, soils, and microbial activity to reduce the concentrations of metals, nutrients, and TSS in wastewater. A constructed wetland typically consists of several cells that contain bacteria and vegetation (e.g., bulrush, cattails, peat moss), which the steam electric power plant selects based on the specific pollutants targeted for removal. The vegetation completely fills each cell and produces organic matter (i.e., carbon) used by the bacteria. In the aqueous phase of the wastewater, the bacteria reduce metals, such as mercury and selenium, to their elemental state. The metals removed by the bacteria will partition into the sediment, where they either accumulate or are absorbed by the vegetation in the wetland cells [EPRI, 2006; Rogers, 2005].

**Capping and Closure**

Capping and closing a disposal site includes the installation of a final cover system. According to 25 Pa. Code § 289.242, the components of final cover systems for residual waste disposal impoundments includes: 1) an impermeable cap (no more permeable than $1.0\times10^{-7}$ cm/sec) that minimizes the migration of precipitation into the waste, is resistant to physical and chemical failure, and covers all areas where waste is disposed; 2) a drainage layer capable of transmitting flow and preventing erosion of the soil layer; 3) a uniform later of material over the drainage layer to support vegetation and protect the cap; and 4) a permanent vegetative cover. Capping and closing also may include perimeter diversion channels to prevent run-on to the final cover system.

*Treatment Performance*

In Sections 6 and 10 of the 2015 TDD, EPA summarized the untreated wastewater characteristics of combustion residual leachate and the average pollutant concentrations in leachate treated using the technologies commonly used to treat combustion residual leachate—chemical precipitation with/without biological treatment. Industry data for constructed wetlands used to treat combustion residual leachate were not summarized in the 2015 TDD, but treatability data were developed by the Electric Power Research Institute (EPRI). From May 1996 through August 1998, EPRI conducted a 28-month study of the effectiveness of constructed wetlands for trace element removal from combustion residual leachate at the Springdale CCB Landfill in Springdale, PA. The results of the Springdale study were described by EPRI in a November 2001 final report as follows:

> The study focused on eighteen trace elements present at elevated concentrations in coal-ash leachate from the utility: sulfur (S), boron (B), strontium (Sr), manganese (Mn) and iron (Fe) at 449, 30, 6, 2 and 1 mg $L^{-1}$, respectively. The wetland had mixed efficiency for removing the trace elements. Almost all of the Fe and Mn were removed from the water, 50 to 70% of the Co, Ni and As were removed, but only 0.01 to 30% of the other 13 trace elements were removed from the water. Importantly, almost none of the S, B and Sr were removed. The sediments were the primary sinks for the trace elements removed from the water, and there was no significant increase in the concentration of trace elements in the sediment over time. Cattail (*Typha latifolia*) represented over 80% of the living biomass in the wetland and constituted only a very minor sink for the trace elements removed; 8% of the Cd was accumulated in the shoots, but less than 1% of most of the other trace elements were accumulated there. The roots of cattail had an equally small contribution to the removal of trace elements, except for Al of which the roots accounted for 20%. A novel finding was that, in the winter, the dead tissues of cattail which had fallen into the surface water appear to act as a site of accumulation of trace elements; higher concentrations of many elements, but especially immobile Mn, were seen in this material. We also screened a variety of plant species growing in the wetland for their ability to accumulate trace elements. The four emergent species, *Sagittaria latifolia*, *Panicum dichotomiflorum*, *Polygonum pensylvanicum* all had very similar concentrations of trace elements but two submerged macro-algae, *Chara* spp. and *Spirogyra* spp. had approximately 10-fold higher trace element uptake than the rooted species. Since cattail produced the highest biomass, it can accumulate the highest net amount of

trace elements. Cattail and *Chara* are the most promising species for trace element removal from coal-ash leachate at the Allegheny Power Services Springdale wetland. [2]

Treatability data for constructed wetlands also are available for the constructed wetlands at EHG's Hatfield CCB Landfill (NPDES PA0255840), which was formerly operated as a captive landfill for CCBs from the Hatfield's Ferry Power Station. The Hatfield CCB Landfill was approved to receive CCBs from both the Hatfield's Ferry Power Station and the Bruce Mansfield Power Plant, but no CCBs have been disposed at the Hatfield CCB Landfill since those two power plants were decommissioned. DEP's understanding is that the Hatfield CCB Landfill never received CCBs from the Bruce Mansfield Power Plant even though it was approved to do so by DEP's Waste Management Program. Presently, the Hatfield CCB Landfill is categorized as a retired CCB landfill. Although, that landfill has not undergone capping and closure.

The effect on leachate quality and quantity resulting from the capping and closure of a retired CCB disposal site was not summarized by EPA in the 2015 TDD because discharges from retired CCB disposal sites are not regulated by Part 423. However, according to EHG's 2022 application update, LBR is about 50% capped, so comparing current leachate quality to pre-capping leachate quality will provide some information on the effect of capping.

Treatment performance data and capital cost data for a variety of mine drainage treatment projects, including passive constructed wetland treatment systems, are available on www.datashed.org. Datashed.org is a free, web-based, GIS-enabled database developed by Stream Restoration Incorporated (SRI). SRI is a small 501(c)(3) nonprofit organization dedicated to restoring streams that have been impacted by human activity. The Datashed website provides a variety of documents, design drawings, maps, photographs, and water quality data to assist watershed groups, nonprofits, volunteers, students, industry, and government agencies in the operation and maintenance of passive treatment systems and manage their watershed restoration efforts. Each passive treatment system or stream project has its own unique webpage, but the level of detail for each system varies.

Table 2 and Table 3, below, summarize the average concentrations achieved by constructed wetlands (based on EPRI's Springdale study), chemical precipitation, and chemical precipitation plus biological treatment for the treatment of combustion residual leachate. Datashed.org treatability data for the treatment of abandoned mine drainage using aerobic wetlands are not summarized in the tables because it is unknown whether the treatability data represent properly operated and maintained treatment systems. The characteristics of LBR's combustion residual leachate also differ from those of abandoned mine drainage. The capital cost data for constructed wetlands on Datashed.org are still useful for DEP's analysis (discussed later).

Table 2 and Table 3 also summarize the average concentrations of pollutants in discharges from LBR's outfalls with Table 2 summarizing pre-2018 data and Table 3 summarizing post-2020 data where LBR is approximately 50% capped, covered, and vegetated. For reference, the average concentrations achieved by chemical precipitation plus evaporation for the treatment of Flue Gas Desulfurization wastewater also are shown. Evaporation and membrane filtration were not identified by EPA as appropriate technologies for the treatment of combustion residual leachate, but the characteristics of combustion residual leachate are similar to the characteristics of FGD wastewater, so the evaporation data are presented for reference.

Generally, the treatment technologies are listed from left to right in Tables 2 and 3 in order of increasing treatment effectiveness and increasing costs for treatment with constructed wetlands achieving the lowest removals overall with the lowest costs for treatment and evaporation/membrane filtration achieving the highest removals with the highest costs for treatment. In some cases, the average concentrations of pollutants in the effluent from a more effective treatment technology are higher than those in the effluent from a less effective treatment technology.

The color coding in the tables is used to identify the concentrations of pollutants in LBR's effluent that exceed one of the corresponding treatability values. Results shaded yellow exceed the average concentration of wastewater treated by chemical precipitation plus biological treatment. Results shaded orange exceed the average concentration of wastewater treated by chemical precipitation (and, by extension, chemical precipitation plus biological treatment). Results shaded red exceed the average concentration of wastewater treated by constructed wetlands (and chemical precipitation, and chemical precipitation plus biological treatment). Results exceeding the treatability values for chemical precipitation plus evaporation are not color coded because evaporation was not identified by EPA as an appropriate technology for combustion residual leachate.

[2] Electric Power Research Institute, Inc. (5 November 2001). *The Allegheny Power Service Constructed Wetland at Springdale: The Role of Plants in the Removal of Trace Elements*, Product ID 1006504. https://www.epri.com/research/products/000000000001006504.

The basis for the color coding is to identify pollutants that are characteristic of LBR's leachate and which may be appropriate for technology-based regulation. For example, if a pollutant is present in LBR's effluent at a concentration that is treatable by the least sophisticated and least expensive treatment technology (red shading—treatable by constructed wetlands), then technology-based regulation of that pollutant may be more reasonable than technology-based regulation of a pollutant that is present at a concentration that is treatable only by the most sophisticated and most expensive treatment technology (yellow shading—treatable by chemical precipitation plus biological treatment). DEP notes that this is just a screening methodology and that the concentration of a pollutant in a discharge at a level greater than the average concentration achieved by a treatment technology does not automatically make that technology BAT because other factors listed in 40 CFR § 125.3(d)(3) must be considered.

Comparing the number of shaded results between Tables 2 and 3 also provides an indication of the effectiveness of capping and closing the impoundment because Table 2 results are from a time when little capping was complete and Table 3 results are from a time when capping is further along. Table 2 results are presented to enable an evaluation of the effectiveness of capping and closing the impoundment, but the determination of BAT for discharges of combustion residual leachate from LBR is based on the most recent data in Table 3.

Based on Table 3, the parameters that are characteristically present in LBR's combustion residual leachate at levels that may be treatable by one of the listed technologies are Sulfate, Nitrate-Nitrite as N, Total Aluminum, and Total Iron. In addition, Total Arsenic is present at Outfall 022 and Outfall 027 and Total Mercury is present at Outfall 022 at levels that may be treatable by one of the listed technologies.

Based on a comparison of Table 2 and Table 3 data, capping is a likely cause for observed reductions in the concentrations of aluminum, molybdenum, nickel, selenium, and thallium at many outfalls.

The following sections discuss the factors that must be considered when establishing case-by-case BAT TBELs.

*Equipment and Facility Age*

Equipment and facility age impact the feasibility, cost, and reasonableness of modifying existing systems to implement a technology. Older facilities may be subject to more costly modifications than newer facilities (e.g., upgrading/replacing old treatment units to make them current or to make them compatible with new treatment systems).

Equipment age does not significantly affect the ability of EHG to use additional treatment systems at LBR because the equipment currently used to manage wastewaters at LBR—the Stilling Basin, the pH Adjustment System, and related wastewater conveyance systems—are simplified in nature. That is, there are no complex site-specific process equipment or facilities that would be costly to upgrade or replace. If necessary, additional wastewater treatment technologies can be plumbed into the existing discharge pathway with the existing facilities acting as pretreatment or post-treatment/polishing for additional treatment systems. Also, new, and modified wastewater conveyance structures are already planned as part of closure.

Facility age will impact wastewater quality as leachable compounds decrease over time and the disposed wastes slowly dewater as the CCBs settle. A substantial reduction in leachate generated by the impoundment is expected to occur after capping and closure of the impoundment. Form 17R Attachment 2 of the Closure Plan estimates an 85% reduction in the flow rate of leachate generated by the impoundment between pre- and post-closure states.

**LEACHATE GENERATION SUMMARY TABLE**

| Leachate Generation Timeframe | Proposed Configuration | Estimated Total Leachate Generation |
|---|---|---|
| Pre-Closure (Existing) | Partial seeding of CCB, existing pool | 2050 gpm |
| Closure | Partial seeding of CCB, reduced pool, no cap installation | 1120 gpm |
| Post-Closure | Geomembrane, geotextile and 1-foot soil cover, positively draining pool | 300 gpm |

**Table 2. Average Concentration Achieved by Treatment Technologies and Average Concentrations of LBR's Discharges (Pre-2018)**

| Analyte | Unit | Untreated Combustion Residual Leachate | Average Concentrations Achieved by Treatment Technologies | | | | Average Concentrations of LBR's Effluent | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Constructed Wetlands [a] | Chemical Precipitation (CP) [b] | CP + Biological Treatment [c] | CP + Evaporation [d] | 021 | 022 | 023 (AR-1) | 024 (S-22) | 025 (S-16) | 026 (S-19) | 027 | 028 (S-56) | 029 (S-62) | 030 (S-19A, B, & C) | 031 (S-13, S-18) | 032 (S-19D) | 033 (S-21B) | 034 (S-21C) | 036 (J2/J2A /JI) | 037 (J-1B) | 038 (S-21H, S-21F) | 039 (S-39P) | 040 (S-35D) | 041 (S-11A) | 042 (S-66) | 043 (S-89) |
| **Classicals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ammonia as N | mg/L | — | — | 6.85 | 6.85 | 24.3 | <0.05 | 1 | 0.10 | 0.065 | 0.064 | 0.073 | <0.5 | 0.09 | 0.08 | 0.08 | 0.1 | 0.078 | 0.060 | 0.081 | 0.066 | 0.09 | 0.049 | — | — | 0.066 | — | — |
| Nitrate-Nitrite as N | mg/L | — | — | 96 | 0.647 | 0.100 | <1.1 | 0.88 | <1.1 | <0.0056 | 1.1 | <0.28 | <1.1 | 0.88 | 1.08 | 2.76 | 2.8 | 3.47 | 4.2 | 5.0 | 0.33 | 1.5 | 2.6 | — | — | — | — | — |
| TKN | mg/L | — | — | 32.9 | 32.9 | 23.5 | <0.2 | 2 | <0.2 | 0.254 | 0.282 | 0.278 | 0.222 | 2.5 | <5 | <5 | <5 | 2.23 | <5 | <5 | <5 | 11.3 | <5 | — | — | — | — | — |
| BOD5 | mg/L | — | — | 2.22 | 2.22 | 2.22 | 7.4 | 2 | 3.7 | <2 | <2 | <2 | 8.5 | <2 | <2 | <2 | <2 | 1.9 | 1.9 | <2 | <2 | 287 | <2 | — | — | — | — | — |
| COD | mg/L | — | — | 404 | 404 | 10 | 21 | 24 | 6 | 17.2 | 0.6 | 9.5 | 13.3 | 7.0 | 11.7 | 19.9 | 22.0 | 21.5 | 16.1 | 21.7 | 13.84 | 14.8 | 8.4 | — | — | 12.3 | — | — |
| Chloride | mg/L | 413 | — | 7,120 | 7,120 | 1.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Sulfate | mg/L | 1,790 | 448 ± 17 | 1,240 | 1,240 | 2.5 | 1,630 | 3,750 | 1.18 | 1.18 | 1,150 | 2,000 | 2,070 | 590 | 524 | 910 | 870 | 958 | 523 | 344 | 519.2 | 144 | 467 | — | — | 105 | — | — |
| Cyanide, Total | µg/L | | — | 949 | 949 | 949 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | — | — | <10 | — | — |
| TDS | mg/L | 3,500 | — | 24,100 | 24,100 | 10.8 | 3,170 | 6,530 | 2,360 | 2,360 | 2,230 | 3,660 | 4,000 | 119 | 830 | 703 | 1,094 | 1,876 | 986 | 624 | 802 | 283 | 922 | — | — | 344 | — | — |
| TSS | mg/L | 35.8 | — | 8.59 | 8.59 | 2.0 | 5 | 2 | 6 | <4 | <4 | <4 | <4 | 43 | 4.7 | 70 | 54 | 24 | 81 | 68 | 24 | 21.1 | 33.2 | — | — | — | — | — |
| Phosphorus, Tot. | mg/L | — | — | 0.319 | 0.319 | 0.025 | 0.01 | 7 | <0.001 | <0.011 | 0.01 | <0.011 | <0.011 | 0.05 | 0.039 | 0.04 | 0.027 | 0.033 | 0.17 | 0.17 | <0.1 | <0.1 | <0.1 | — | — | — | — | — |
| **Metals, Metalloids, and other Nonmetals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | µg/L | 2,990 | 440 ± 160 | 120 | 120 | 100 | 72.8 | 313 | 75.8 | 92 | 99 | 520 | 10.2 | 179 | 1,510 | 411 | 2,226 | 490 | 560 | 1,456 | 741 | 414 | 2,473 | — | — | 600 | — | — |
| Antimony | µg/L | 3.75 | — | 4.25 | 4.25 | 1.00 | <3.1 | <3.1 | <0.175 | <0.175 | 0.12 | <0.175 | <3.1 | 0.09 | 0.1 | <0.175 | <0.175 | 0.11 | 0.20 | <0.175 | 0.13 | <0.175 | <0.175 | — | — | 0.10 | — | — |
| Arsenic | µg/L | 38.4 | 4 ± 1 | 5.83 | 5.83 | 2.00 | <4.6 | 29 | <5 | 1 | 1.32 | 1.84 | <4.6 | 0.67 | 0.39 | 2.7 | 3.1 | 1.2 | 0.89 | 1.5 | 1.0 | 0.87 | 1.16 | — | — | 0.74 | — | — |
| Barium | µg/L | 53.2 | 13 ± 1 | 140 | 140 | 10.0 | 42.7 | 65.1 | 42.8 | 42 | 62.0 | 66.4 | 23.7 | 30 | 22.0 | 40.1 | 120 | 45.2 | 57.6 | 80.6 | 68.5 | 67 | 55.6 | — | — | 70.7 | — | — |
| Beryllium | µg/L | 1.33 | — | 1.34 | 1.34 | 1.00 | <0.095 | 0.1 | <0.022 | <0.22 | <0.22 | <0.22 | <0.095 | <0.22 | 0.40 | <0.22 | 1.0 | 0.26 | 0.20 | 0.28 | <0.22 | <0.22 | <0.22 | — | — | <0.22 | — | — |
| Boron | µg/L | 22,400 | 28,000 ± 11,800 | 225,000 | 225,000 | 3,750 | 1,660 | 8,790 | 487 | 510 | 376 | 1,270 | 2,870 | 444 | 146.5 | 220 | 750 | 693 | 541 | 363 | 188 | 46.8 | 226 | — | — | 61.6 | — | — |
| Cadmium | µg/L | 10.1 | 4 ± 1 | 4.21 | 4.21 | 2.00 | <0.3 | 0.5 | <0.175 | <0.175 | <0.175 | <0.175 | <0.3 | 0.11 | 0.13 | <0.175 | <0.175 | <0.175 | <0.175 | <0.175 | 0.14 | 0.37 | 0.26 | — | — | 0.11 | — | — |
| Calcium | µg/L | 408,000 | — | 1,920,000 | 1,920,000 | 200 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Chromium | µg/L | 2,120 | 4 ± 1 | 6.45 | 6.45 | 4.00 | <0.22 | 0.9 | 2.4 | <0.45 | 2.18 | 2.28 | <0.22 | 0.71 | 0.33 | 1.7 | 2.6 | 1.4 | 1.3 | 2.71 | 1.69 | 1.9 | 1.9 | — | — | 0.91 | — | — |
| Chromium (VI) | µg/L | — | — | 5.22 | 5.22 | 5.22 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <10[e] | <10[e] | <10[e] | <10[e] | <10[e] | <10[e] | 5.4 | <10[e] | <10[e] | <10[e] | — | — | — | — | — |
| Cobalt | µg/L | 38.6 | 3 ± 1 | 9.30 | 9.30 | 10.0 | <0.53 | <0.53 | 1.3 | <0.225 | 3.46 | 1.67 | <0.53 | 0.5 | 14.5 | 51.4 | 6.0 | 0.97 | 0.69 | 1.74 | 3.03 | 36.4 | 4.7 | — | — | 0.94 | — | — |
| Copper | µg/L | 7.58 | 120 ± 40 | 3.78 | 3.78 | 2.00 | <2.5 | <2.5 | 1.2 | 3.86 | 0.98 | 2.42 | <2.5 | 1.3 | 1.7 | 3.5 | 7.1 | 2.2 | 2.2 | 3.70 | 1.81 | 0.99 | 0.63 | — | — | 1.42 | — | — |
| Iron | µg/L | 37,100 | 100 ± 30 | 110 | 110 | 100 | 198 | 220 | 171 | 163 | 218 | 637 | 42 | 407 | 1,058 | 1,295 | 2,720 | 921 | 1,226 | 2,878 | 905 | 852 | 4,629 | — | — | 10 | — | — |
| Lead | µg/L | 2.37 | 40 ± 10 | 3.39 | 3.39 | 1.00 | <24 | <2.4 | <0.52 | 1.2 | <0.52 | 1.64 | <24 | 0.72 | <0.52 | 0.25 | 2.5 | 1.46 | 1.38 | 3.28 | 0.93 | 1.1 | 1.6 | — | — | 1.54 | — | — |
| Magnesium | µg/L | 118,000 | — | 3,370,000 | 3,370,000 | 200 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Manganese | µg/L | 2,720 | 80 ± 20 | 12,500 | 12,500 | 10.0 | 92 | 551 | 48.7 | 22 | 291 | 56.3 | 409 | 25.7 | 1,210 | 51 | 484 | 72.9 | 67.6 | 172 | 171 | 292 | 362 | — | — | 111 | — | — |
| Mercury | ng/L | 1060 | — | 139 | 50.7 | 10.3 | <60 | <60 | 1.23 | 2.4 | 1.0 | 11 | <60 | 1.4 | 0.42 | 5 | 3.4 | 1.7 | 2.3 | <5 | 2.6 | 1.2 | 1.5 | — | — | 0.04 | — | — |
| Molybdenum | µg/L | 1,380 | 100 ± 10 | 125 | 125 | 20.0 | <1 | 128.2 | 3.04 | 3.2 | 3.99 | 1.32 | 27.1 | 1.1 | <0.285 | <0.285 | 2.5 | 0.92 | 0.91 | 0.54 | 1.96 | 1.1 | 1.1 | — | — | <0.285 | — | — |
| Nickel | µg/L | 46.5 | 16 ± 1 | 9.11 | 6.30 | 2.00 | 4.4 | 12.1 | <20 | 9.3 | 5.29 | 5.02 | 4.1 | 1.1 | 50 | 7.2 | 7.2 | 1.90 | 2 | 4.14 | 4.09 | 5.0 | 2.1 | — | — | 1.28 | — | — |
| Selenium | µg/L | 111 | 6 ± 1 | 928 | 5.72 | 2.00 | 9.1 | 94.4 | 0.91 | 0.61 | 0.75 | 0.57 | 8.5 | 1.6 | 1.3 | 1.8 | 2.6 | 2.74 | 1.17 | 1.81 | 1.46 | 1.24 | 1.24 | — | — | 0.71 | — | — |
| Silver | µg/L | 1.63 | — | 0.925 | 0.925 | 1.00 | <0.64 | 4.1 | 0.33 | 3.98 | 0.34 | 0.34 | <0.64 | 0.47 | 0.3 | <0.45 | 0.38 | 0.40 | <0.45 | <0.45 | 0.4 | 0.3 | 0.3 | — | — | 0.4 | — | — |
| Sodium | µg/L | 308,000 | — | 276,000 | 276,000 | 5,000 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Thallium | µg/L | 1.16 | — | 9.81 | 9.81 | 1.00 | 13.4 | 7.2 | <0.175 | <0.175 | <0.175 | <0.175 | <3.5 | <0.175 | <0.175 | <0.175 | <0.175 | <0.175 | <0.175 | <0.175 | <0.175 | 0.11 | <0.175 | — | — | <0.175 | — | — |
| Tin | µg/L | 49.3 | 18 ± 5 | 100 | 100 | 100 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Titanium | µg/L | 13.6 | — | 9.30 | 9.30 | 10.0 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Vanadium | µg/L | 1,910 | — | 12.6 | 12.6 | 5.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Zinc | µg/L | 211 | 60 ± 20 | 20.0 | 20.0 | 28.5 | 6.2 | 15.1 | 8.92 | 8.66 | 8.64 | 10.79 | 7.8 | 8.2 | 62.2 | 10.5 | 10 | 11.8 | 10.1 | 19.4 | 13.3 | 10.4 | 84.6 | — | — | 9.0 | — | — |

[a] As reported in Table 3-3 of EPRI's Report: "The Allegheny Power Service Constructed Wetland at Springdale: The Role of Plants in the Removal of Trace Elements."
[b] As reported in Table 10-8 of the 2015 TDD.
[c] As reported in Table 10-9 of the 2015 TDD.
[d] As reported in Table 10-6 of the 2015 TDD and Table 6-1 of the 2020 Supplemental TDD.
[e] The Quantitation Limit is not sensitive enough to compare to the average treatment concentrations, but Total Chromium concentrations indicate that Hexavalent Chromium concentrations are not significant.

**= Concentration exceeds level achievable by Chemical Precipitation + Biological Treatment**
**= Concentration exceeds level achievable by Chemical Precipitation**
**= Concentration exceeds level achievable by Constructed Wetlands**

**Table 3. Average Concentration Achieved by Treatment Technologies and Average Concentrations of LBR's Discharges (Post-2020)**

| Analyte | Unit | Untreated Combustion Residual Leachate | Average Concentrations Achieved by Treatment Technologies | | | | Average Concentrations of LBR's Effluent | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Constructed Wetlands [a] | Chemical Precipitation (CP) [b] | CP + Biological Treatment [c] | CP + Evaporation [d] | 021 | 022 | 023 (AR-1) | 024 (S-22) | 025 (S-16) | 026 (S-19) | 027 | 028 (S-56) | 029 (S-62) | 030 (S-19A, B, & C) | 031 (S-13, S-18) | 032 (S-19D) | 033 (S-21B) | 034 (S-21C) | 036 (J2/J2A /JI) | 037 (J-1B) | 038 (S-21H, S-21F) | 039 (S-39P) | 040 (S-35D) | 041 (S-11A) | 042 (S-66) | 043 (S-89) |
| Flow Rate (Avg.) | MGD | — | — | — | — | — | 0.059 | 3.52 | 0.0056 | 0.00078 | 0.0082 | 0.0025 | 0.032 | 0.00029 | 0.00096 | 0.00063 | 0.0011 | 0.0009 | 0.0009 | 0.0009 | 0.00027 | 0.0062 | 0.0014 | — | — | 0.0009 | 0.0008 | 0.0007 |
| **Classicals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ammonia as N | mg/L | — | — | 6.85 | 6.85 | 24.3 | <0.25 | <0.19 | <0.175 | <0.15 | <0.13 | <0.2 | <0.28 | <0.15 | <0.15 | <0.15 | <0.19 | <0.16 | <0.16 | <0.18 | <0.16 | <0.17 | <0.14 | <0.14 | <0.17 | <0.14 | <0.19 | <0.15 |
| Nitrate-Nitrite as N | mg/L | — | — | 96 | 0.647 | 0.100 | <0.51 | <0.74 | 0.47 | 0.33 | 0.34 | 0.6 | <0.20 | 0.89 | 0.95 | 1.4 | 0.7 | 1.8 | 1.8 | 2.2 | 1.1 | 0.7 | 1.6 | <0.36 | <0.4 | 1.1 | <0.27 | 0.7 |
| TKN | mg/L | — | — | 32.9 | 32.9 | 23.5 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| BOD5 | mg/L | — | — | 2.22 | 2.22 | 2.22 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| COD | mg/L | — | — | 404 | 404 | 10 | <10.3 | <17 | <14.5 | <9.2 | <8.7 | <17 | 18 | <12 | <10 | <11 | <11 | <11 | <10 | <9 | <12 | <11 | <11 | <11 | <10 | <9.8 | <13 | <14 |
| Chloride | mg/L | 413 | — | 7,120 | 7,120 | 1.5 | 196 | 173 | 102 | 156 | 121 | 212 | 282 | 26 | 32 | 87 | 111 | 123 | 84 | 62 | 39 | 21 | 58 | 36 | 5 | 43 | 140 | 43 |
| Sulfate | mg/L | 1,790 | 448 ± 17 | 1,240 | 1,240 | 2.5 | 1,318 | 1,475 | 434 | 720 | 648 | 1,410 | 2,017 | 186 | 500 | 329 | 688 | 790 | 580 | 387 | 282 | 118 | 320 | 82 | 78 | 105 | 923 | 415 |
| Cyanide, Total | µg/L | | — | 949 | 949 | 949 | 7.5 | 12 | 9.5 | 9.5 | 9.5 | 9.2 | 9.1 | 9.3 | 9 | 9.4 | 9.9 | 9.6 | 9.6 | 9.4 | 9.3 | 9.1 | 9.3 | 9.2 | 9.4 | 8.75 | 9.3 | 9.6 |
| TDS | mg/L | 3,500 | — | 24,100 | 24,100 | 10.8 | 2,208 | 2,437 | 983 | 1,422 | 1,276 | 2,450 | 3,350 | 429 | 802 | 700 | 1,241 | 1,457 | 968 | 697 | 573 | 248 | 635 | 257 | 181 | 310 | 1647 | 836 |
| TSS | mg/L | 35.8 | — | 8.59 | 8.59 | 2.0 | 1.3 | 6.8 | 6 | <4 | <4 | <4 | 18 | 43 | 4.7 | 40 | 36 | <4.3 | <10 | 24 | 24 | 21.1 | 33.2 | — | — | — | 9 | 39 |
| Phosphorus, Tot. | mg/L | — | — | 0.319 | 0.319 | 0.025 | 0.01 | 7 | <0.001 | <0.011 | 0.01 | <0.011 | <0.011 | 0.05 | 0.039 | 0.04 | 0.027 | 0.033 | 0.17 | 0.17 | <0.1 | <0.1 | <0.1 | — | — | — | | |
| **Metals, Metalloids, and other Nonmetals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | µg/L | 2,990 | 440 ± 160 | 120 | 120 | 100 | <75 | <150 | <55 | <97 | <72 | <257 | <247 | <136 | 1,860 | 182 | 737 | <64 | <188 | <329 | 607 | 271 | 114 | 685 | 226 | 760 | <120 | 272 |
| Antimony | µg/L | 3.75 | — | 4.25 | 4.25 | 1.00 | <2 | <1 | <2 | <2 | <2 | <2 | <3.1 | <2 | <2 | <1.9 | <1.8 | <1.8 | <1.8 | <1.6 | <1.8 | <2 | <1.9 | <1.8 | <2 | <2 | <2 | <2 |
| Arsenic | µg/L | 38.4 | 4 ± 1 | 5.83 | 5.83 | 2.00 | <3 | 19 | <3 | <3 | <2.5 | <2.2 | <80 | <2.1 | <2.9 | <1.2 | 1.5 | <1.9 | <1.6 | <1.5 | <1.2 | <1.4 | <1.2 | <1.3 | <1.5 | 0.6 | <2.2 | <3.4 |
| Barium | µg/L | 53.2 | 13 ± 1 | 140 | 140 | 10.0 | 37 | 23 | 37 | 37 | 60 | 73 | 22 | 32 | 16 | 33 | 79 | 28 | 55 | 53 | 52 | 57 | 40 | 30 | 23 | 68 | 34 | 38 |
| Beryllium | µg/L | 1.33 | — | 1.34 | 1.34 | 1.00 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <0.85 | <0.99 | <1 | <1 | <1 | <1 | <1 | <0.95 | <1 | <1 | <1 | <1 | <0.96 | <1 |
| Boron | µg/L | 22,400 | 28,000 ± 11,800 | 225,000 | 225,000 | 3,750 | 1,057 | 1,800 | 297 | 494 | 329 | 1,075 | 1,647 | 186 | 137 | 215 | 492 | 581 | 424 | 241 | 148 | <70 | 188 | <79 | <68 | <83 | 804 | 432 |
| Cadmium | µg/L | 10.1 | 4 ± 1 | 4.21 | 4.21 | 2.00 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <0.61 | <1 | <1 | <1 | <1 | <1 | <0.95 | <0.96 | <0.9 | <0.9 | <1 | <1 | <0.95 | <1 |
| Calcium | µg/L | 408,000 | — | 1,920,000 | 1,920,000 | 200 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Chromium | µg/L | 2,120 | 4 ± 1 | 6.45 | 6.45 | 4.00 | <3.5 | <3.5 | <2.8 | <2.9 | <2.9 | <3.5 | <2.5 | <2.5 | <2.9 | <1.9 | <1.8 | <2.4 | <2.4 | <2.1 | <2.1 | <2.2 | <2.1 | <2.4 | <2.9 | <1.6 | <2.8 | <2.4 |
| Chromium (VI) | µg/L | — | — | 5.22 | 5.22 | 5.22 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Cobalt | µg/L | 38.6 | 3 ± 1 | 9.30 | 9.30 | 10.0 | 0.2 | 1.1 | <0.4 | <0.38 | <0.47 | <0.46 | 1.6 | <0.4 | 16 | <0.27 | 0.7 | <0.4 | <0.4 | <0.52 | 0.7 | 0.9 | <0.29 | 0.9 | <0.34 | 0.8 | 1 | <0.29 |
| Copper | µg/L | 7.58 | 120 ± 40 | 3.78 | 3.78 | 2.00 | <1.7 | <2 | <1.9 | <1.9 | <1.8 | <1.8 | <1.8 | <1.9 | <1.8 | <1.6 | 1.8 | <1.9 | <3 | <1.5 | <1.4 | <2 | <1.7 | <2.5 | <1.7 | 1.2 | <1.6 | <2.0 |
| Iron | µg/L | 37,100 | 100 ± 30 | 110 | 110 | 100 | <143 | 700 | <101 | <129 | <163 | <317 | 1590 | <244 | 237 | 475 | 1,325 | <106 | <363 | <501 | 1091 | 791 | <179 | 1470 | 474 | 1498 | 1061 | 435 |
| Lead | µg/L | 2.37 | 40 ± 10 | 3.39 | 3.39 | 1.00 | <1 | <0.6 | <1 | <0.8 | <0.93 | <0.91 | <0.48 | <0.8 | <0.62 | <0.58 | 1.1 | <0.9 | <0.8 | <0.68 | 0.9 | <0.6 | <0.6 | 1.6 | <0.53 | 1.4 | <0.8 | <0.7 |
| Magnesium | µg/L | 118,000 | — | 3,370,000 | 3,370,000 | 200 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Manganese | µg/L | 2,720 | 80 ± 20 | 12,500 | 12,500 | 10.0 | 158 | 600 | 26 | 13 | <259 | <17 | 935 | <12 | 1,105 | 33 | 53 | <11 | 89 | <75 | 319 | 570 | 13 | 109 | 73 | 101 | 278 | <7.9 |
| Mercury | ng/L | 1060 | — | 139 | 50.7 | 10.3 | <0.4 | 71 | — | — | — | — | 23 | — | — | 4 | 2 | 0.43 | 0.41 | 1.3 | | | | | | | <0.4 | 1.1 |
| Molybdenum | µg/L | 1,380 | 100 ± 10 | 125 | 125 | 20.0 | 1.8 | 11 | <2 | 3 | <2.1 | <5 | <16 | <5 | <4.6 | <5 | <4.3 | <5 | <5 | <5 | <4.2 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Nickel | µg/L | 46.5 | 16 ± 1 | 9.11 | 6.30 | 2.00 | <1.4 | <3 | <1.3 | <1.3 | <1.3 | <1.4 | 2.4 | <1.2 | 58 | <2.0 | 1.9 | <0.98 | <1.5 | 2.1 | 1.9 | <2.1 | <2.7 | <2.7 | <1.3 | 1.6 | 2.6 | <1.4 |
| Selenium | µg/L | 111 | 6 ± 1 | 928 | 5.72 | 2.00 | <5 | 5 | <4.2 | <5 | <5 | <5 | <2.7 | <5 | <5 | <4.7 | <5 | <4.7 | <5 | <4.5 | <4.7 | <4.7 | <5 | <5 | <5 | <5 | <4.6 | <5 |
| Silver [e] | µg/L | 1.63 | — | 0.925 | 0.925 | 1.00 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <0.93 | <1 | <1 | <1 | <1 | <1 | <1 |
| Sodium | µg/L | 308,000 | — | 276,000 | 276,000 | 5,000 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Thallium | µg/L | 1.16 | — | 9.81 | 9.81 | 1.00 | <1 | <0.9 | <1 | <1 | <1 | <1 | <1 | <0.88 | <1 | <0.89 | <1 | <0.92 | <0.86 | <0.9 | <0.9 | <1 | <1 | <0.98 | <0.9 | <1 | <0.93 | <1 |
| Tin | µg/L | 49.3 | 18 ± 5 | 100 | 100 | 100 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Titanium | µg/L | 13.6 | — | 9.30 | 9.30 | 10.0 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Vanadium | µg/L | 1,910 | — | 12.6 | 12.6 | 5.00 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Zinc | µg/L | 211 | 60 ± 20 | 20.0 | 20.0 | 28.5 | <12 | <10 | <12.4 | <12.5 | <12.5 | <12.5 | <9.9 | <9.5 | 72 | <8.9 | <6.6 | <8.5 | <11 | <8.8 | <14 | <8.1 | <7.3 | <17 | <10 | <5.9 | <11 | <11 |

[a] As reported in Table 3-3 of EPRI's Report: "The Allegheny Power Service Constructed Wetland at Springdale: The Role of Plants in the Removal of Trace Elements."
[b] As reported in Table 10-8 of the 2015 TDD.
[c] As reported in Table 10-9 of the 2015 TDD.
[d] As reported in Table 10-6 of the 2015 TDD and Table 6-1 of the 2020 Supplemental TDD.
[e] Silver concentrations appear to exceed the average treatment concentrations for silver, but only due to the Quantitation Limit used. Silver removals were low for all treatment technologies.

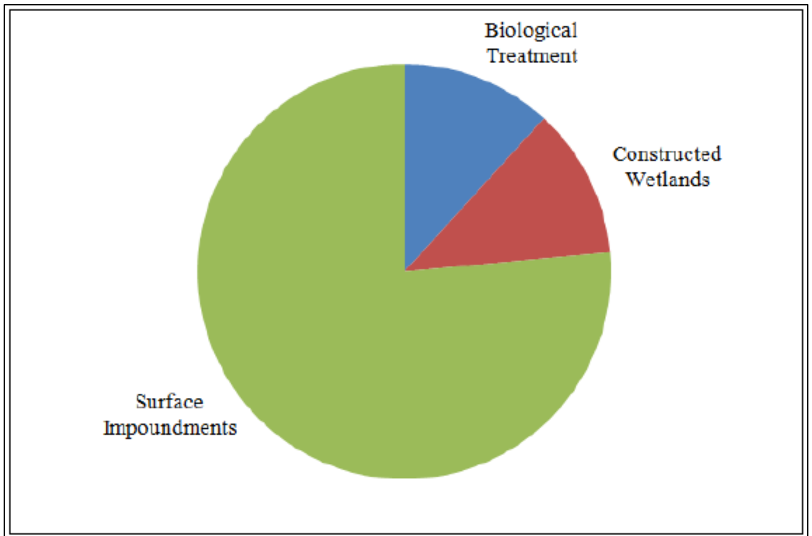
**(yellow) = Concentration exceeds level achievable by Chemical Precipitation + Biological Treatment**
**(orange) = Concentration exceeds level achievable by Chemical Precipitation**
**(red) = Concentration exceeds level achievable by Constructed Wetlands**

The Closure Plan also anticipates the routing of non-contact storm water runoff from the final cover system to the secondary spillway, which would increase the post-closure discharge flow rate at Outfall 022, but also dilute leachate routed to the same location.

DEP proposes that non-contact storm water runoff from the final cover system be collected separately from leachate in the secondary spillway and that the non-contact storm water runoff be used to re-establish stream flow in what remains of the Little Blue Run stream below the dam. That would return the Little Blue Run stream to a condition comparable to the period before CCB disposal in the stream valley began.

_Processes Employed_

This factor relates to the nature and capabilities of existing wastewater treatment and control processes. As described previously, the Stilling Basin (a surface impoundment) is not effective at controlling toxic metals. In addition, all combustion residual leachate discharges at LBR besides those routed through the Stilling Basin receive no treatment. EPA and the Fifth Circuit Court concluded that technologies are available to effectively control toxic metals. A portion of the active facilities in the industry already employ constructed wetlands, chemical precipitation, and/or biological treatment for combustion residual leachate (see Figure 7-19 from the 2015 TDD).




Source: Steam Electric Survey [ERG, 2015a; WVDEP, 2010].
Note: This figure represents the EPA population used in analyses for the ELGs, which was developed using the weighted Steam Electric Survey data (see Section 4.2.4), industry profile changes (see Section 4.5), and additional industry-provided information.

**Figure 7-19. Distribution of Treatment Systems for Leachate from Landfills and Impoundments Containing Combustion Residual Wastes**

Some leachate discharges are collected and pumped back into the LBR impoundment (another industry practice reported in the Steam Electric Survey) but the availability of that option will change as capping proceeds.

There are no longer any waste management processes that would affect the quantity of leachate discharged other than closure, which is required by the December 14, 2012 Consent Decree and will be implemented by capping in accordance with the approved Closure Plan. EHG has no need for moisture conditioning of dry fly ash and should not require dust control, which are processes some facilities employed to reuse collected leachate, as reported in the Steam Electric Survey.

_Engineering Aspects of Control Techniques_

Technology-based performance criteria must be limited to technologies or process modifications that are feasible from an engineering standpoint. As a treatment technology that is already in use at other CCB disposal sites including EHG's Hatfield CCB Landfill and West Penn Power Company's Springdale CCB Landfill (a.k.a. the Springdale Closed Ash Site), constructed wetlands are generally feasible from an engineering standpoint. Constructed wetlands make up approximately 12% of treatment facilities used by active CCB disposal sites in the industry according to Steam Electric Survey data reported in the 2015 TDD. Constructed wetlands also are widely used in Pennsylvania to treat acid mine drainage, which targets some of the same pollutants that are present in elevated concentrations in LBR's discharges. The technology is viable and well-demonstrated for the removal of certain trace metals. EPRI explains in Section 1.2 of its Springdale report:

> In contrast to chemical treatment, constructed wetland treatment technology offers a practical alternative to the chemical treatment of drainage from certain coal-related sources (Brodie et al., 1988; Nu-Hoai et al., 1998). The advantages of wetland treatment systems over chemical treatment alternatives include low costs of construction, operation and maintenance, while effectively removing many contaminants such as heavy metals and metalloids (NRA, 1992; Nu-Hoai et al., 1998). Constructed wetlands have been shown to substantially reduce the levels of trace metals and other pollutants in water passing through them (e.g., Cooper and Findlater, 1990; Hansen et al., 1998). In addition, wetland systems are usually better able to cope with fluctuating water flow rates and variable contaminant concentrations than conventional treatment systems (Bastian and Hammer, 1997). At present, wetland treatment systems represent virtually the only way of removing trace elements present at low concentrations in large volumes of wastewater. Wetlands are particularly useful for 'polishing' partially-treated wastewater (Horne,

2000). The success of wetlands has therefore resulted in the construction of over 400 wetlands in the United States for the purpose of treating drainage from coalmines alone (Kleinmann, 1991). Additional benefits of wetlands include the provision of valuable ecological functions, wildlife habitat maintenance and hydrologic control (Horne, 2000). These functions result from their placement between terrestrial and aquatic ecosystems, and because of their hydraulic, geochemical and biochemical characteristics.

One of the advantages of constructed wetlands as it relates to LBR's leachate is that wetlands can effectively remove trace elements present at low concentrations in large volumes of wastewater. Independent of EPRI's observations, DEP is aware that incremental pollutant removal is more difficult when influent pollutant concentrations are low. The concentrations of pollutants in untreated leachate reported by EPA are significantly higher than the concentrations of pollutants in LBR's untreated leachate. The average concentrations of aluminum and iron in untreated combustion residual leachate reported by EPA are 2,990 µg/L and 37,100 µg/L, respectively, compared to LBR's average concentrations of aluminum that range from <64 µg/L to 1,860 µg/L and average concentrations of iron that range from <101 µg/L to 1,590 µg/L.

**Hatfield CCB Landfill. Passive Wetlands Treatment System (Google Earth Pro, March 2021)**

**Sprindale Closed Ash Site. Passive Wetlands Treatment System (Google Earth Pro, November 2021)**

Constructed wetlands require space to build the wetland cells and EHG must be able to get wastewaters to the cells for treatment and then from the cells to the discharge point. There are sites along the secondary spillway and at the base of the dam where wetlands could be constructed and any sites below the top elevation of the secondary spillway would benefit from gravity flow. Although, the need for pumping would not be prohibitive. The leachate management systems described in the Closure Plan already include pumps and force mains. However, the existing and expected leachate flow rates from pre-closure through post-closure are significant flow rates that would require a substantial wetland footprint to treat effectively even with the ability of wetlands to treat large volumes of water. The constructed wetlands treatment system at the Hatfield CCB Landfill takes up approximately 4.4 acres (excluding the polishing sedimentation pond) and has maximum flow rates of up to about 100 gpm. The constructed wetlands treatment system at the Springdale Closed Ash Site takes up approximately 2.7 acres and treats flows of up to 10 gpm. The current estimated leachate generation at LBR during closure is 1,120 gpm (about 1.6 MGD)—ten times the maximum leachate flows treated at the Hatfield CCB Landfill. A constructed wetlands treatment system would realize economies of scale, but the footprint necessary for a constructed wetlands system handling the current volume of flow may be prohibitive to use of the technology at LBR—at least during the closure period.

Post-closure leachate flows of 300 gpm may be treatable by a constructed wetlands system that could be built within open land areas at LBR. DEP's understanding is that the 300 gpm estimate does not include non-contact runoff from the final cover system routed to the secondary spillway. In addition, if the non-contact runoff from the final cover system dilutes metals concentrations in the leachate, then pollutants may not be present in treatable concentrations post-closure.

Chemical precipitation is a fully mature technology and is the main technology used to treat wastewaters containing metals. BAT for various industries' Effluent Limitations Guidelines are based on chemical precipitation as the model treatment technology. Chemical precipitation can require multiple treatment steps to adjust wastewater pH and maximize metals removal depending on the solubilities of the targeted metals. Aluminum and iron precipitate as hydroxides at circumneutral pH. Arsenic is removable with iron co-precipitation. And mercury is removable to low concentrations with sulfide precipitation. Chemical precipitation systems can be set up as fully automated systems that provide automatic chemical feed, monitoring, and control. Automation could reduce operator oversight to a level commensurate with that of a passive constructed wetlands system provided there is sufficient chemical storage. Chemical precipitation systems avoid impacts to treatment effectiveness from external environmental factors, but are disadvantaged by the need to supply and transport coagulants and flocculants to the treatment plant; increased maintenance requirements for the treatment equipment; the generation of waste sludge that needs to be transported and disposed offsite; and the costs and secondary impacts of electricity supply to run the equipment. In addition, at current flow rates, space requirements for settling tanks could be significant to facilitate the necessary detention time for reaction kinetics to occur.

The engineering aspects of capping and closing the impoundment were addressed as part of the Closure Plan. Aspects considered included the size of the area to be capped; the ability of the CCB surface to support construction equipment; the flat slopes and fine grained CCBs resulting in soil saturation and ponding; the need for several growing seasons to develop adequate “root mats” in the underlying vegetation; temperature issues that affect welding and placing geomembrane and establishing vegetation; precipitation and its impact on the CCB surface and the rate of capping; the interface between predicted settlement of the CCBs and liner installation; the need to develop and environmentally control over 400 acres of borrow sites; and the priority placed on reducing dust, odors, noise and traffic in the neighboring communities.

*Process Changes*

Consideration for process changes relates to the feasibility of any modifications that reduce the quantity or toxicity of a wastewater. It is better to prevent pollutants from being introduced to a wastewater than to remove those pollutants after they are in a wastewater, so process changes may include changes affecting wastewater generation in addition to changes to existing treatment processes.

Leachate from the impoundment primarily originates from water percolating through disposed wastes and leaching contaminants from those wastes. That process can be controlled by limiting the amount of storm water and groundwater that comes in contact with the disposed wastes. Limitations on groundwater contact with disposed wastes were determined based on the initial design of the disposal area since the impoundment is unlined and is now full of CCBs. Groundwater flow into the impoundment and through the CCBs may contribute to leachate generation. However, those contributions should be small because the impoundment has altered the predominant flow pathways of aquifers in the area so that they flow away from the impoundment. Shallow groundwater variously flows toward and away from the impoundment (refer to the blue contours and flow arrows in the Closure Plan drawings in **Attachment D** to this Fact Sheet Addendum).

As explained previously, capping and closure will substantially reduce the volume of leachate generated by reducing storm water inputs to the impoundment over the impoundment’s 936-acre drainage area. Capping and closure represent the most substantial control technologies for combustion residual leachate from LBR due to the substantial reduction in leachate generation expected to result (85%) and the associated reductions in wastewater pollutant loading.

*Costs of Effluent Reduction*

When FirstEnergy Solutions was in bankruptcy, DEP expressed concern that FirstEnergy’s liability sites might be split off into a new company (the company that ultimately became Energy Harbor) with a lack of revenue streams from the transfer of sites like LBR to the new company without a corresponding transfer of revenue-generating assets (i.e., active power-generating facilities) impeding environmental compliance. As explained previously, inactive/closed CCB disposal sites are legacy liabilities for their owners. Therefore, the costs for environmental compliance at such sites must be borne by the disposal site’s owner at the corporate level.

In a May 19, 2020 press release, EHG stated that it received a BBB- investment rating with a stable outlook from Standard and Poor’s. In that same release, EHG promoted itself as a “financially secure independent power producer” with a “fleet of reliable generating resources, including substantial carbon-free generation” that includes four nuclear power plants and a coal-fired power plant. Besides the nuclear power plants, EHG owns four CCB disposal sites.

Detailed financial information for Energy Harbor Corp. is not available (there are no public 10-K SEC filings). However, Energy Harbor’s nuclear power plants provide a stable source of revenue. Those plants also generate millions of dollars in revenue in the form of zero-emission credits.

Table 9-13 in the 2015 TDD summarizes the estimated industry-level costs for the chemical precipitation technology option for combustion residual leachate.

**Table 9-13. Estimated Industry-Level Costs for the Chemical Precipitation Technology Option for Combustion Residual Leachate Based on Oil-Fired Units and Units 50 MW or Less Not Installing Technology Basis**

| Technology Option | Number of Plants | Total Capital Cost ($) | Total O&M Cost ($/year) | 6-Year Recurring Cost ($/6-year) | 10-Year Recurring Cost ($/10-year) |
|---|---|---|---|---|---|
| Chemical Precipitation | 82 | $605,000,000 | $34,300,000 | $7,000,000 | $0 |

Note: Costs are rounded to three significant figures.

Note: All costs are indexed to 2010 dollars using RSMeans Historical Cost Indices [RSMeans, 2015].

The 6-year recurring costs are associated with operation of a mercury analyzer with an expected life of six years.

Dividing the costs in Table 9-13 by the number of plants that incur compliance costs provides a general estimate of the costs for an individual plant to install a chemical precipitation system. The per-plant estimated capital cost in 2010 dollars would be about $7,378,000 or about $10 million in 2022 dollars. The per-plant estimated annual O&M costs would be $418,292 or about $570,000 in 2022 dollars. The per-plant six-year recurring cost for a mercury analyzer would be $85,366 in 2022 dollars.

The equivalent annual cost of a $10 million capital investment for a chemical precipitation system would be about $944,000 assuming a discount rate of 7% and a useful life of the treatment equipment of 20 years based on values used by EPA in Sections 1.5.2 and 1.5.3 of EPA's "Benefit and Cost Analysis for the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category" [EPA-821-R-15-005, September 2015].

$$\text{Equivalent Annual Cost} = (\text{Asset Price} \times \text{Discount Rate}) / (1 - (1 + \text{Discount Rate})^{-n})$$

$$= (\$10{,}000{,}000 \times 0.07) / (1 - (1 + 0.07)^{-20})$$

$$= \$700{,}000 / (1 - (1.07)^{-20}) \approx \$700{,}000 / 0.74158 \approx \$944{,}000$$

EHG's total estimated annual costs for a chemical precipitation system including annualized capital costs, O&M, and a mercury analyzer would be $1.528 million.

In Attachment 17R-1 of the Closure Plan, FirstEnergy estimated that post-closure leachate will exhibit characteristics similar to the existing characteristics of the toe drain. Sampling results for the toe drain from Attachment 17R-2: Attachment E of the Closure Plan were as follows:

| | **Toe Drain** | | | | |
|---|---|---|---|---|---|
| Date Sampled: | *11/27/2012* | *1/30/2013* | *4/11/2013* | *7/2/2013* | *Avg.* |
| *Parameters* | **Field Parameters** | | | | |
| pH (S.U.) | 7.77 | 7.5 | 7.44 | 7.51 | *7.56* |
| Conductivity (umhos/cm) | 5990 | 5580 | 5250 | 5490 | *5578* |
| Temperature (C) | 10.8 | 13.5 | 14.4 | 16.3 | *13.8* |
| *Parameters* | **Quarterly – Total Metals (mg/L)** | | | | |
| Arsenic (Total) | 0.0021 | 0.0067 | <0.005 | <0.005 | *0.005* |
| Boron (Total) | 5.65 | 5.43 | 5.15 | 6 | *5.56* |
| Calcium (Total) | 513 | 572 | 476 | 518 | *520* |
| Iron (Total) | <0.05 | <0.05 | <0.05 | <0.05 | *<0.05* |
| Magnesium (Total) | 73.7 | 76.2 | 69.3 | 78.4 | *74.4* |
| Manganese (Total) | <0.01 | <0.01 | <0.01 | <0.01 | *<0.01* |
| Mercury (Total) | <0.0002 | <0.0002 | <0.0002 | <0.0002 | *<0.0002* |
| Potassium (Total) | 61.6 | 54 | 58.2 | 65.5 | *59.8* |
| Sodium (Total) | 748 | 755 | 770 | 873 | *787* |
| *Parameters* | **General Chemistry** | | | | |
| Ammonia (mg/L) | <0.2 | <0.2 | <0.2 | <0.2 | *<0.2* |
| Total Alkalinity (mg/L) | 136 | 126 | 119 | 144 | *131* |
| Bicarbonate Alkalinity as $CaCO_3$ (mg/L) | 136 | 126 | 119 | 144 | *131.3* |
| Chemical Oxygen Demand (mg/L) | <20 | <20 | <20 | <20 | *<20* |
| Chloride (mg/L) | 429 | 391 | 376 | 409 | *401.3* |

| *Parameters* | General Chemistry | | | | |
|---|---|---|---|---|---|
| Fluoride (mg/L) | <0.1 | 0.579 | 0.963 | 0.966 | *0.7* |
| Laboratory pH (S.U.) | 7.08 | 7.01 | 7.19 | 7.2 | *7.1* |
| Nitrate as N (mg/L) | 1.68 | 1.85 | 1.16 | 1.25 | *1.5* |
| Specific Conductance (umhos/cm) | 5380 | 5330 | 4910 | 5710 | *5332.5* |
| Sulfate (mg/L) | 2730 | 2530 | 2430 | 2720 | *2602.5* |
| TDS (mg/L) | 4900 | 4600 | 4340 | 4860 | *4690.0* |
| Total Organic Carbon (mg/L) | <1 | <1 | <1 | <1 | *<1* |
| Turbidity (NTU) | <1 | <1 | <1 | <1 | *<1* |

Aluminum results were not provided for the toe drain. However, estimates of post-closure leachate quality suggest that treatment technologies that would reduce toxic pollutant concentrations during the closure period may not be necessary for post-closure. Consistent with estimated post-closure leachate quality, the useful life of any treatment technologies would be reduced—theoretically to the remaining duration of closure. Assuming a 10-year useful life of a chemical precipitation system, EHG's total estimated annual costs for a chemical precipitation system including annualized capital costs, O&M, and a mercury analyzer would increase to $2.0 million.

Capital costs for constructed wetlands would include clearing and grubbing, building access roads, excavating the wetland cells, installing substrate, installing wastewater conveyances, and planting and seeding the wetland vegetation. Section 2.1 of EPRI's Springdale study report explained the design and construction of that system as follows:

> The present study focuses on the four vegetated wetland cells (see C1, C2, C3, and C4 in Figure 1-1) that were dominated by cattail. These four vegetated wetland cells each enclosed approximately 375 $m^2$ giving the Springdale wetland a total vegetated area of 1500 $m^2$. The vegetated cells were excavated, lined with a claymat liner, and covered by a 30 cm protective layer of native soil. The main sediment within the cells was added as a mixture of native soil and spent mushroom compost in a ratio of 2:1, selected to approximate the organic content of sediments found in natural wetlands. The cells were not fertilized. Cells 1 and 3 received 60 cm depth of this soil/compost substrate, and cells 2 and 4 received a 45 cm depth. The cells were flooded so that the water depth above the sediment was 3 inches. The cells were planted with rootstock of cattail (*Typha latifolia*), bulrushes (*Scirpus* spp.) and sedges (*Carex* spp.). No controls over the plant density were applied, allowing local pioneer species to colonize over time. Cattail was by far the dominant species within the wetland, but the following invasive species were also recorded: arrowhead (*Sagittaria latifolia Willd.*), Chara (*Chara* spp.), panicum (*Panicum dichotomiflorum* Michx.), smartweed (*Polygonum pensylvanicum* L.), and Spirogyra (*Spirogyra* spp.).

EPA did not develop cost estimates for constructed wetlands. However, capital costs for constructed wetland systems for passive treatment of abandoned mine drainage are available on www.datashed.org. Based on data from Datashed.org, the estimated average capital cost of a constructed wetland treatment system composed primarily of an aerobic wetland cell and a settling pond would be approximately $540,000 in 2022 dollars with an equivalent annual capital cost of $50,972.

Equivalent Annual Cost = (Asset Price × Discount Rate) / (1 – (1 + Discount Rate)$^{-n}$)

= ($540,000 x 0.07) / (1 – (1 + 0.07)$^{-20}$)

= $37,800 / (1 – (1.07)$^{-20}$) ≈ $37,800 / 0.74158 ≈ $50,972

Datashed does not provide O&M costs, but O&M costs should be low for a constructed wetland system because maintenance activities would be limited to seasonal biomass removal and less frequent dredging and replanting/reseeding of the wetland cells when they become clogged and/or when toxic metals accumulate in sediments enough to cause plant die-off. The annualized capital cost of constructed wetlands would not necessarily increase due to improved post-closure leachate quality and reduced useful life of the wetlands treatment system because constructed wetlands could continue to remove trace metals present in wastewaters at low concentrations.

The cost considerations above do not account for the costs to which EHG is already subject as part of EHG's obligation to close the impoundment under the December 14, 2012 Consent Decree (estimated to be $152 million).

*Non-Water Quality Environmental Impacts (Including Energy Requirements)*

Non-water quality environmental impacts associated with treatment technologies that must be considered include air pollution, solid waste generation, radiation exposure, and energy requirements.

Non-water quality impacts for a constructed wetland system are low because the systems are designed to be passive and low maintenance. Wetlands also are beneficial because they can be integrated into the natural environment and provide habitat for wildlife. Air quality impacts and energy requirements would be minimal—generally relating to the operation of pumps (if needed) to transport wastewater to and from the wetlands. Solid waste may be generated seasonally from the removal of harvestable biomass and at less frequent intervals from the removal of metalliferous sediments if there is sufficient buildup of metals in the wetlands' sediments to cause clogging or plant die-off. EPRI noted the following in Section 3.5.3 of its Springdale study report:

> It is important that the rate at which the trace elements are building up in the sediments is determined. For example, if there was a localized build-up of trace elements within the sediments, these sediments may gradually become sufficiently contaminated as to cause the death of the plants, resulting in less effective removal of the wetland. Moreover, the localized build up of dense precipitates (e.g., iron oxide), can clog wetlands reducing the efficiency with which water flows through them (EPRI, 1998). In contrast, highly localized deposition in one cell can actually be exploited; the localized build-up allows easy removal of the toxic elements from the system by dredging, for example. In well-designed wetlands such as the Springdale wetland, the by pass channels allows the cells to be dredged and replanted without taking the whole wetland out of service.

Chemical precipitation requires supplies of chemicals for coagulation and flocculation, sludge disposal, and electricity usage. Chemicals would have to be trucked onsite and sludge would have to be trucked offsite for disposal for an indeterminate amount of time. The need for treatment chemicals may be lessened because LBR's untreated pollutant concentrations are low, which would require fewer chemical reactants and which, in turn, would reduce the amount of sludge generated. Air pollution resulting from long-term truck transport of chemicals and wastes could be significant. Radiation exposure is not a concern for LBR's discharges.

The non-water quality environmental impacts of capping and closing LBR including impacts associated with liner manufacturing and transportation; air pollution from trucking and equipment operation; habitat disturbance from earthmoving in borrow areas, etc. will be realized regardless of whether capping and closure are BAT because capping and closure are part the approved Closure Plan and the December 14, 2012 Consent Decree.

<u>Best Available Technology for Combustion Residual Leachate</u>

Based on the preceding evaluation, BAT for discharges of combustion residual leachate from the retired LBR disposal area is based on capping and closure. As stated previously, capping and closing the LBR disposal area represent the most substantial control technologies for combustion residual leachate from LBR due to the substantial reduction in leachate generation expected to result and the associated reductions in wastewater pollutant loading for all pollutants. Since leachate generation is actively decreasing as capping proceeds, DEP is not identifying any additional wastewater treatment technologies beyond surface impoundments and pH adjustment as BAT. Any costs that would be incurred for additional wastewater treatment systems during the closure period are better invested in capping the disposal area (and accelerating that process if possible) because, at present, the effect of capping will have more substantial impacts on leachate quantity and quality—including the concentrations of toxics that are better addressed at the source than at the point of discharge—than wastewater treatment.

Consistent with DEP's selection of site-specific BAT based on capping and closure, the following narrative effluent limitation will be included in the permit:

> The permittee shall cap and close the disposal area and implement any other necessary structural and non-structural controls, best management practices, and pollution prevention measures to minimize the generation of combustion residual leachate.

Section 5.2.1.3 (p.5-22) of U.S. EPA's NPDES Permit Writers' Manual explains the allowance for non-numeric effluent limitations.

> In some cases, EPA includes nonnumeric or narrative effluent limitations rather than, or in addition to, numeric limitations in effluent guidelines. Nonnumeric effluent limitations might include specific BMPs or requirements to minimize or eliminate discharges. CWA sections 304(e), 308(a), 402(a), and 501(a) authorize the Administrator to prescribe BMPs as part of effluent guidelines and as part of an NPDES permit. CWA section 304(e) authorizes EPA to include supplemental BMPs in effluent guidelines for toxic or hazardous pollutants for the purpose of controlling "plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage." Several effluent guidelines include BMPs as requirements. Some effluent guidelines, such as the Concentrated Aquatic

> Animal Production point source category (Part 451), include the BMPs requirement exclusively. Section 9.1.2 of this manual further discusses BMPs.
>
> CWA section 402(a)(1) and (2) and the NPDES regulations at § 122.44(k) also authorize BMPs in NPDES permits to control or abate the discharge of pollutants when numeric effluent limitations are infeasible, or when the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA.

Although EPA's explanation in the NPDES Permit Writers' Manual is provided in the context of Federal ELGs, Sections 402(a)(1) and (2) of the Clean Water Act give permitting authorities the authority to prescribe conditions in NPDES permits that are necessary to carry out the provisions of the Act, which may include narrative requirements that are impractical to state as maximum daily and average monthly discharge limitations or numerical case-by-case TBELs.

DEP's determination that capping and closing LBR is site-specific BAT for LBR's combustion residual leachate does not preclude a future determination that wastewater treatment technologies are warranted in addition to a cap once leachate generation rates stabilize and the impacts to groundwater and surface water discharges from LBR in its final closed state are known. To facilitate future BAT evaluations after capping and closure are complete, a condition will be included in the permit requiring the permittee to submit a feasibility report on the use of constructed wetlands, chemical precipitation, and biological treatment based on post-closure effluent characteristics. The condition will require the permittee to consider the following: 1) a summary of effluent quality trends and effluent flow rate trends; 2) expected post-closure effluent quality and effluent flow rates including estimated post-closure leachate generation rates; 3) conceptual system designs for each treatment technology including estimated treatment unit sizing, siting options, and wastewater routing; 4) estimates of capital costs and annual operating and maintenance costs for each wastewater treatment technology based on the conceptual systems' designs; and 5) evaluation of the permittee's ability to afford each wastewater treatment technology. If necessary, information relating to the permittee's financial assets and liabilities may be submitted as Confidential Business Information.

With the potential for future numerical TBELs, reporting requirements for pollutants of concern considered in DEP's analysis are added to Outfall 022 for the post-relocation period. Twice per month monitoring and reporting will be required for Total Arsenic and Total Iron and 2/quarter monitoring and reporting will be required for Total Aluminum. Sampling for those pollutants was already required for the 59-month and 56-month interim periods, so DEP is merely extended those sampling requirements for the final months of the permit, which will continue if the permit is administratively extended.


Image Source and Date: Google Earth Pro, August 21, 2015.


Image Source and Date: Google Earth Pro, March 20, 2021.

# ATTACHMENTS

ATTACHMENT A: FirstEnergy's September 24, 2018 Comments

ATTACHMENT B: Sierra Club's September 10, 2018 Comments

ATTACHMENT C: Analytical Results from DEP's January 7, 2019 Stream Sampling

ATTACHMENT D: LBR Groundwater Contours and Flow Direction Diagrams

# ATTACHMENT A

# FirstEnergy’s September 24, 2018 Comments

## FirstEnergy's Comments on Draft NPDES Permit Renewal (PA0027481)

### 1. Oil and Grease Monitoring for Mansfield Plant/LBR

**Citation**: Part A, Tables I.G, I.X, I.AA, I.BB, I.CC, I.DD, I.EE, I.FF, I.GG, I.HH, I.II, I.JJ, I.KK, I.LL, I.MM, I.NN, I.OO, I.PP, I.QQ, I.RR, I.SS, I.TT, I.UU, I.VV, I.WW, I.XX, I.AAA, I.DDD

**Issue**: The draft permit does not contain a condition allowing FirstEnergy to use Method 1664 "Cu" when analyzing samples for oil and grease.

**Explanation**: When the NPDES application addendum was submitted on, or around, February 20, 2018, FirstEnergy noted that an alternative oil and grease method was necessary to eliminate the sulfur/thiosulfate interference that results from the use of Method 1664B and causes artificially elevated results of oil and grease at several Mansfield/LBR NPDES outfalls. Method 1664 "Cu" is an alternative oil and grease method that eliminates the sulfur/thiosulfate interference and is currently used by several facilities, particularly in EPA Region 8. BMP performed a study comparing the side-by-side oil and grease analytical results from Method 1664B and Method 1664 "Cu". FirstEnergy communicated these results to PADEP on, or around, April 13, 2018, and sent a formal request for approval to use Method 1664 "Cu" to PADEP on, or around, May 29, 2018. It is FirstEnergy's understanding that PADEP has shared the study and request to use the alternative analytical method with the U.S. Environmental Protection Agency ("EPA") for its approval. FirstEnergy should be allowed to use Method 1664 "Cu" as soon as possible to avoid errant results that do not reflect the water quality at these outfalls.

**Requested Modification**: The alternative oil and grease analysis method, Method 1664 "Cu", should be incorporated into this renewal permit. Alternatively, if EPA has not approved the use of Method 1664 "Cu" by the time PADEP issues the final renewal permit, PADEP should add a condition to the permit allowing FirstEnergy to analyze samples for oil and grease at these outfalls using both Method "Cu" and Method 1664B, report the results using Method 1664 "Cu", and keep the results from Method 1664B on file until EPA makes its determination.

### 2. IMP 307, 407, 507 Aluminum and Copper Monitoring

**Citation**: Part A, Tables I.H, I.I, and I.J

**Issue**: The draft permit's new weekly 24-hour composite sampling requirements for aluminum and copper at IMPs 307, 407, and 507 are overly burdensome, unnecessarily costly, unsupported, and needlessly incompatible with the sampling requirements for the other parameters at IMPs 307, 407, and 507.

**Explanation**: The draft permit includes different sampling requirements for 13 parameters at IMPs 307, 407, and 507. For most of these parameters, Mansfield Plant must take grab samples once or twice per month. For aluminum and copper, however, Mansfield Plant must conduct 24-hour composite sampling once per week. The sampling requirements for aluminum and copper will take two days to complete, resulting in eight total days of sampling for these parameters each month. The once per week, 24-hour composite sampling requirements for aluminum and copper at these IMPs are overly burdensome, impose unnecessary costs, and are unsupported by information in the Fact Sheet. Aluminum and copper monitoring requirements should be aligned with the other parameters, samples for which will be collected twice per month.

**Requested Modification**: The monitoring frequencies for aluminum and copper at IMPs 307, 407, and 507 in Part A, Tables I.H, I.I, and I.J should be changed from 1/week to 2/month and be changed from 24-hour composite to grab. In addition, the corresponding monitoring frequencies for aluminum and copper at Outfall 007 should be adjusted accordingly.

**3. IMP 307, 407, 507 Fecal Coliform Monitoring**

**Citation**: Part A, Tables I.H, I.I, and I.J

**Issue**: The draft permit's monthly sampling requirements for fecal coliform at IMPs 307, 407, and 507 are unsupported and inappropriate.

**Explanation**: The wastewater at IMPs 307, 407, and 507 is composed entirely of non-contact cooling water ("NCCW") from the cooling tower. The Fact Sheet notes a fecal coliform value of 8,800 CFU/100mL that was recorded for the cooling tower at IMP 507 and included in the NPDES renewal application. This one sample result at IMP 507 was preceded by a sample result of 11,800 CFU/100mL from the Ohio River on the same day, demonstrating that the intake water from the Ohio River was the cause of the single elevated fecal coliform value at IMP 507. Given that the Mansfield Plant treats the NCCW in the cooling tower by chlorination and is required to monitor for total residual and free available chlorine at each of these IMPs, the potential for fecal coliform production in the cooling tower is extremely unlikely. PADEP should evaluate the totality of the circumstances and not rely upon one elevated fecal coliform value at IMP 507 to impose sampling requirements at each of these IMPs.

**Requested Modification**: The monitoring requirements in Part A, Tables I.H, I.I, and I.J for fecal coliform from the cooling water at IMPs 307, 407, and 507 should be removed, or at the very least, the monitoring frequency should be reduced from 1/month to 1/six months.

**4. Outfall 007 Copper Limit**

**Citation**: Part A, Table I.N

**Issue**: The draft permit contains a new copper limit for Outfall 007 that is based on a flawed reasonable potential analysis using an outlier data point.

**Explanation**: The draft permit contains a new copper limit for Outfall 007 with a monthly average of 266 μg/L and daily maximum of 415 μg/L which was based on a maximum result of 312.164 µg/L (Fact Sheet, Page C-1). This sample result was derived from a June 15, 2018 sample result of 318.7 µg/L at IMP 507. Based on Dixon's Q-Test, an accepted method that is endorsed by EPA to identify an outlier in a small dataset, the 318.7 µg/L result clearly is an outlier with a 99 percent confidence level (see analysis below). The five other data points are approximately half the concentration of the outlier data point. Given that the wastewater at IMP 507 is comprised entirely of NCCW with no process wastewater inputs, there is little to no variability in water quality at this IMP (as the remaining data points illustrate). An unknown interference or contaminant caused the outlier value of 318.7 µg/L. As demonstrated by the accepted statistical test, this data point is an outlier that should not be used in a reasonable potential analysis. Furthermore, given the extremely limited dataset and timeframe under which the data was collected, PADEP should exercise its authority to include monitor-only requirements for copper throughout the permit term, allow FirstEnergy to compile a more representative dataset, and, if necessary, use this representative dataset to perform a reasonable potential analysis in the next permit renewal.

**Dixon's Q-Test**

| Sample Date | Value |
|---|---|
| 8/24/2018 | 134.7 |
| 2011 Application | 146 |
| 6/18/2018 | 149.4 |
| 8/14/2018 | 151.5 |
| 7/25/2018 | 162.8 |
| 7/2/2018 | 167.5 |
| 8/10/2018 | 175.2 |
| 6/15/2018 | 318.7 |

| | |
|---|---|
| N: | 8 |
| Q_exp: | 0.78 |
| Q_crit (@99% CL): | 0.634 |

**Q_exp>Q_crit --> Reject 318.7 ug/L**

**Requested Modification**: The copper effluent limits at Outfall 007 in Part A, Table I.N should be removed.

**5. Outfall 009 Fecal Coliform Summer Season Monthly Average Limit**

**Citation**: Part A, Table I.P

**Issue**: The draft permit contains a stringent monthly average fecal coliform limit for Outfall 009 from April 1 to October 31 that is inconsistent with 25 Pa. Code §92a.47 and based on ORSANCO *E. coli* standards that could be eliminated during the permit term.

3

**Explanation**: According to 25 Pa. Code §92a.47(a)(4), the summer fecal coliform limits apply from May through September. In the Fact Sheet, PADEP states that the fecal coliform limits in 25 Pa. Code §92a.47 are more stringent than or equivalent to the ORSANCO *E. coli* effluent standards, which apply April through October. Based on this conclusion, PADEP proposes to extend the summer season fecal coliform limits in 25 Pa. Code §92a.47(a)(4) into April and October to match the months that ORSANCO's *E. coli* effluent limits are in effect (Fact Sheet, p. 75). Despite acknowledging in the Fact Sheet that the ORSANCO *E. coli* standards could be eliminated in the near future, there is nothing in the draft permit that would limit the proposed summer season fecal coliform limits to May through September should ORSANCO's *E. coli* standards be eliminated. The draft permit should account for the possible elimination of ORSANCO's *E. coli* standards.

**Requested Modification**: The 200CFU/100mL monthly average fecal coliform limit in Table I.P. that applies April 1 to October 31 should include a footnote stating that it automatically, without reopening or amending the permit, reverts to the May 1 through September 30 summer season set forth in 25 Pa. Code §92a.47(a)(4) if ORSANCO's *E. coli* standards are eliminated or revised to be less stringent.

6. **Outfall 009 Fecal Coliform Daily Maximum Limit**

**Citation**: Part A, Table I.P

**Issue**: The draft permit contains a fecal coliform daily maximum limit at Outfall 009 that is inconsistent with 25 Pa. Code §92a.47.

**Explanation**: According to 25 Pa. Code §92a.47(a)(4), the instantaneous maximum limit for Outfall 009 from May 1 to September 30 should be 1,000 CFU/100mL (see also Fact Sheet, p. 74), but the draft permit currently lists 400 CFU/100mL as the instantaneous maximum fecal coliform limit from April 1 through October 31.

**Requested Modification**: The instantaneous maximum limit for fecal coliform from April 1 through October 31 (with the footnote described in Comment 5, above) should be changed from 400 CFU/100mL to 1,000 CFU/100mL

7. **Outfall 009 Monitoring Frequencies**

**Citation**: Part A, Table I.P

**Issue**: The draft permit includes daily monitoring requirements for pH, dissolved oxygen, and total residual chlorine ("TRC") that are overly burdensome for this relatively low volume small sewage treatment system.

**Explanation**: The draft permit requires daily monitoring for pH, dissolved oxygen, and TRC at Outfall 009, a significant change from the twice per month monitoring frequencies for these parameters in the previous permit. Collecting these daily samples will be unduly burdensome for the two chemistry analysts who work during the week at the Mansfield

Plant. The costs to hire a third-party to perform this monitoring on weekends are unnecessary given the volume of sanitary wastewater in question, the size of this sewage treatment plant, and the fact that it only discharges for two hours in each eight-hour period. While daily monitoring of a sewage treatment plant for the specified parameters may be appropriate for high volume, large treatment plants, the design flow of the Mansfield Plant sewage treatment plant is only 0.047 million gallons per day ("MGD"), with the actual flow being much less (Fact Sheet, Page 12). Daily monitoring, particularly on weekends, would require the two chemistry analysts to work overtime or FirstEnergy to hire a third-party to collect samples. The Mansfield Plant's relatively low volume small sanitary wastewater system poses little risk to the environment, and daily monitoring is excessive.

**Requested Modification**: The 1/day monitoring requirements for pH, dissolved oxygen, and TRC in Part A, Table I.P should be changed to 5/week (excluding Federal Holidays).

**8. Outfall 009 TRC Limits**

**Citation**: Part A, Table I.P

**Issue**: The draft permit contains new, more stringent monthly average and instantaneous maximum limits for TRC that are inconsistent with 25 Pa. Code §§92a.47(a)(8) and 92a.48(b).

**Explanation**: As compared with the 2006 renewal permit, PADEP reduced the average monthly and instantaneous maximum limits for TRC at this Outfall by 64 percent and 52 percent, respectively. DMRs show that the Mansfield Plant had several instances in 2018, alone, where the discharge from this Outfall would not meet the new, reduced limits. According to the Fact Sheet, the basis for the new, more stringent TRC limits is 25 Pa. Code §92a.47(a)(8), which requires compliance with 25 Pa. Code §92a.48(b) if chlorine is used. There is no instantaneous maximum limit of 1.6 mg/L listed in 25 Pa. Code §92a.48(b); therefore, contrary to the statements in the Fact Sheet, the referenced regulatory citation does not support the Department's proposed instantaneous maximum limit. Because there is no regulatory basis for the new, significantly more stringent instantaneous maximum TRC limit, PADEP should impose the 3.3 mg/L instantaneous maximum limit from the 2006 renewal permit. With respect to the 0.5 mg/L monthly average limit in 25 Pa. Code §92a.48(b), the Department failed to determine whether a facility-specific TRC limit was appropriate based on, among other things, the age of the equipment and facilities involved, cost of achieving the effluent reduction, and the nonwater quality environmental impacts. Given that the existing sewage treatment equipment is almost 40 years old, the Department should have imposed a facility-specific monthly average TRC limit, which should be 1.4 mg/L (the monthly average limit included in the 2006 renewal permit).

**Requested Modification**: PADEP should revise the TRC limits at Outfall 009 to 1.4 mg/L average monthly and 3.3 mg/L instantaneous maximum, as they were in the previous renewal permit. Alternatively, PADEP should revise the permit to give BMP 24 months to determine how it will comply with the new, significantly more stringent TRC limits at Outfall 009.

**9. Outfall 009 Dissolved Oxygen Instantaneous Minimum Limit**

**Citation:** Part A, Table I.P

**Issue:** The draft permit includes a new instantaneous minimum Best Professional Judgement ("BPJ") Technology-Based Effluent Limit ("TBEL") of 4.0 for dissolved oxygen at Outfall 009 that is not justified and for which there is little to no available data for the Mansfield Plant to assess whether it would be able to meet this new limit.

**Explanation:** PADEP has included a new dissolved oxygen limit at Outfall 009. The Fact Sheet states that this new limit is a BPJ TBEL, but the Fact Sheet fails to include any analysis of the required factors. PADEP is required to consider several factors in 40 C.F.R. §125.3(d) before imposing a BPJ TBEL. The lack of available data on dissolved oxygen in the Outfall 009 discharge demonstrates that PADEP has failed to, and cannot appropriately, analyze the factors needed to establish a BPJ TBEL.

**Requested Modification:** PADEP should remove the dissolved oxygen limit at Outfall 009.

**10. Outfalls 021 to 043 Osmotic Pressure Monitoring**

**Citation**: Part A, Tables I.V, I.W, I.AA, I.CC, I.DD, I.EE, I.FF, I.GG, I.HH, I.II, I.JJ, I.KK, I.LL, I.MM, I.NN, I.OO, I.PP, I.QQ, I.RR, I.SS, I.TT, I.UU, I.VV, I.WW, I.XX, I.YY, I.ZZ, I.BBB, I.CCC

**Issue**: The draft permit contains unnecessary requirements to conduct quarterly monitoring for osmotic pressure at several outfalls.

**Explanation**: The draft permit's requirement to monitor quarterly for osmotic pressure at several LBR outfalls is explained in the Fact Sheet as being required by the Solid Waste Permit (Permit No. 300558). The Solid Waste Permit does not require osmotic pressure monitoring at the impacted seeps from the impoundment.

**Requested Modification**: The osmotic pressure monitoring requirements at these outfalls should be removed from the draft permit.

**11. Outfall 021 to 043 Hexavalent Chromium Monitoring**

**Citation**: Part A, Tables I.W, I.AA, I.CC, I.DD, I.EE, I.FF, I.GG, I.HH, I.II, I.JJ, I.KK, I.LL, I.MM, I.NN, I.OO, I.PP, I.QQ, I.RR, I.SS, I.TT, I.UU, I.VV, I.WW, I.XX, I.YY, I.ZZ, I.BBB, I.CCC

**Issue**: The draft permit contains an unnecessary requirement to monitor quarterly for hexavalent chromium at several outfalls.

**Explanation**: The draft permit's quarterly monitoring requirements for hexavalent chromium at several LBR outfalls is explained in the Fact Sheet as being required by the Solid Waste Permit (Permit No. 300558). The Solid Waste Permit does not require hexavalent chromium monitoring at the impacted seeps from the impoundment.

**Requested Modification**: The hexavalent chromium monitoring requirements at these outfalls should be removed from the draft permit.

**12. Outfall 021 to 043 Nitrite Monitoring**

**Citation**: Part A, Tables I.W, I.AA, I.CC, I.DD, I.EE, I.FF, I.GG, I.HH, I.II, I.JJ, I.KK, I.LL, I.MM, I.NN, I.OO, I.PP, I.QQ, I.RR, I.SS, I.TT, I.UU, I.VV, I.WW, I.XX, I.YY, I.ZZ, I.BBB, I.CCC

**Issue**: The draft permit contains an unnecessary requirement to monitor quarterly for nitrite at several outfalls.

**Explanation**: The draft permit's requirement to monitor quarterly for nitrate-nitrite at several LBR outfalls is explained in the Fact Sheet as being required by the Solid Waste Permit (Permit No. 300558). The Solid Waste Permit requires nitrate monitoring at the impacted seeps from the impoundment, but it does not require nitrite monitoring.

**Requested Modification**: The nitrite monitoring requirements at these outfalls should be removed from the draft permit.

**13. Outfall 021 to 043 Free Cyanide Monitoring**

**Citation**: Part A, Tables I.W, I.AA, I.CC, I.DD, I.EE, I.FF, I.GG, I.HH, I.II, I.JJ, I.KK, I.LL, I.MM, I.NN, I.OO, I.PP, I.QQ, I.RR, I.SS, I.TT, I.UU, I.VV, I.WW, I.XX, I.YY, I.ZZ, I.BBB, I.CCC

**Issue**: The draft permit contains an unnecessary requirement to monitor quarterly for free cyanide at several outfalls.

**Explanation**: The draft permit's requirement to monitor quarterly for free cyanide at several LBR outfalls is explained in the Fact Sheet as being required by the Solid Waste Permit (Permit No. 300558). The Solid Waste Permit does not require free cyanide monitoring at the impacted seeps from the impoundment.

**Requested Modification**: The free cyanide monitoring requirements at these outfalls should be removed from the draft permit.

**14. Outfall 021 to 043 Bromide Monitoring**

**Citation**: Part A, Tables I.W, I.AA, I.CC, I.DD, I.EE, I.FF, I.GG, I.HH, I.II, I.JJ, I.KK, I.LL, I.MM, I.NN, I.OO, I.PP, I.QQ, I.RR, I.SS, I.TT, I.UU, I.VV, I.WW, I.XX, I.YY, I.ZZ, I.BBB, I.CCC

**Issue**: The draft permit contains an unnecessary requirement to monitor quarterly for bromide at several outfalls.

**Explanation**: The draft permit's requirement to monitor quarterly for bromide at several LBR outfalls is explained in the Fact Sheet as being required by the Solid Waste Permit (Permit No. 300558). The Solid Waste Permit does not require bromide monitoring at the impacted seeps from the impoundment.

**Requested Modification**: The bromide monitoring requirements at these outfalls should be removed from the draft permit.

### 15. Outfall 021 to 043 Hardness Monitoring

**Citation**: Part A, Tables I.W, I.AA, I.CC, I.DD, I.EE, I.FF, I.GG, I.HH, I.II, I.JJ, I.KK, I.LL, I.MM, I.NN, I.OO, I.PP, I.QQ, I.RR, I.SS, I.TT, I.UU, I.VV, I.WW, I.XX, I.YY, I.ZZ, I.BBB, I.CCC

**Issue**: The draft permit contains an unnecessary requirement to monitor quarterly for hardness at several outfalls.

**Explanation**: The draft permit's requirement to monitor quarterly for hardness at several LBR outfalls is explained in the Fact Sheet as being required by the Solid Waste Permit (Permit No. 300558). The Solid Waste Permit does not require hardness monitoring at the impacted seeps from the impoundment.

**Requested Modification**: The hardness monitoring requirements at these outfalls should be removed from the draft permit.

### 16. Outfall 029 Typographical Error

**Citation**: Part A, Table I.LL

**Explanation**: The draft permit lists the daily maximum limit for iron as 13.2 mg/L, but the wasteload allocation in Attachment B of the Fact Sheet shows the daily maximum limit for iron as 13.3 mg/L.

**Requested Modification**: the daily maximum limit for iron at Outfall 029 should be changed to 13.3 mg/L.

### 17. Outfall 035 Part A Table

**Citation**: Part A, Table I.RR

**Issue**: The draft permit's TBELs and numerous other monitoring requirements for the Laughlin Collection System emergency overflow (i.e., new Outfall 035) are inappropriate and unnecessary.

**Explanation**: The Laughlin Collection System was designed to collect the "base flow" in the Laughlin valley and the run-off from precipitation events up to a capacity of approximately 220 gallons per minute ("gpm") and return it to LBR. **Appendix A, First Energy's August 26, 2015 Letter to PADEP; Appendix B, FirstEnergy's Nov. 6, 2015 Letter to PADEP**. The Collection System has and will continue to function as intended and as approved by PADEP to abate the unregulated discharge of impoundment seepage. **Appendix A.** Available data shows that recorded overflows from the suction vault upstream of Outfall 035 occurred three percent of the time at an average discharge flow rate of 96 gpm. **Appendix B, Attachment 3; *see also* Appendix C, FirstEnergy's Aug. 31, 2015 Letter to PADEP**. Given the unpredictable and infrequent nature of the discharge at Outfall 035, sampling once or twice per quarter, as PADEP requires for the various parameters in the draft permit, would be extremely difficult, if not impossible. Therefore, PADEP should delete the quarterly monitoring requirements for all non-TBEL constituents in the Outfall 035 discharge. Furthermore, to ensure that the required sampling is representative of the seeps that discharge during the infrequent overflow events at Outfall 035, PADEP should allow LBR to sample one impacted seep, with consistent flow, that is representative of water quality from the other seeps. Based on available data and information, seep S-9G is a representative seep for purposes of determining compliance with the applicable TBELs.

**Requested Modification**: The monitoring requirements for all non-TBEL parameters should be deleted from Table I.RR due to the unpredictable and infrequent nature of the emergency overflow discharge at this outfall. In addition, the Fact Sheet on page 94 should be revised to indicate that FirstEnergy can collect samples at seep S-9G and report these samples as being representative of the infrequent, seep discharges at Outfall 035 as written below:

*Outfall 035 was not included in the multiple-discharge wasteload allocation because it is an overflow discharge from the Laughlin Collection System. The outfall only discharges during heavy precipitation when influent flows exceed pump capacity. Since the discharge occurs intermittently during high flow conditions, it does not exhibit a reasonable potential to cause or contribute to excursions above water quality criteria at design conditions ($Q_{7\text{-}10}$). WQBELs do not apply, but Federal ELGs and other monitoring requirements do apply.* ***For purposes of Federal ELGs, monitoring for TSS, Oil & Grease, and pH shall occur for Outfall 035 at seep S-9G.***

**18. Outfall 022 Compliance Schedule Description**

**Citation**: Part C, Condition III.A

**Issue**: The draft permit does not include redirecting Outfall 027 to Outfall 022 as part of the compliance schedule.

**Explanation**: The draft permit includes the redirection of Outfalls 021, 042, and 043 into the Outfall 022 pipeline and diffuser. Outfall 027, as stated in the FirstEnergy Generation, LLC Bruce Mansfield Plant Little Blue Run Disposal Impoundment NPDES Application

9

Addendum, submitted on or about February 20, 2018, will be directed into the Outfall 022 pipeline and diffuser.

**Requested Modification**: PADEP should revise Part C, Condition III.A as follows:

*A. The permittee shall engineer, permit, procure, construct and optimize the pipeline and diffuser for Outfall 022 as discussed in the February 20, 2018 Permit Renewal Application Addendum, and redirects Outfalls 021,* ***027,*** *042, and 043 to the Outfall 022 pipeline in accordance with the following schedule:*

**19. Outfall 022 Schedule of Compliance**

**Citation**: Part C, Condition III.A.4

**Issue**: The draft permit provides for 25 months to complete construction of the pipeline and diffuser for Outfall 022 when FirstEnergy proposed 26 months.

**Explanation**: The 25-month period to complete construction was a typographical error. Instead, PADEP should have given FirstEnergy 26 months to complete construction of the pipeline and diffuser for Outfall 022.

**Requested Modification**: PADEP should revise Part C, Condition III.A.4 to give FirstEnergy 26 months, from commencement of construction, to complete construction of the Outfall 022 pipeline and diffuser.

**20. Toxics Reduction Evaluation (TRE) Description**

**Citation**: Part C, Condition VI

**Issue**: The Toxics Reduction Evaluation (TRE) section of the draft permit refers generally to "pollutants," even though the requirements apply only to copper.

**Explanation**: The draft permit includes conditions related to a Toxics Reduction Evaluation (TRE). Although Part C, Condition VI.A.1 implies that the TRE requirements would apply only to copper and PADEP acknowledges in the Fact Sheet that the TRE requirements would apply only to the new copper WQBELs (Fact Sheet, p. 71), the remainder of the TRE-related conditions refer generally to "pollutants" and are not specific to copper.

**Requested Modification**: "Pollutants" as used in Part C, Condition VI be stricken and replaced with "copper."

**21. 316(b) Requirements**

**Citation**: Part C, Condition X.B

**Issue**: The draft permit requirement that cooling water intakes be operated in a way that minimizes impingement mortality and entrainment "to the fullest extent possible" is arbitrary and capricious and is inconsistent with the requirements of Section 316(b) of the Clean Water Act ("CWA").

**Explanation**: Part C, Condition X.B of the draft permit provides that "…cooling water intake structures must be operated in a way that minimizes impingement mortality and entrainment *to the fullest extent possible* [emphasis added]." Read literally, this language could require the Mansfield Plant to stop using its cooling water intake structure ("CWIS").

Section 316(b) of the CWA states that "[t]hese national requirements, which will be implemented through National Pollutant Discharge Elimination System (NPDES) permits, apply to the location, design, construction, and capacity of cooling water intake structures (CWIS) at regulated facilities by *setting requirements that reflect the best technology available (BTA) for minimizing adverse environmental impact* [emphasis added]."

There is no requirement in the CWA or the implementing regulations to minimize impingement mortality and entrainment "to the fullest extent possible." The Mansfield Plant operates a closed-cycle recirculating system as defined at 40 C.F.R. §125.92(c) to minimize makeup and blowdown flows from the Ohio River to support non-contact cooling water uses at the facility. As such, the Mansfield Plant meets BTA standards for impingement mortality at 40 C.F.R. §125.94(c)(1) and BTA for entrainment under Best Professional Judgment.

**Requested Modification**: PADEP should revise Part C, Condition X.B as follows:

*B. Technology and operational measures currently employed at the cooling water intake structures must be operated in a way that minimizes impingement mortality and entrainment* ***in accordance with the BTA determination*** ~~***to the fullest extent possible***~~.

**22. 316(b) Requirements**

**Citation**: Part C, Condition X.E

**Issue**: Part C, Condition X.E of the draft permit requires information that was already submitted in March 2018.

**Explanation**: Part C, Conditions X.E.1.-7. would require FirstEnergy to submit information that is required under 40 C.F.R. §122.21(r)(2)-(8). FirstEnergy submitted this information to PADEP in March 2018 in a report entitled "40 CFR §122.21(r)(2-8) NPDES Application Requirements for Facilities with Cooling Water Intake Structures Report." **Appendix D.**

**Requested Modification**: Part C, Conditions X.E.1.-7. should be removed from the draft permit.

**23. 316(b) Requirements**

**Citation**: Part C, Condition X.F

**Issue**: The draft permit requirement to complete one year of entrainment sampling is unnecessary and inappropriate for a closed-cycle recirculating system like that used at BMP.

**Explanation**: In March 2018, FirstEnergy submitted a comprehensive report as prescribed by 40 C.F.R. §122.21(r). Pursuant to 40 C.F.R. §122.21(r)(4), FirstEnergy provided biological baseline characterization data that are representative of existing conditions. With a three unit operation, the Mansfield Plant has a through-screen velocity at maximum actual intake flow ("AIF") of 0.37 feet per second to 0.62 feet per second (**Appendix D**, Page 51). Due to the infrequent and intermittent nature of the operations of Units one and two at the Mansfield Plant, the intake flows are significantly less than what was calculated in the report.

Furthermore, under 40 C.F.R. §122.21(r), entrainment sampling is only required for a facility with an AIF greater than 125 MGD. The Mansfield Plant has an AIF of 37.6 MGD to 55.0 MGD (**Appendix D**, Page 11), well under the requirements specified in 40 C.F.R. §122.21(r).

The Mansfield Plant's closed-cycle recirculating system supports the existing entrainment BTA determination, without the need for further inquiry or study.

**Requested Modification**: The entrainment study requirement should be removed from the permit.

**24. 316(b) Requirements**

**Citation**: Part C, Condition X.G

**Issue**: Part C, Condition X.G of the draft permit omits an important regulatory citation.

**Explanation**: Part C, Conditions X.G of the draft permit states that "[o]peration of the facility's existing closed-cycle recirculating system constitutes interim BTA for impingement and entrainment pursuant to 40 CFR §125.98(b)(5)." Based on the information submitted with its March 2018 report, **Appendix D**, FirstEnergy has demonstrated that its existing closed-cycle recirculating system constitutes BTA for impingement and entrainment pursuant to 40 C.F.R. §125.98(b)(5) **and** 40 C.F.R. §125.94(c). PADEP's interim determination is unnecessary.

**Requested Modification**: PADEP should revise Part C, Condition X.G as follows:

*G. Operation of the facility's existing closed-cycle recirculation system constitutes ~~**interim**~~ BTA for impingement and entrainment pursuant to 40 CFR § 125.98(b)(5)* ***and 40 CFR §125.94(c)***

12

**25. Outfalls 001-006, 008, 010-014 Fact Sheet Description Typographical Error**

**Citation:** Fact Sheet, Page 56

**Explanation:** The Fact Sheet includes a typographical error in the section describing the effluent limitations for these outfalls that must be corrected to avoid confusion.

**Requested Modification:** PADEP should correct section SWO.C. on Page 56 of the Fact Sheet as follows:

*No numerical TBELs and WQBELs* ~~**do not**~~ *apply, so the Appendix H and other monitoring requirements will be imposed.*

**25. Outfall 022 Fact Sheet Description Typographical Error**

**Citation**: Fact Sheet, Page 81

**Explanation**: The Fact Sheet makes reference to seep S-19AC, but incorrectly calls it "S-19C."

**Requested Modification**: PADEP should revise Page 81 of the Fact Sheet as follows:

*Construction of a collection system along a portion of Mill Creek to collect Seeps S-19A, S-19B, S-19AC, S-13, S-18, S-19D, S-21B, and S-21C. In the interim, prior to construction of the Mill Creek Collection System, those seeps will be permitted as Outfalls 030 (S-19A, S-19B, S-19AC), 031 (S-13 and S-18), 032 (S-19D), 033 (S-21B), and 034 (S-21C).*

**26. Outfall 022 Point of First Use**

**Citation:** Fact Sheet, p. 87, Table I.R

**Issue:** The Fact Sheet states that several interim monitoring limits at Outfall 022 are based on the PADEP's erroneous and flawed conclusion that Outfall 022 flows into Mill Creek, and Table I.R, which contains these interim limits, incorrectly lists Mill Creek as the receiving water.

**Explanation:** FirstEnergy incorporates by this reference its November 25, 2015 letter to Mr. Chris Kriley, including all enclosures. **Appendix E.** As FirstEnergy has made clear previously, PADEP's longstanding conclusion that Outfall 022 flows into the Ohio River is sound and remains consistent with both the facts and the law.

**Requested Modifications:** PADEP should correct the Fact Sheet and Table I.R to state that the discharge from Outfall 022 flows into the Ohio River.

**26. Schedules of Compliance Typographical Error**

**Citation**: Fact Sheet, Page 90

**Explanation**: The Fact Sheet includes two compliance periods for a comparison with Effluent Limitation Guidelines, one based on a permit renewal before December 31, 2018 and another after that date. In introducing the second compliance period (i.e., a permit renewal date after December 31, 2018), the Fact Sheet erroneously uses the word "before" instead of "after."

**Requested Modification**: PADEP should correct Page 90 of the Fact Sheet as follows:

*Figure 2 shows the schedule if the permit takes effect ~~**before**~~ **after** December 31, 2018, which would put the December 31, 2023 compliance date within the five-year term of the permit.*

**27. Outfalls 042 and 043 Language**

**Citation**: Fact Sheet, Page 102

**Explanation**: The Fact Sheet for Outfall 042 and 043 should include similar language as that describing the 59-month compliance schedule for Outfall 021.

**Requested Modification**: PADEP should add the following language to Page 102 of the Fact Sheet before LBRO.C:

***WQBELs at Outfalls 042 and 043 will take effect when WQBELs take effect at Outfalls 022's current discharge location: 59 months after the permit effective date. Outfalls 042 and 043 tie-in to the Stilling Basin discharge pipeline (and related tie-in of Outfall 021) will be completed as part of the Outfall 022 pipeline extension. Once Outfalls 042 and 043 are tied into the Outfall 022 discharge pipeline, FirstEnergy can submit a request for a minor amendment to remove Outfalls 042 and 043 from the permit if the work is completed prior to the permit expiration. Alternatively, the permit will be renewed with Outfalls 042 and 043 omitted.***

# ATTACHMENT B

# Sierra Club’s September 10, 2018 Comments

SIERRA CLUB

September 10, 2018

***Via email to crwitt@pa.gov, rydecker@pa.gov***

Crystal Witt
Ryan Decker
Pennsylvania Department of Environmental Protection
Clean Water Program
400 Waterfront Drive
Pittsburgh, Pennsylvania 15222

**Re: Comments on Draft NPDES Permit No. PA0027481 for Bruce Mansfield Plant**

On behalf of its nearly 31,000 Pennsylvania members, Sierra Club submits these comments on the draft National Pollutant Discharge Elimination System ("NPDES") permit for the Bruce Mansfield Plant, Permit No. PA0027481 (the "Draft Permit"), noticed for public comment by the Pennsylvania Department of Environmental Protection ("DEP"). While Sierra Club strongly supports the proposed requirement for November 1, 2020 compliance with the flue gas desulfurization wastewater component of the federal Effluent Limitation Guidelines, Sierra Club objects to the Draft Permit on several other grounds. The Draft Permit fails to set proper best available technology for critical wastestreams, contains an illegal and improper provision to nullify certain wastewater control requirements upon "notice" by the Environmental Protection Agency ("EPA"), contemplates an improperly long extension for compliance with the Effluent Limitation Guidelines for ash transport water, and fails to set best available technology for control of bromide pollution.

## BACKGROUND

Bruce Mansfield is a 2.5 gigawatt-rated coal-fired power plant, located in Shippingport, Pennsylvania. It has three boilers, which came online in 1976, 1977, and 1980, respectively. Bruce Mansfield is equipped with a wet scrubber flue gas desulfurization system, although this system was damaged in a fire in January of 2018. Bruce Mansfield discharges pollutants into the Ohio River and Haden Run (which itself empties into the Ohio River).

## LEGAL REQUIREMENTS

In enacting the Clean Water Act ("CWA") Congress established a national goal of eliminating all discharges of pollution into navigable waters. 33 U.S.C. § 1251(a)(1). To that end, Congress implemented the NPDES program, under which no pollutant may be discharged from any point source without a permit, and any failure to comply with such a permit constitutes a violation of the CWA. 33 U.S.C. §§ 1311(a), 1342(a); 40 C.F.R. § 122.41(a). The NPDES permit program is an integral part of the CWA's plan to eliminate pollution discharges and restore and maintain the health and integrity of the nation's waters. 33 U.S.C. § 1342. Bruce Mansfield discharges into multiple such waterways, and is therefore required, pursuant to Section 402 of the CWA, to obtain a NPDES permit.

The CWA requires NPDES permits to include effluent limits based on the level of performance achievable through the use of technology that "will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants." 33 U.S.C. § 1311(b)(2)(A)(i), *see also id*. § 1311(b)(1)(A). Technology-based effluent limitations ("TBELs") constitute the minimum level of control that must be included in a permit "regardless of a discharge's effect on water quality." *Am. Petroleum Inst. v. EPA*, 661 F.2d 340, 344 (5th Cir. 1981).

For sources such as Bruce Mansfield, discharges of pollutants must be eliminated or controlled through application of Best Available Technology ("BAT"). *See* 33 U.S.C. § 1311(b)(2)(A). In accordance with the Act's goal of eliminating all discharges of pollutants, BAT limits "shall require the elimination of discharges of all pollutants if the Administrator finds, on the basis of information available to him . . . that such elimination is technologically and economically achievable . . ." *Id*.

The requirement to meet the BAT standard is ongoing; it compels polluting industries to meet ever more stringent limitations on the path towards complete elimination of water pollution. *See NRDC v. EPA*, 822 F.2d 104, 123 (D.C. Cir. 1987). With each renewal of a NPDES permit, permitting agencies must reconsider whether further pollution reductions and technologies are attainable. The objective of the law is continuous, rapid improvement:

> The BAT standard reflects the intention of Congress to use the latest scientific research and technology in setting effluent limits, pushing industries toward the goal of zero discharge as quickly as possible. In setting BAT, EPA uses not the average plant, but the optimally operating plant, the pilot plant which acts as a beacon to show what is possible.

*Kennecott v. EPA*, 780 F.2d 445, 448 (4th Cir. 1985) (citing 1 *Legislative History of the Federal Water Pollution Control Act of 1972*, 798 (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress), Ser. No. 93-1 (1973)).

EPA periodically promulgates national effluent limitation guidelines ("ELGs") for NPDES permits that reflect BAT for particular discharges, pollutants, and activities found in a category of point sources. *See* 40 C.F.R. § 423. Where those guidelines have been set, they establish the floor or *minimum* level of control that must be imposed in a NPDES permit. In 2015, EPA updated ELGs for steam electric power plants such as Bruce Mansfield. 80 Fed. Reg. 67,838 (Nov. 3, 2015) (codified at 40 C.F.R. Pt. 423). EPA's final rule noted: "Steam electric power plants contribute the greatest amount of all toxic pollutants discharged to surface waters by industrial categories regulated under the [Clean Water Act]." *Id*. Among other things, the new rule prohibits the discharge of pollutants from bottom ash and fly ash transport water and limits the amount of arsenic, mercury, selenium, and nitrate that may be discharged in FGD wastewater. 40 C.F.R. §§ 423.13 (g)(1)(i), (h)(1)(i), and (k)(1)(i). Prior to this long overdue rulemaking, the ELGs were "out of date" and did "not adequately control the pollutants (toxic metals and other) discharged by" power plants, "nor [did] they reflect relevant process and technology advances that ha[d] occurred in the last 30-plus years." 80 Fed. Reg. at 67,840.

Dischargers were required to meet these limitations "as soon as possible beginning November 1, 2018" but in no case later than December 31, 2023. *Id.* Last year EPA extended the 2018 deadline for bottom ash (but not fly ash) transport water and FGD wastewater to November 1, 2020. 82 Fed. Reg. 43,494 (Sept. 18, 2017). "'As soon as possible' means" November 1, 2018 (or November 1, 2020 with respect to bottom ash and FGD-related discharges) unless the permitting authority establishes a later date based on the receipt of certain information and the consideration of specifically enumerated factors. 40 C.F.R. § 423.11(t).

Additionally, state permitting agencies such as DEP must promulgate effluent limitations on a *case-by-case basis* using the permit writer's best professional judgment ("BPJ"). 40 C.F.R. § 125.3(c)(2) and (3); *see also Texas Oil & Gas Ass'n v. EPA*, 161 F.3d 923, 928-29 (5th Cir. 1998). In making site-specific BPJ determinations, state permitting agencies must follow the same factors that EPA is required to apply in determining and applying BAT limits in NPDES permits. *See* 33 U.S.C. §§ 1342(b) and 1311(b); *see also Natural Res. Def. Council v. EPA*, 859 F.2d 156, 183 (D.C. Cir. 1988). Those factors are: the production process in use and the possibility of changing processes; the non-water-quality impacts of controlling pollution; the age of equipment; the costs of pollution control; and the engineering aspects of various control techniques. 22 U.S.C. § 1314(b)(2)(B); 40 C.F.R. § 125.3(d)(3). In applying these factors, the agency must consider the best state of the art practices in the industry, to ensure the goals of the CWA are met. "Congress intended these [BAT] limitations to be based on the performance of the single best-performing plant in an industrial field." *Chem. Mfrs. Ass'n v. EPA*, 870 F.2d 177, 226 (5th Cir. 1989); *Texas Oil & Gas Ass'n*, 161 F.3d at 927; *see also Am. Frozen Food Inst. v. Train*, 539 F.2d 107, 132 (D.C. Cir. 1976).

A technology is considered "available" where there is, or could feasibly be, use within an industry. In fact, courts have held that even if "no plant in a given industry has adopted a pollution control device which could be installed [this] does not mean that the device is not 'available,'" thus ensuring that industry cannot game the system by agreeing to not adopt pollution control technology. *Hooker Chems. & Plastics Corp. v. Train*, 537 F.2d 620, 636 (2d Cir. 1976); *see also Am. Paper Inst. v. Train*, 543 F.2d 328, 346 (D.C.

Cir. 1976) (BAT should "at a minimum, be established with reference to the best performer in any industrial category.").

With respect to economic considerations, a technology is "economically achievable" under the BAT standard if it is affordable for the best-run facility within an industry. *See, e.g.*, *Reynolds Metals Co. v. EPA*, 760 F.2d 549 (4th Cir. 1985). "BAT should represent 'a commitment of the maximum resources economically possible to the ultimate goal of eliminating all polluting discharges.'" *Natural Res. Def. Council v. EPA*, 863 F.2d 1420, 1426 (9th Cir. 1988) (citations omitted); *see also EPA v. Nat'l Crushed Stone*, 449 U.S. 64, 74 (1980) (If a discharger of pollutants can afford the best available technology, then it must meet, and should not be allowed a variance from, stringent BAT limits.); *Kennecott v. U.S. E.P.A.*, 780 F.2d 445, 448 (4th Cir. 1985) ("In setting BAT, [the issuing authority] uses not the average plant, but the optimally operating plant which acts as a beacon to show what is possible.").

After application of the most stringent treatment technologies available under the BAT standard, if a discharge causes or contributes to, or has the reasonable potential to cause or contribute to, a violation of water quality standards, permitting agencies must also include in the governing NPDES permit any limits necessary to ensure that water quality standards are maintained and not violated. *See* 40 C.F.R. § 122.44(d); *see also Am. Paper Inst. v. EPA*, 996 F.2d 346, 350 (D.C. Cir. 1993); *Waterkeeper Alliance, Inc. v. EPA*, 399 F.3d 486, 502 (2d. Cir. 2005). Agencies must conduct a reasonable potential analysis ("RPA") and determine whether additional WQBELs are required to protect human health and aquatic life. This obligation includes compliance with both narrative and numeric water quality standards. 40 C.F.R. § 122.44(d)(1).

In order to ensure that progress is continually made toward the goals of restoring and protecting the integrity of our nation's waters, the CWA requires that effluent limits in permits not be relaxed at the time of renewal or amendment of a permit. The CWA provides that a permit may not upon renewal, reissuance, or amendment include less stringent effluent limits than the comparable effluent limit in the previous permit or version of the permit. 33 U.S.C. § 1342(o).

## COMMENTS

### A. Technology-Based Effluent Limits Are Needed for Key Outfalls

As noted above, under the CWA, a state-permitting agency must promulgate permit effluent limitations, in accordance with best available technology ("BAT"), on a case-by-base basis. 40 C.F.R. § 125.3(c)(2) and (3); *see also Texas Oil & Gas Ass'n*, 161 F.3d at 928-29. In doing so, the state agency is bound by the same factors that EPA is required to apply in determining and applying BAT limits in a permit. *See* 33. U.S.C. §§ 1342(b) and 1311(b); *see also Natural Res. Def. Council*, 859 F.2d at 183.

It is well-settled that the pollutants selenium, cadmium, lead, copper, mercury, ammonia, nitrite, chloride, arsenic, barium, nickel, antimony, and hexavalent chromium, are present in discharges from coal-fired plants, from things like coal pile runoff, ash leachate, and coal ash dewatering wastewater. *See, e.g.*, U.S. EPA, 2017 Toxics Release Inventory report, Toxics Release Inventory Program, *at* http://www.epa.gov/tri/. (discussing the contents of coal ash water). Well-known and widely-implemented technologies are available to address these wastestreams. Indeed, EPA has identified numerous types of BAT for dealing with the pollutants found in effluent from coal-fired plants, such as coagulants, floculents, bioreactors, vapor-compression evaporation, and organosulfides to remove metals from coal wastewater.

Here, the Draft Permit fails to set appropriate BAT for wastestreams containing just such toxics-laden wastewater. For example, Outfalls 21, 23, 24, 26, 28, 30, 31, 32, 33, 34,35, 36, 37, 38, 39, 40, and 41 are springs and seepwater impacted by Little Blue Run. This means that these outfalls are discharging wastewater containing pollutants characteristic of ash transport water, FGD wastewater, and coal pile runoff. However, for each of these outfalls, the Draft Permit proposes to monitor only the wide range of pollutants that the outfalls would be discharging. DEP has accordingly failed to undertake the required BPJ analysis to set TBELs for these outfalls consistent with BAT.

The Draft Permit should be revised to incorporate limits for additional pollutants, and to require additional controls, such as a bioreactor for selenium, to ensure that limits are consistent with BAT for outfalls such as these at Bruce Mansfield.

### B. The Final Permit Must Be Amended to Remove the Automatic ELG Rescission Language

Although the Draft Permit properly includes requirements for compliance with the Effluent Limitation Guidelines, it includes a provision that would appear to automatically delete these requirements should EPA "notice" changes to the ELGs. While DEP calls this a "reopener" provision in the Draft Fact Sheet, this deletion provision is both problematic and contrary to the Clean Water Act.

First, the language of the provision is extremely vague, and accordingly does not achieve the objective of providing certainty to the permittee or the public concerning when DEP will require TBELs consistent with the ELGs to be implemented. As regards FGD wastewater, he provision states:

> Starting November 1, 2020, flue gas desulfurization (FGD) wastewater generated by the permittee shall not be discharged to surface waters unless the wastewater is treated to achieve the effluent limitation guidelines (ELGs) for Best Available Technology (BAT) at 40 CFR § 423.13(g)(1)(i). ***In the event EPA publishes notice of the modification*** of the ELGs at 40 CFR § 423.13(g)(1)(i) prior to December 31, 2023, the permittee shall achieve compliance with the modified ELGs ***as soon as possible*** but no later than the date established by federal regulations. ***If EPA publishes notice of the rescission or revocation of the ELGs*** at 40 CFR § 423.13(g)(3)(i) prior to December 31, 2023, this provision is not

applicable.

Draft Permit at 107 (emphasis added). Nearly identical language is in place in the Draft Permit for ash transport water. *Id.* First and foremost, the FGD provision contains a contradiction: Bruce Mansfield is required to comply with the FGD ELG by November 21, 2023, unless EPA publishes notice of rescission or revocation "prior to December 31, 2023." As a result, it appears that DEP is offering Bruce Mansfield the ability to resume discharging FGD wastewater even after November 2020 if EPA takes action at some point in the ensuing three years, which is illogical at best.

Second, the language is improperly vague. Terms such as "publishes notice" are undefined, and are in their colloquial sense regulatorily irrelevant. "Notice" of a modification to the ELGs could mean any number of things (a press release, a web page posting, a tweet, etc.)—many of which have little to do with actual changes in the law.[1] Nor is the phrase "as soon as possible" defined; leaving it undefined improperly delegates authority from DEP to the permittee.

Third, stripping ELG compliance from the permit would amount to illegal backsliding. DEP is required to undertake a BPJ analysis to set TBELs consistent with BAT for Bruce Mansfield. DEP may ultimately determine, as part of that BPJ analysis, that the effluent limits and restrictions in the Draft Permit adopted from the ELGs are consistent with BAT, and therefore are TBELs for Bruce Mansfield. In such case, those limits cannot be stricken from the permit—certainly not by automatic action—without running afoul of antibacksliding requirements. 33 U.S.C. § 1342(o). Indeed, even if DEP determines that the ELG requirements are *not* BAT for Bruce Mansfield, stripping those requirements from the permit would be a major modification to the permit, requiring notice and comment. DEP cannot shirk its BPJ analysis obligations through such a conditional permit provision as the "reopener" language in the Draft Permit. Such language should be removed from the permit, and DEP's BPJ analysis adopting the ELGs affirmed.

## C. The Draft Permit Improperly Contemplates an Unwarranted ELG Extension for Coal Ash Transport Water

The Draft Permit proposes to provide an extension for compliance with the bottom-ash transport water ELG from November 2018 until December 31, 2023, or over 5 years from the present. This is excessive, unwarranted, and contrary to law. Technologies for implementing zero discharge for such waste waters are readily available

[1] Even this sets aside the question of whether or not any such notice is legal. For example, consider EPA's announcement, earlier this summer on July 6, that it would not enforce the "Glider Rule" regulating emissions from certain types of trucks, and the subsequent order on July 18 from the D.C. Circuit nullifying that announcement. *See, e.g.*, Timothy Cama, *The Hill*, "Court blocks EPA policy against enforcing truck pollution rule," (July 18, 2018), *available at* http://thehill.com/policy/energy-environment/397687-court-blocks-epa-policy-against-enforcing-truck-pollution-rule.

(and have been for years). In addition, as discussed in more detail below, implementation times for such technologies should not take more than 2-3 years at most (even assuming nothing has been done at Bruce Mansfield by way of preparation for compliance with the Rule, which has now been in effect for almost 3 years).

1. *The Draft Permit and Fact Sheet Offer No Justification for a Compliance Extension for Bruce Mansfield*

Bruce Mansfield's bottom-ash transport water discharges are subject to EPA's 2015 ELGs for steam electric power generation sources. *See* 40 C.F.R. § 423.13. As discussed, Bruce Mansfield must comply with this standard "as soon as possible," meaning no later than November 1, 2020 unless the permitting authority establishes a later date, after receiving information from the discharger reflecting consideration of certain enumerated factors. 40 C.F.R. § 423.11(t) (explaining that, with respect to ELGs bottom ash transport water, "'as soon as possible' means" November 1, 2020)). Critically, permitting authorities must "provide a well-documented justification for how [they] determined the 'as soon as possible' date in the fact sheet or administrative record for the permit," and to "explain why allowing additional time to meet the limitations is appropriate." *See* U.S. EPA, Technical Development Document for the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (Sept. 2015), at 14-11.[2]

Here, DEP notes uncritically that FirstEnergy provided a "proposed" schedule for elimination of bottom-ash transport water discharges "within 64 months." Draft Permit Fact Sheet at 83. DEP then goes on to assume that Bruce Mansfield would not even bother starting work on this schedule "until the permit is renewed." *Id.* at 83-84. DEP concludes that, because fewer than 64 months would be likely to elapse between permit issuance and December 31, 2023, it proposes to offer an extension until the end of 2023. *Id.* at 84. This represents the sum total discussion in the Draft Permit Fact Sheet of DEP's proposal to grant such an extension.

DEP has accordingly failed to justify the extension; nor, for the reasons explained below, could it so justify. DEP's cursory and uncritical adoption of FirstEnergy's proposed 64-month schedule fails to explain *why* such a schedule is necessary and likewise fails to explain why Bruce Mansfield would take twice as long to install equipment necessary to comply with the ELGs as other plants. Nor does it—or can it—explain why any compliance schedule should be calculated based on an assumption that Bruce Mansfield does not start working on compliance until after the permit issues. FirstEnergy has been on notice since the ELGs were issued in 2015 that it would have to comply, and while ELGs are to be incorporated into NPDES permits, compliance timelines are not dependent on the vagaries of permit issuance timing. *See* 40 C.F.R. § 423.11(t)(4) (discussing factors to be considered in making the well-documented justification for any compliance extension beyond November 1, 2020 necessary for any

[2] *Available at* https://www.epa.gov/sites/production/files/2015-10/documents/steam-electric-tdd_10-21-15.pdf.

such extension, and not discussing the date of permit finalization as one such factor). As such, the extension should not be included in the final permit, and instead Bruce Mansfield should be required to comply with the ELG by November 1, 2020.

2. *Vendor Experience and Discussions During the ELG Rulemaking*

Even if DEP had provided the required well-documented justification for the three-year compliance extension that it proposes, any such purported justification would be out of step with the realities of the short time frames needed to install technology to comply with the ELG. Most utilities have stated that they intend to meet the zero discharge requirements of the ELG rule by using a remote mechanical drag system ("RMDS") if there is not sufficient space below the boiler to install a similar system right directly below the boiler. These are standard technology options that many utilities are selecting to meet the bottom-ash transport water zero discharge requirements in the ELG Rule. Several vendors have these types of technologies available and they all indicated so when they participated during ELG rulemaking.

In order "to gather information on handling fly ash and bottom ash" during the ELG rulemaking, EPA contacted several ash handling and ash storage vendors. The vendors provided the following types of information for EPA's analyses:

- Types of fly ash and bottom ash handling systems available for reducing or eliminating ash transport water;
- Equipment, modifications, and demolition required to convert wet-sluicing fly ash and bottom ash handling systems to dry ash handling or closed-loop recycle systems;
- Equipment that can be reused as part of the conversion from wet to dry handling or in a closed-loop recycle system;
- Outage time required for the different types of ash handling systems;
- Maintenance required for each type of system;
- Operating data for each type of system;
- Purchased equipment, other direct, and indirect capital costs for fly ash and bottom ash conversions;
- Specifications for the types of ash storage available (*e.g.*, steel silos or concrete silos) for the different types of handling systems;
- Equipment and installation capital costs associated with the storage of fly ash and bottom ash; and,
- Operation and maintenance costs for fly ash and bottom ash handling systems.[3]

The vendor community has been well aware of the rule requirements and participated fully in the rulemaking. There are numerous well-qualified U.S. vendors (and foreign vendors that are active in the U.S. market) that are capable of providing equipment and

[3] U.S. EPA, Technical Development Document for the Effluent Limitation Guidelines and Standards for the Steam Electric Power Generating Point Source Category, EPA-821-R-15-007 at 3-21 and 3-22 (Sept. 2015).

services for ash handling and conversion of wet bottom ash handling systems to dry systems or closed-loop recycle systems. Major vendors include United Conveyer Corporation ("UCC"),[4] Clyde Bergemann,[5] and Magaldi[6]—each of which has wet to dry conversion technologies. Other vendors such as GE, Veolia, Nalco, Aquatech, Heartland, LB Industrial Systems, and many others also have potential capabilities and solutions for specific aspects of ash handling. The ELG rulemaking docket shows that EPA consulted extensively with at least UCC and Clyde Bergemann with respect to bottom ash transport water and handling during rule development.[7] Both of these vendors have wet to dry ash conversion systems, which have been installed at coal plants around the world, including in the U.S.

That the vendor community for bottom ash handling is robust is not surprising given that the U.S. coal-fired power plant fleet is over 800 units strong, with each one generating copious amounts of bottom ash that must be handled and managed. Further, as the ELG rulemaking record shows, a significant portion of the U.S. coal fleet already meets the ELG standard for bottom ash transport water using dry handling systems. These vendors already have many technology solutions and offerings for achieving a zero discharge bottom ash wastewater standard. As EPA states in the preamble to the ELG Rule:

> [T]echnologies for control of bottom ash transport water are demonstrably available. Based on survey data, more than 80 percent of coal-fired generating units built in the last 20 years have installed dry bottom ash handling systems. In addition, EPA found that more than half of the entities that would be subject to BAT requirements for bottom ash transport water are already employing zero discharge technologies (dry handling or closed-loop wet ash handling) or planning to do so in the near future.[8]

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[4] UCC offers various hydraulic, mechanical, pneumatic, and vibratory systems for dry bottom ash handling. See http://unitedconveyor.com/bottom_ash/.

[5] Clyde Bergemann offers a trademarked "DRYCON" system for dry bottom ash handling. *See* http://www.cbpg.com/en/products-solutions-materials-handling-bottom-ash/drycon%E2%84%A2.

[6] Magaldi offers a dry ash handling system called MAC. *See* http://www.magaldi.com/en/magaldi_solutions_for/Ash-Handling-Mac__9_11.php#tab_fototab.

[7] *See, e.g.*, ERG/EPA Call Notes re Ash Handling Conversion in the Industry (May 24, 2012), EPA-HQ-OW-2009-0819-0580, *available at* https://www.regulations.gov/document?D=EPA-HQ-OW-2009-0819-0580 (pertaining to EPA and its contractor's discussions with UCC); ERG Memorandum re Ash Handling Documentation from Communications with Clyde Bergemann (Sept. 30, 2015), EPA-HQ-OW-2009-0819-6232, *available at* https://www.regulations.gov/document?D=EPA-HQ-OW-2009-0819-6232.

[8] 80 Fed. Reg. at 67,852.

Thus, Bruce Mansfield has a good selection of experienced and prepared vendors to select from to achieve compliance with the bottom ash transport water ELG requirements.

3. *Schedule for Implementing Bottom Ash Transport Water Conversion During Development of the ELGs*

While numerous parties provided comments to the EPA during its ELG rulemaking, it is particularly important to note certain relevant portions of comments provided by the Utility Water Act Group ("UWAG"), an industry consortium, which includes almost all U.S. utilities as its members.[9] Almost all US power plant operators are members of UWAG.

In its comments pertaining to bottom ash conversions, UWAG offers case studies showing conversion to dry bottom ash handling in 36 months or less:

> [I]n the case study presented in the attachment, it would take 30-36 months to convert from a wet bottom ash hopper to a dry bottom ash hopper for a large unit . . . . Another case study for adding a remote wet ash hopper and submerged flight conveyor would take 27-33 months.[10]

The project implementation timeframes referenced in this section, which are already considerably shorter than what PADEP has proposed at Bruce Mansfield (i.e., till December 31, 2023 or over 5 years from now), are relevant for situations in which no initial planning or assessment has been completed. However, even if it were the case that Bruce Mansfield has made no preparations since the ELG Rule went into effect almost 3 years ago, DEP has made no such finding; nor would it be consistent with good public policy to reward Bruce Mansfield for such foot-dragging at the expense of the public's health and the environment. Thus, the implementation schedule at Bruce Mansfield should be shorter than 36 months or 3 years.

In addition, other utilities, such as the Southern Company, in their own comments on the proposed ELG Rule also indicated their ability to convert wet bottom ash handling

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[9] As UWAG's comments note, "UWAG is a voluntary, *ad hoc*, non-profit, unincorporated group of 198 individual energy companies and three national trade associations of energy companies: the Edison Electric Institute, the National Rural Electric Cooperative Association, and the American Public Power Association. The individual energy companies operate power plants and other facilities that generate, transmit, and distribute electricity to residential, commercial, industrial, and institutional customers." Utility Water Act Group Comments on EPA's Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, at 1 n.1.

[10] *Id.* at 84.

systems to dry systems in the same time frames as indicated in the UWAG comments.[11]

Accordingly, the Draft Permit's proposal to give Bruce Mansfield until December 31, 2023 should be removed before the permit is finalized, and Bruce Mansfield should be required to comply with the bottom-ash transport water ELG by no later than November 1, 2020.

4. *Bruce Mansfield's Retirement Announcement Further Demonstrates that a December 31, 2023 ELG Compliance Extension Is Improper*

On August 29, 2018, FirstEnergy Solutions announced that it was seeking grid decertification for multiple power plants, including all three units at Bruce Mansfield, which FirstEnergy stated would be retired by June 1, 2021.[12] Deactivation of Bruce Mansfield, and cessation of coal-firing there, would mean the cessation of discharges from coal ash transport water (as well as all other direct waste streams, such as FGD wastewater). Effectively, Bruce Mansfield is electing to "comply" with the ELGs by ceasing to pollute, in less than three years. As such, DEP's proposed ELG compliance extension until the end of 2023 is improper for the further reason that FirstEnergy has stated that it is entirely able to cease discharges of bottom-ash transport water two-and-a-half years earlier than the Draft Permit contemplates. Because the ELGs require compliance "as soon as possible" after November 1, 2020, and because FirstEnergy itself has announced that it will cease discharges by June 1, 2021, it would be arbitrary and capricious if DEP granted a compliance extension to December 31, 2013. 40 C.F.R. § 423.11(t).

**D. The Final Permit Must Include TBELs for Bromide**

As discussed above, DEP has, at a minimum, an ongoing obligation to assess BAT for controlling discharges from Bruce Mansfield and impose TBELs accordingly. 33 U.S.C. § 1311(b)(2)(A); *see also NRDC v. EPA*, 822 F.2d at 123. Even when EPA has not promulgated specific federal limitations, DEP is still required to assess site-specific BAT using BPJ "with reference to the best performer in any industrial category." *Am. Paper Inst. v. Train*, 543 F.2d at 346; 40 C.F.R. § 125.3(c)(2) and (3).

The Draft Permit fails to include any effluent limitations for discharges of bromides from Bruce Mansfield's wet FGD. These toxic discharges are harmful in their own right, but are especially dangerous in this case especially dangerous given the Plant's proximity to drinking water intakes. Bromides in sources of drinking water can result in extremely dangerous carcinogenic compounds as a result of water treatment facilities'

[11] Southern Company Comments on EPA's Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, Appendix B.
[12] *See, e.g.*, PRNewswire "FirstEnergy Solutions Files Deactivation Notice for Oil- and Coal-fired Plants in Ohio and Pennsylvania," (Aug. 29, 2018) *available at* https://www.prnewswire.com/news-releases/firstenergy-solutions-files-deactivation-notice-for-oil--and-coal-fired-plants-in-ohio-and-pennsylvania-300704459.html.

disinfection processes. *See* Good et. al., "Power Plant Bromide Discharges and Downstream Drinking Water Systems in Pennsylvania," Environ. Sci Technol., 2017, 51 (20), pp. 11,829-38 (discussing coal plants' bromide pollution, and observing that "the bromide load contributions from wet FGD lead to higher concentration[s]").[13] This issue of bromides in drinking water has been a major concern in Western Pennsylvania for years. *See, e.g.*, Pittsburgh Today, "Water Quality: Bromide and TDS," (Feb. 7, 2017);[14] The Heinz Endowments, "Safe Drinking Water – Bromide in Our Water," (showing the "coal-fired power plants operating wet flue gas desulfurization," such as Bruce Mansfield, and discussing the resulting "bromide flows downstream where it can increase carcinogenic disinfection byproduct formation at drinking water treatment plants");[15] Bill O'Driscoll, Pittsburgh City Paper, "If you're going to use river water as your drinking water, you shouldn't discharge bromide," (Nov. 21, 2012);[16] Don Hopey, Pittsburgh Gazette, "Bromide: A concern in drilling wastewater," (March 13, 2011).[17]

As with all other pollutants, DEP must assess appropriate TBELs reflecting BAT based on BPJ for those discharges, as well as any more stringent limits necessary to protect water quality. 33 U.S.C. § 1311(b)(2)(A); 40 C.F.R. § 122.44(d).

## CONCLUSION

For the foregoing reasons, we urge DEP to incorporate these changes in amending the Draft Permit and to prevent the continued contamination of Pennsylvania waters. Thank you for your consideration of our comments.

Respectfully submitted,

/s/

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[13] *Available at* http://pubs.acs.org/doi/10.1021/acs.est.7b03003.
[14] *Available at* http://pittsburghtoday.org/news/water-quality-bromide-tds/.
[15] *Available at* http://www.heinz.org/strategic-areas/sustainability/safe-drinking-water.
[16] *Available at* https://www.pghcitypaper.com/pittsburgh/if-youre-going-to-use-river-water-as-your-drinking-water-you-shouldnt-discharge-bromide/Content?oid=1590245.
[17] *Available at* http://www.post-gazette.com/news/environment/2011/03/13/Bromide-A-concern-in-drilling-wastewater/stories/201103130368.

# ATTACHMENT C

# Analytical Results from DEP's January 7, 2019 Stream Sampling

Date of Issue: 02/02/2019 04:03:56

DEP Bureau of Laboratories - Harrisburg
P.O. Box 1467
2575 Interstate Drive
Harrisburg, PA 17105-1467

Contact Phone Number: (717) 346-7200

NELAP - accredited by

NJ DEP - Laboratory Number: PA059
PA DEP LAP - DEP Lab ID: 22-00223

**Analytical Report For**
**Water Quality Protection**

**Sample ID:** 0577 001 **Date Collected:** 01/07/2019 11:45:00 AM **Lab Sample ID:** I2019000458 **Status:** Completed

**Name of Sample Collector:** Richard Spear
**Date Received:** 01/08/2019

**County:** NOT INDICATED **State:**
**Municipality:** NOT INDICATED

**Sample Medium:** Water
**Sample Medium Type:** Water

**Location:** NOT INDICATED
**Reason:** Routine Sampling
**Project:** NOT INDICATED
**Standard Anlysis:** 612
**Matrix:** Water

| Field Tests | | |
|---|---|---|
| pH | 6.94 | pH units |
| Temperature | 4.6 | C |
| Dissolved Oxygen | 12.26 | mg/L |
| Specific Conductance | 217 | umhos/cm |

**Stream Condition:**

**Sample Comment:** UNT 33280 to Mill Creek Upstream Site.. Gather data for First Eneregy Little Blue Run Permit.

**Analytical Report For**
**Water Quality Protection**

**Sample ID:** 0577 001 **Date Collected:** 01/07/2019 11:45:00 AM **Lab Sample ID:** I2019000458 **Status:** Completed

| Test Codes / CAS # - Description | Reported Results | Date And Time Analyzed | Approved by | Test Method |
|---|---|---|---|---|
| 00410 ALKALINITY AS CaCO3 @ pH 4.5 | 36.6 mg/L | 01/16/2019 04:03 PM | MTUZINSKI | SM 2320B |
| 01105A ALUMINUM, TOTAL (WATER & WASTE) BY ICP | 115.000 ug/L (J) | 01/28/2019 02:21 PM | CREITMEYER | EPA 200.7 |
| 00608A AMMONIA DISSOLVED AS NITROGEN | 0.03000 mg/L | 01/30/2019 02:51 PM | CRADEK | EPA 350.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00610A AMMONIA TOTAL AS NITROGEN | 0.020 mg/L | 01/30/2019 02:50 PM | CRADEK | EPA 350.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 01002H ARSENIC, TOTAL (WATER & WASTE) BY ICPMS | <.661 ug/L (U) | 01/09/2019 11:54 AM | SCHOY | EPA 200.8 |
| ** Comment ** Results are reported to the MDL level | | | | |
| 01007A BARIUM, TOTAL (WATER & WASTE) BY ICP | 21.000 ug/L | 01/28/2019 02:21 PM | CREITMEYER | EPA 200.7 |
| 01022K BORON, TOTAL (WATER & WASTE) BY ICP | 28.000 ug/L (J) | 01/28/2019 02:21 PM | CREITMEYER | EPA 200.7 |
| 00916A CALCIUM, TOTAL (WATER & WASTE) BY ICP | 19.300 mg/L | 01/28/2019 02:21 PM | CREITMEYER | EPA 200.7 |
| 01042H COPPER, TOTAL (WATER & WASTE) BY ICPMS | 0.422 ug/L | 01/09/2019 11:54 AM | SCHOY | EPA 200.8 |
| ** Comment ** Results are reported to the MDL level | | | | |
| 00631A Dissolve Nitrate & Nitrite Nitrogen | 1.839 mg/L | 01/08/2019 01:01 PM | TBEAR | EPA 353.2 |
| 00671A Dissolve Ortho Phosphorus | 0.016 mg/L | 01/08/2019 01:19 PM | LBENT | EPA 365.1 |
| 00602A Dissolved Nitrogen as N | 2.239 mg/L | 01/22/2019 10:00 AM | TBEAR | SM 4500-NC |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00666A Dissolved Phosphorus as P | 0.057 mg/L | 01/22/2019 01:14 PM | LBENT | EPA 365.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00900 HARDNESS, TOTAL (CALCULATED) | 76 mg/L | 01/28/2019 02:21 PM | CREITMEYER | SM 2340 B |
| ** Comment ** Accredited by NJ only - accreditation not available from PA | | | | |
| 01045A IRON, TOTAL (WATER & WASTE) BY ICP | 243.000 ug/L | 01/28/2019 02:21 PM | CREITMEYER | EPA 200.7 |
| 01051H LEAD, TOTAL (WATER & WASTE) BY ICPMS | 0.159 ug/L | 01/09/2019 11:54 AM | SCHOY | EPA 200.8 |
| ** Comment ** Results are reported to the MDL level | | | | |
| 01132A LITHIUM, TOTAL (WATER & WASTE) BY ICP | 6.000 ug/L (J) | 01/28/2019 02:21 PM | CREITMEYER | EPA 200.7 |
| 99020 Low Bromide by IC | 29.3610 ug/L | 01/17/2019 04:19 AM | MAMCNULTY | EPA 300.1 B |
| 00927A MAGNESIUM, TOTAL (WATER & WASTE) BY ICP | 6.800 mg/L | 01/28/2019 02:21 PM | CREITMEYER | EPA 200.7 |
| 01055A MANGANESE, TOTAL (WATER & WASTE) BY ICP | 56.000 ug/L | 01/28/2019 02:21 PM | CREITMEYER | EPA 200.7 |
| 01067A NICKEL, TOTAL (WATER & WASTE) BY ICP | 6.000 ug/L (J) | 01/28/2019 02:21 PM | CREITMEYER | EPA 200.7 |
| 82550 OSMOTIC PRESSURE, MOS/KG | <1 (U) | 01/08/2019 11:42 AM | KMCMULLEN | BOL 3003 |
| 00403 pH, Lab (Electrometric) | 7.4 pH units | 01/16/2019 04:03 PM | MTUZINSKI | SM 4500-H+ B |

**Analytical Report For**
**Water Quality Protection**

**Sample ID:** 0577 001 **Date Collected:** 01/07/2019 11:45:00 AM **Lab Sample ID:** I2019000458 **Status:** Completed

| Test Codes / CAS # - Description | Reported Results | Date And Time Analyzed | Approved by | Test Method |
|---|---|---|---|---|
| ** Comment ** Holding Time Exceeded | | | | |
| 00937A POTASSIUM, TOTAL (WATER & WASTE) BY ICP | 3.250 mg/L | 01/28/2019 02:21 PM | CREITMEYER | EPA 200.7 |
| 01147H SELENIUM, TOTAL (WATER & WASTE) BY ICPMS | <.524 ug/L (U) | 01/09/2019 11:54 AM | SCHOY | EPA 200.8 |
| ** Comment ** Results are reported to the MDL level | | | | |
| 00929A SODIUM, TOTAL (WATER & WASTE) BY ICP | 5.440 mg/L | 01/28/2019 02:21 PM | CREITMEYER | EPA 200.7 |
| 00095 SPECIFIC CONDUCTIVITY @ 25.0 C | 214.00 umhos/cm | 01/08/2019 02:29 PM | MTUZINSKI | SM 2510B |
| 01082A STRONTIUM, TOTAL (WATER & WASTE) BY ICP | 80.000 ug/L | 01/28/2019 02:21 PM | CREITMEYER | EPA 200.7 |
| 00403T Temperature at which pH is measured | 19.83 C | 01/16/2019 04:03 PM | MTUZINSKI | SM 4500-H+ B |
| 00940 Total Chloride-Ion Chromatograph | 3.2030 mg/L | 01/08/2019 02:32 PM | FVODOPIVEC | EPA 300.0 |
| 70300U TOTAL DISSOLVED SOLIDS @ 180C BY USGS-I-1750 | 138 mg/L | 01/08/2019 12:38 PM | LWILKINSON | USGS I-1750 |
| 00630A Total Nitrate & Nitrite Nitrogen | 1.773 mg/L | 01/08/2019 12:59 PM | TBEAR | EPA 353.2 |
| 00600A Total Nitrogen as N | 1.932 mg/L | 01/22/2019 09:58 AM | TBEAR | SM 4500-NC |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00680 Total Organic Carbon | 1.5070 mg/L | 01/10/2019 07:46 AM | MAMCNULTY | SM 5310 C |
| 70507A Total Ortho Phosphorus as P | 0.016 mg/L | 01/08/2019 01:18 PM | LBENT | EPA 365.1 |
| 00665A Total Phosphorus as P | 0.021 mg/L | 01/22/2019 01:12 PM | LBENT | EPA 365.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00945 Total Sulfate-Ion Chromatograph | 52.3360 mg/L | 01/08/2019 02:32 PM | FVODOPIVEC | EPA 300.0 |
| 00530 TOTAL SUSPENDED SOLIDS | <5 mg/L (U) | 01/08/2019 03:38 PM | LWILKINSON | USGS I-3765 |
| 01092A ZINC, TOTAL (WATER & WASTE) BY ICP | <7.00 ug/L (U) | 01/28/2019 02:21 PM | CREITMEYER | EPA 200.7 |

The results of the analyses provided in this laboratory report relate only to the sample(s) identified therein. Unless otherwise noted, the results presented on this laboratory report meet all requirements of the 2009 TNI standard. Sample was in acceptable condition when received by the Laboratory. Any exceptions are noted in the report.
* denotes tests that the laboratory is not accredited for

J - Indicates an estimated value, reported between Reporting Limit (RL) and Minimum Detection Limit (MDL).

Taru Upadhyay, Technical Director, Bureau of Laboratories

**Date of Issue:** 02/02/2019 04:11:00

**DEP Bureau of Laboratories - Harrisburg**
**P.O. Box 1467**
**2575 Interstate Drive**
**Harrisburg, PA 17105-1467**

**Contact Phone Number: (717) 346-7200**

**NELAP - accredited by**

**NJ DEP - Laboratory Number: PA059**
**PA DEP LAP - DEP Lab ID: 22-00223**

**Analytical Report For**
**Water Quality Protection**

**Sample ID:** 0577 002 **Date Collected:** 01/07/2019 12:00:00 PM **Lab Sample ID:** I2019000459 **Status:** Completed

**Name of Sample Collector:** Richard Spear
**Date Received:** 01/08/2019

**County:** NOT INDICATED **State:**
**Municipality:** NOT INDICATED

**Sample Medium:** Water
**Sample Medium Type:** Water

**Location:** NOT INDICATED
**Reason:** Routine Sampling
**Project:** NOT INDICATED
**Standard Anlysis:** 612
**Matrix:** Water

| Field Tests | | |
|---|---|---|
| pH | 6.75 | pH units |
| Temperature | 5.2 | C |
| Dissolved Oxygen | 11.80 | mg/L |
| Specific Conductance | 193.8 | umhos/cm |

**Stream Condition:**

**Sample Comment:** UNT 33280 to Mill Creek Middle. Gathering data for First Energy Permit.

**Analytical Report For**
**Water Quality Protection**

**Sample ID:** 0577 002 **Date Collected:** 01/07/2019 12:00:00 PM **Lab Sample ID:** I2019000459 **Status:** Completed

| Test Codes / CAS # - Description | Reported Results | Date And Time Analyzed | Approved by | Test Method |
|---|---|---|---|---|
| 00410 ALKALINITY AS CaCO3 @ pH 4.5 | 32.6 mg/L | 01/16/2019 04:09 PM | MTUZINSKI | SM 2320B |
| 01105A ALUMINUM, TOTAL (WATER & WASTE) BY ICP | 192.000 ug/L (J) | 01/28/2019 02:23 PM | CREITMEYER | EPA 200.7 |
| 00608A AMMONIA DISSOLVED AS NITROGEN | 0.03900 mg/L | 01/30/2019 02:55 PM | CRADEK | EPA 350.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00610A AMMONIA TOTAL AS NITROGEN | 0.031 mg/L | 01/30/2019 02:53 PM | CRADEK | EPA 350.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 01002H ARSENIC, TOTAL (WATER & WASTE) BY ICPMS | <.661 ug/L (U) | 01/09/2019 12:10 PM | SCHOY | EPA 200.8 |
| ** Comment ** Results are reported to the MDL level | | | | |
| 01007A BARIUM, TOTAL (WATER & WASTE) BY ICP | 21.000 ug/L | 01/28/2019 02:23 PM | CREITMEYER | EPA 200.7 |
| 01022K BORON, TOTAL (WATER & WASTE) BY ICP | 24.000 ug/L (J) | 01/28/2019 02:23 PM | CREITMEYER | EPA 200.7 |
| 00916A CALCIUM, TOTAL (WATER & WASTE) BY ICP | 17.200 mg/L | 01/28/2019 02:23 PM | CREITMEYER | EPA 200.7 |
| 01042H COPPER, TOTAL (WATER & WASTE) BY ICPMS | 0.590 ug/L | 01/09/2019 12:10 PM | SCHOY | EPA 200.8 |
| ** Comment ** Results are reported to the MDL level | | | | |
| 00631A Dissolve Nitrate & Nitrite Nitrogen | 1.234 mg/L | 01/08/2019 01:04 PM | TBEAR | EPA 353.2 |
| 00671A Dissolve Ortho Phosphorus | 0.046 mg/L | 01/08/2019 02:14 PM | LBENT | EPA 365.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00602A Dissolved Nitrogen as N | 1.660 mg/L | 01/22/2019 09:56 AM | TBEAR | SM 4500-NC |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00666A Dissolved Phosphorus as P | 0.057 mg/L | 01/22/2019 01:33 PM | LBENT | EPA 365.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00900 HARDNESS, TOTAL (CALCULATED) | 70 mg/L | 01/28/2019 02:23 PM | CREITMEYER | SM 2340 B |
| ** Comment ** Accredited by NJ only - accreditation not available from PA | | | | |
| 01045A IRON, TOTAL (WATER & WASTE) BY ICP | 477.000 ug/L | 01/28/2019 02:23 PM | CREITMEYER | EPA 200.7 |
| 01051H LEAD, TOTAL (WATER & WASTE) BY ICPMS | 0.265 ug/L | 01/09/2019 12:10 PM | SCHOY | EPA 200.8 |
| ** Comment ** Results are reported to the MDL level | | | | |
| 01132A LITHIUM, TOTAL (WATER & WASTE) BY ICP | 6.000 ug/L (J) | 01/28/2019 02:23 PM | CREITMEYER | EPA 200.7 |
| 99020 Low Bromide by IC | 25.5420 ug/L | 01/17/2019 04:40 AM | MAMCNULTY | EPA 300.1 B |
| 00927A MAGNESIUM, TOTAL (WATER & WASTE) BY ICP | 6.610 mg/L | 01/28/2019 02:23 PM | CREITMEYER | EPA 200.7 |
| 01055A MANGANESE, TOTAL (WATER & WASTE) BY ICP | 120.000 ug/L | 01/28/2019 02:23 PM | CREITMEYER | EPA 200.7 |
| 01067A NICKEL, TOTAL (WATER & WASTE) BY ICP | <6.00 ug/L (U) | 01/28/2019 02:23 PM | CREITMEYER | EPA 200.7 |

**Analytical Report For**
**Water Quality Protection**

**Sample ID:** 0577 002 **Date Collected:** 01/07/2019 12:00:00 PM **Lab Sample ID:** I2019000459 **Status:** Completed

| Test Codes / CAS # - Description | Reported Results | Date And Time Analyzed | Approved by | Test Method |
|---|---|---|---|---|
| 82550 OSMOTIC PRESSURE, MOS/KG | <1 (U) | 01/08/2019 11:42 AM | KMCMULLEN | BOL 3003 |
| 00403 pH, Lab (Electrometric) | 7.4 pH units | 01/16/2019 04:09 PM | MTUZINSKI | SM 4500-H+ B |
| ** Comment ** Holding Time Exceeded | | | | |
| 00937A POTASSIUM, TOTAL (WATER & WASTE) BY ICP | 3.140 mg/L | 01/28/2019 02:23 PM | CREITMEYER | EPA 200.7 |
| 01147H SELENIUM, TOTAL (WATER & WASTE) BY ICPMS | <.524 ug/L (U) | 01/09/2019 12:10 PM | SCHOY | EPA 200.8 |
| ** Comment ** Results are reported to the MDL level | | | | |
| 00929A SODIUM, TOTAL (WATER & WASTE) BY ICP | 5.150 mg/L | 01/28/2019 02:23 PM | CREITMEYER | EPA 200.7 |
| 00095 SPECIFIC CONDUCTIVITY @ 25.0 C | 192.00 umhos/cm | 01/08/2019 02:35 PM | MTUZINSKI | SM 2510B |
| 01082A STRONTIUM, TOTAL (WATER & WASTE) BY ICP | 72.000 ug/L | 01/28/2019 02:23 PM | CREITMEYER | EPA 200.7 |
| 00403T Temperature at which pH is measured | 19.85 C | 01/16/2019 04:09 PM | MTUZINSKI | SM 4500-H+ B |
| 00940 Total Chloride-Ion Chromatograph | 2.4190 mg/L | 01/08/2019 02:48 PM | FVODOPIVEC | EPA 300.0 |
| 70300U TOTAL DISSOLVED SOLIDS @ 180C BY USGS-I-1750 | 126 mg/L | 01/08/2019 12:39 PM | LWILKINSON | USGS I-1750 |
| 00630A Total Nitrate & Nitrite Nitrogen | 1.228 mg/L | 01/08/2019 01:03 PM | TBEAR | EPA 353.2 |
| 00600A Total Nitrogen as N | 1.409 mg/L | 01/22/2019 09:54 AM | TBEAR | SM 4500-NC |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00680 Total Organic Carbon | 1.4780 mg/L | 01/10/2019 08:14 AM | MAMCNULTY | SM 5310 C |
| 70507A Total Ortho Phosphorus as P | 0.017 mg/L | 01/08/2019 02:12 PM | LBENT | EPA 365.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00665A Total Phosphorus as P | 0.026 mg/L | 01/22/2019 01:18 PM | LBENT | EPA 365.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00945 Total Sulfate-Ion Chromatograph | 48.6500 mg/L | 01/08/2019 02:48 PM | FVODOPIVEC | EPA 300.0 |
| 00530 TOTAL SUSPENDED SOLIDS | 12 mg/L | 01/08/2019 03:38 PM | LWILKINSON | USGS I-3765 |
| 01092A ZINC, TOTAL (WATER & WASTE) BY ICP | <7.00 ug/L (U) | 01/28/2019 02:23 PM | CREITMEYER | EPA 200.7 |

The results of the analyses provided in this laboratory report relate only to the sample(s) identified therein. Unless otherwise noted, the results presented on this laboratory report meet all requirements of the 2009 TNI standard. Sample was in acceptable condition when received by the Laboratory. Any exceptions are noted in the report.
* denotes tests that the laboratory is not accredited for

J - Indicates an estimated value, reported between Reporting Limit (RL) and Minimum Detection Limit (MDL).

Taru Upadhyay, Technical Director, Bureau of Laboratories

**Date of Issue:** 02/02/2019 04:08:16

**DEP Bureau of Laboratories - Harrisburg**
**P.O. Box 1467**
**2575 Interstate Drive**
**Harrisburg, PA 17105-1467**

**Contact Phone Number: (717) 346-7200**

**NELAP - accredited by**

**NJ DEP - Laboratory Number: PA059**
**PA DEP LAP - DEP Lab ID: 22-00223**

**Analytical Report For**
**Water Quality Protection**

**Sample ID:** 0577 003 **Date Collected:** 01/07/2019 01:00:00 PM **Lab Sample ID:** I2019000460 **Status:** Completed

**Name of Sample Collector:** Richard Spear
**Date Received:** 01/08/2019

**County:** NOT INDICATED **State:**
**Municipality:** NOT INDICATED

**Sample Medium:** Water
**Sample Medium Type:** Water

**Location:** NOT INDICATED
**Reason:** Routine Sampling
**Project:** NOT INDICATED
**Standard Anlysis:** 612
**Matrix:** Water

| Field Tests | | |
|---|---|---|
| pH | 6.29 | pH units |
| Temperature | 5.2 | C |
| Dissolved Oxygen | 12.14 | mg/L |
| Specific Conductance | 208.9 | umhos/cm |

**Stream Condition:**

**Sample Comment:** UNT 33280 to Mill Creek Downstream. Gathering data for First Energy Permit

**Analytical Report For**
**Water Quality Protection**

**Sample ID:** 0577 003 **Date Collected:** 01/07/2019 01:00:00 PM **Lab Sample ID:** I2019000460 **Status:** Completed

| Test Codes / CAS # - Description | Reported Results | Date And Time Analyzed | Approved by | Test Method |
|---|---|---|---|---|
| 00410 ALKALINITY AS CaCO3 @ pH 4.5 | 38.6 mg/L | 01/16/2019 04:16 PM | MTUZINSKI | SM 2320B |
| 01105A ALUMINUM, TOTAL (WATER & WASTE) BY ICP | 141.000 ug/L (J) | 01/28/2019 02:26 PM | CREITMEYER | EPA 200.7 |
| 00608A AMMONIA DISSOLVED AS NITROGEN | 0.03200 mg/L | 01/30/2019 02:58 PM | CRADEK | EPA 350.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00610A AMMONIA TOTAL AS NITROGEN | 0.016 mg/L (J) | 01/30/2019 02:57 PM | CRADEK | EPA 350.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 01002H ARSENIC, TOTAL (WATER & WASTE) BY ICPMS | <.661 ug/L (U) | 01/09/2019 12:13 PM | SCHOY | EPA 200.8 |
| ** Comment ** Results are reported to the MDL level | | | | |
| 01007A BARIUM, TOTAL (WATER & WASTE) BY ICP | 19.000 ug/L | 01/28/2019 02:26 PM | CREITMEYER | EPA 200.7 |
| 01022K BORON, TOTAL (WATER & WASTE) BY ICP | 26.000 ug/L (J) | 01/28/2019 02:26 PM | CREITMEYER | EPA 200.7 |
| 00916A CALCIUM, TOTAL (WATER & WASTE) BY ICP | 18.000 mg/L | 01/28/2019 02:26 PM | CREITMEYER | EPA 200.7 |
| 01042H COPPER, TOTAL (WATER & WASTE) BY ICPMS | 1.720 ug/L | 01/09/2019 12:13 PM | SCHOY | EPA 200.8 |
| ** Comment ** Results are reported to the MDL level | | | | |
| 00631A Dissolve Nitrate & Nitrite Nitrogen | 1.191 mg/L | 01/08/2019 01:27 PM | TBEAR | EPA 353.2 |
| 00671A Dissolve Ortho Phosphorus | 0.032 mg/L | 01/08/2019 02:19 PM | LBENT | EPA 365.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00602A Dissolved Nitrogen as N | 1.625 mg/L | 01/22/2019 09:52 AM | TBEAR | SM 4500-NC |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00666A Dissolved Phosphorus as P | 0.040 mg/L | 01/22/2019 01:39 PM | LBENT | EPA 365.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00900 HARDNESS, TOTAL (CALCULATED) | 74 mg/L | 01/28/2019 02:26 PM | CREITMEYER | SM 2340 B |
| ** Comment ** Accredited by NJ only - accreditation not available from PA | | | | |
| 01045A IRON, TOTAL (WATER & WASTE) BY ICP | 303.000 ug/L | 01/28/2019 02:26 PM | CREITMEYER | EPA 200.7 |
| 01051H LEAD, TOTAL (WATER & WASTE) BY ICPMS | 0.150 ug/L | 01/09/2019 12:13 PM | SCHOY | EPA 200.8 |
| ** Comment ** Results are reported to the MDL level | | | | |
| 01132A LITHIUM, TOTAL (WATER & WASTE) BY ICP | 6.000 ug/L (J) | 01/28/2019 02:26 PM | CREITMEYER | EPA 200.7 |
| 99020 Low Bromide by IC | 19.6270 ug/L (J) | 01/17/2019 05:22 AM | MAMCNULTY | EPA 300.1 B |
| 00927A MAGNESIUM, TOTAL (WATER & WASTE) BY ICP | 6.960 mg/L | 01/28/2019 02:26 PM | CREITMEYER | EPA 200.7 |
| 01055A MANGANESE, TOTAL (WATER & WASTE) BY ICP | 110.000 ug/L | 01/28/2019 02:26 PM | CREITMEYER | EPA 200.7 |
| 01067A NICKEL, TOTAL (WATER & WASTE) BY ICP | 6.000 ug/L (J) | 01/28/2019 02:26 PM | CREITMEYER | EPA 200.7 |

**Analytical Report For**
**Water Quality Protection**

**Sample ID:** 0577 003 **Date Collected:** 01/07/2019 01:00:00 PM **Lab Sample ID:** I2019000460 **Status:** Completed

| Test Codes / CAS # - Description | Reported Results | Date And Time Analyzed | Approved by | Test Method |
|---|---|---|---|---|
| 82550 OSMOTIC PRESSURE, MOS/KG | <1 (U) | 01/08/2019 11:42 AM | KMCMULLEN | BOL 3003 |
| 00403 pH, Lab (Electrometric) | 7.5 pH units | 01/08/2019 05:51 PM | MTUZINSKI | SM 4500-H+ B |
| ** Comment ** Holding Time Exceeded | | | | |
| 00937A POTASSIUM, TOTAL (WATER & WASTE) BY ICP | 2.160 mg/L | 01/28/2019 02:26 PM | CREITMEYER | EPA 200.7 |
| 01147H SELENIUM, TOTAL (WATER & WASTE) BY ICPMS | <.524 ug/L (U) | 01/09/2019 12:13 PM | SCHOY | EPA 200.8 |
| ** Comment ** Results are reported to the MDL level | | | | |
| 00929A SODIUM, TOTAL (WATER & WASTE) BY ICP | 7.090 mg/L | 01/28/2019 02:26 PM | CREITMEYER | EPA 200.7 |
| 00095 SPECIFIC CONDUCTIVITY @ 25.0 C | 207.00 umhos/cm | 01/08/2019 02:37 PM | MTUZINSKI | SM 2510B |
| 01082A STRONTIUM, TOTAL (WATER & WASTE) BY ICP | 76.000 ug/L | 01/28/2019 02:26 PM | CREITMEYER | EPA 200.7 |
| 00403T Temperature at which pH is measured | 19.87 C | 01/08/2019 05:51 PM | MTUZINSKI | SM 4500-H+ B |
| 00940 Total Chloride-Ion Chromatograph | 5.4740 mg/L | 01/08/2019 03:04 PM | FVODOPIVEC | EPA 300.0 |
| 70300U TOTAL DISSOLVED SOLIDS @ 180C BY USGS-I-1750 | 128 mg/L | 01/08/2019 12:39 PM | LWILKINSON | USGS I-1750 |
| 00630A Total Nitrate & Nitrite Nitrogen | 1.190 mg/L | 01/08/2019 01:25 PM | TBEAR | EPA 353.2 |
| 00600A Total Nitrogen as N | 1.368 mg/L | 01/22/2019 09:50 AM | TBEAR | SM 4500-NC |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00680 Total Organic Carbon | 1.6400 mg/L | 01/10/2019 08:42 AM | MAMCNULTY | SM 5310 C |
| 70507A Total Ortho Phosphorus as P | 0.016 mg/L | 01/08/2019 02:17 PM | LBENT | EPA 365.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00665A Total Phosphorus as P | 0.017 mg/L | 01/22/2019 01:37 PM | LBENT | EPA 365.1 |
| ** Comment ** Answer Rechecked By Analyst | | | | |
| 00945 Total Sulfate-Ion Chromatograph | 46.4960 mg/L | 01/08/2019 03:04 PM | FVODOPIVEC | EPA 300.0 |
| 00530 TOTAL SUSPENDED SOLIDS | <5 mg/L (U) | 01/08/2019 03:38 PM | LWILKINSON | USGS I-3765 |
| 01092A ZINC, TOTAL (WATER & WASTE) BY ICP | <7.00 ug/L (U) | 01/28/2019 02:26 PM | CREITMEYER | EPA 200.7 |

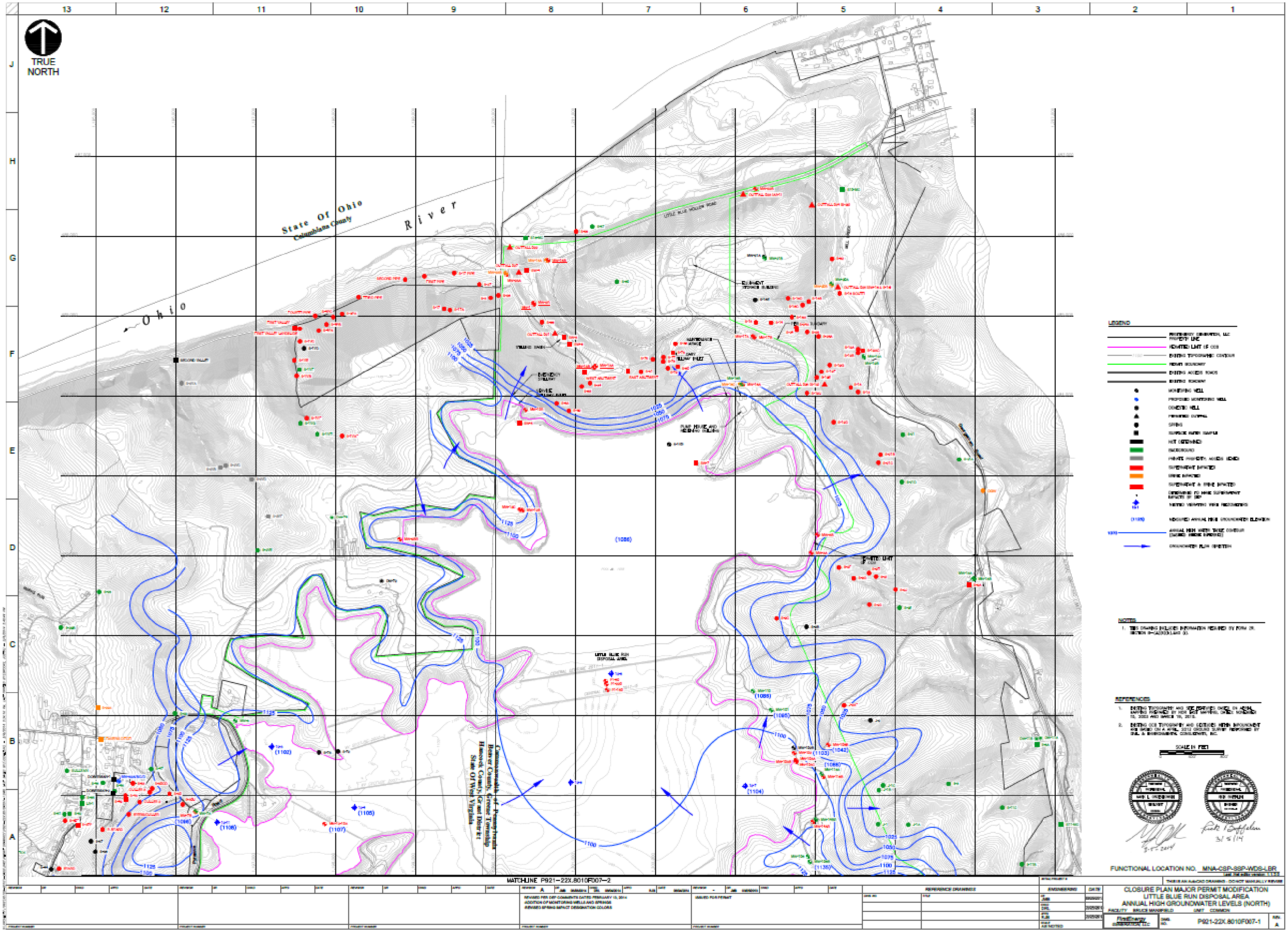
The results of the analyses provided in this laboratory report relate only to the sample(s) identified therein. Unless otherwise noted, the results presented on this laboratory report meet all requirements of the 2009 TNI standard. Sample was in acceptable condition when received by the Laboratory. Any exceptions are noted in the report.
* denotes tests that the laboratory is not accredited for

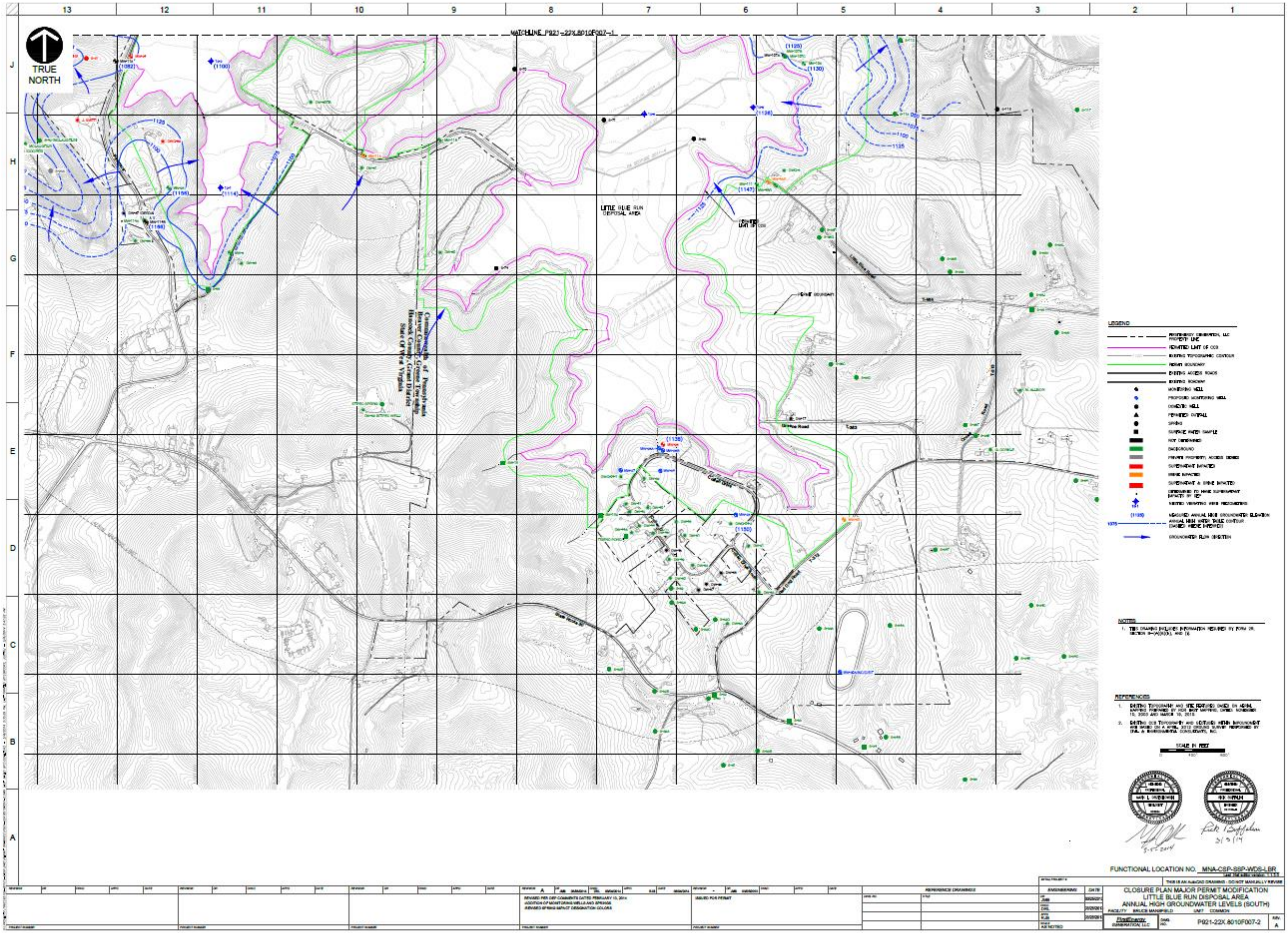
J - Indicates an estimated value, reported between Reporting Limit (RL) and Minimum Detection Limit (MDL).

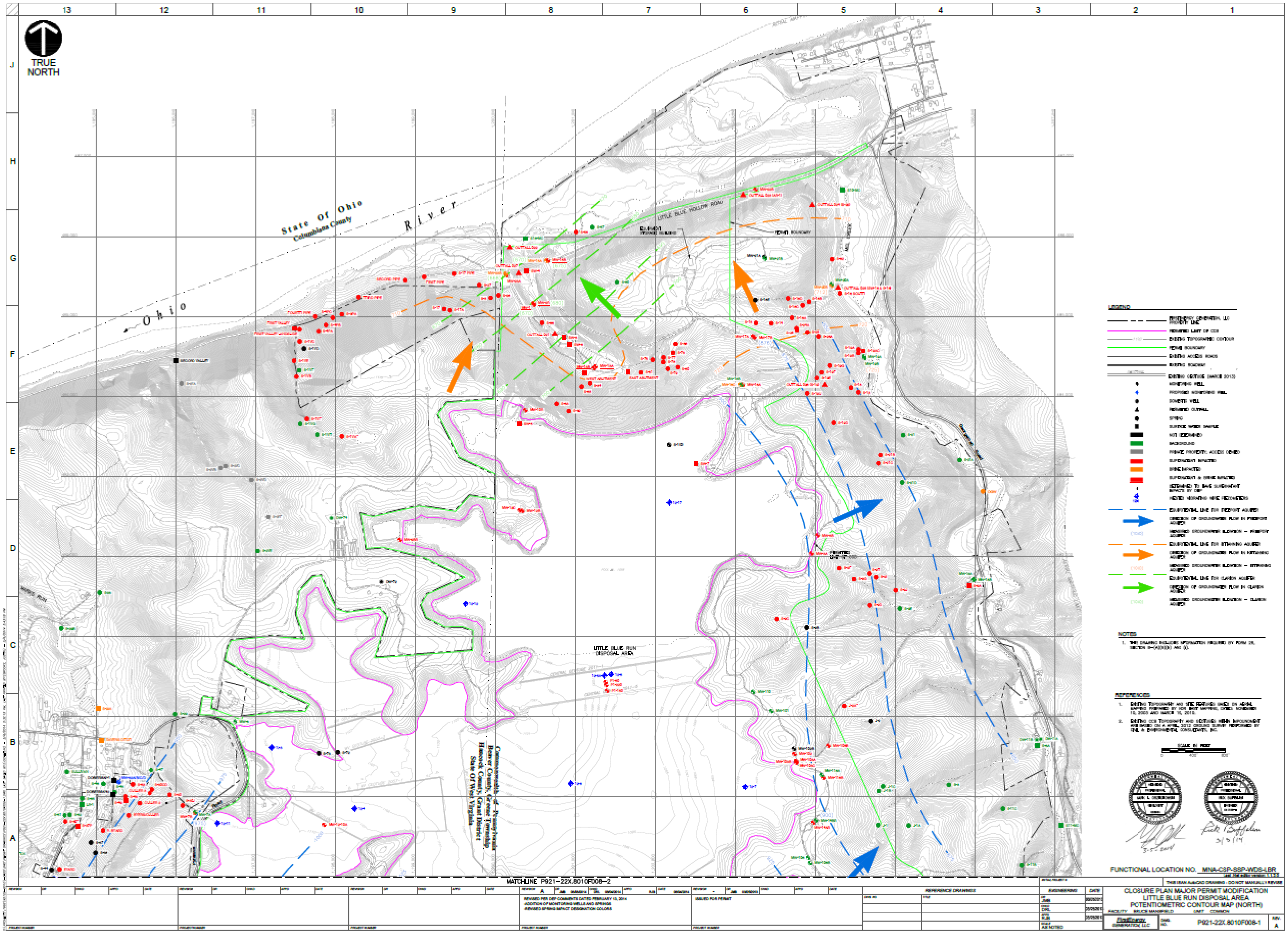
Taru Upadhyay, Technical Director, Bureau of Laboratories

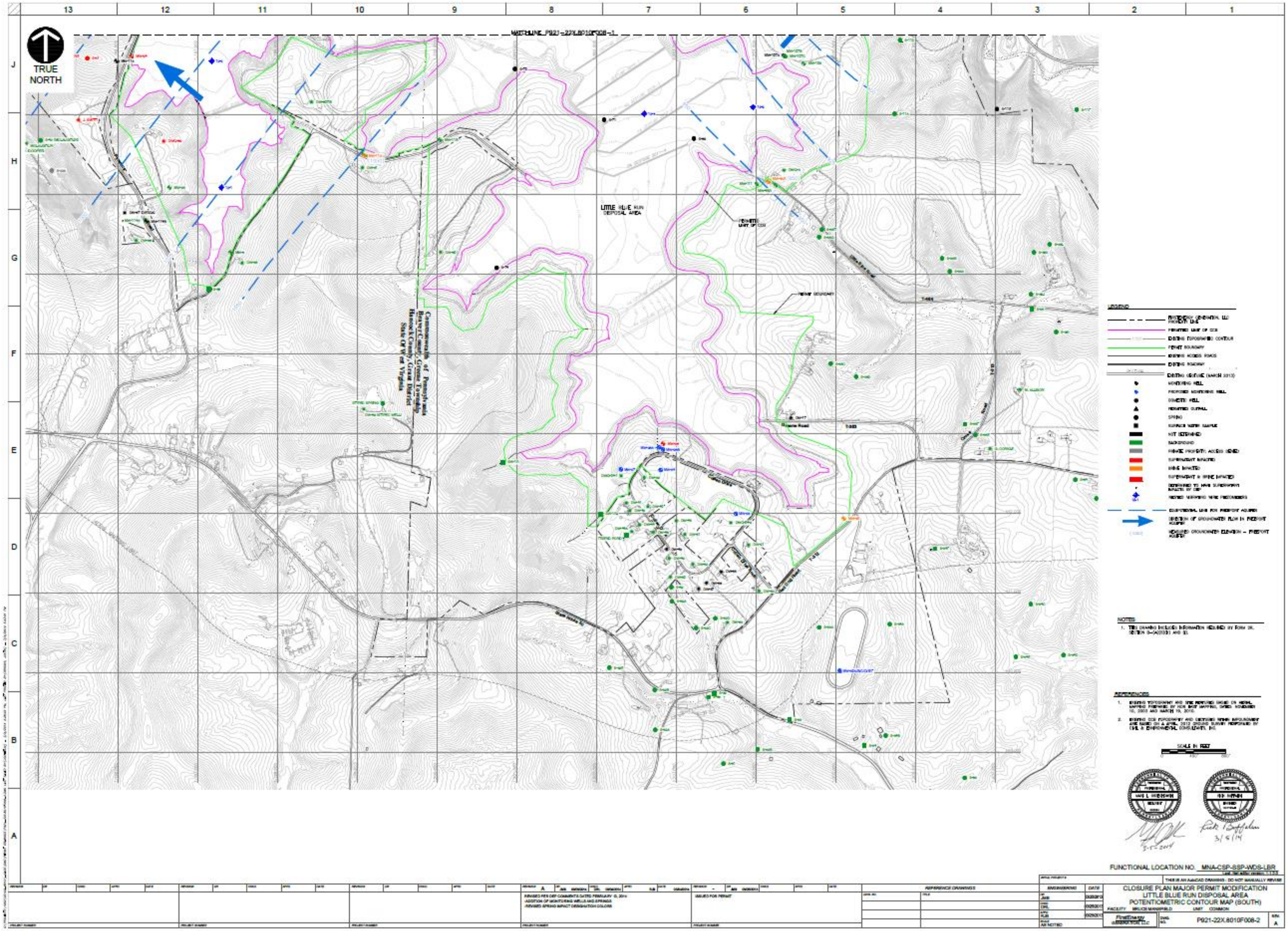
# ATTACHMENT D

# LBR Groundwater Contours and Flow Direction Diagrams


TRUE NORTH
State Of Ohio
Columbiana County
Ohio
River
LEGEND
NOTES
REFERENCES
FUNCTIONAL LOCATION NO. MNA-CSP-SSP-WDS-LBR
MATCHLINE P921-22X.8010F007-2
CLOSURE PLAN MAJOR PERMIT MODIFICATION
LITTLE BLUE RUN DISPOSAL AREA
ANNUAL HIGH GROUNDWATER LEVELS (NORTH)
P921-22X.8010F007-1


TRUE NORTH
LITTLE BLUE RUN DISPOSAL AREA
LEGEND
NOTES
REFERENCES
SCALE IN FEET
FUNCTIONAL LOCATION NO. MNA-CSP-SSP-WDS-LBR
ENGINEERING
DATE
CLOSURE PLAN MAJOR PERMIT MODIFICATION
LITTLE BLUE RUN DISPOSAL AREA
ANNUAL HIGH GROUNDWATER LEVELS (SOUTH)
FACILITY BRUCE MANSFIELD
UNIT COMMON
FirstEnergy GENERATION, LLC
P921-22X.8010F007-2
REV. A
AS NOTED


TRUE
NORTH
State Of Ohio
Columbiana County
Ohio
River
LITTLE BLUE RUN
DISPOSAL AREA
LEGEND
NOTES
REFERENCES
MATCHLINE P921-22X.8010F008-2
FUNCTIONAL LOCATION NO. MNA-CSP-SSP-WDS-LBR
CLOSURE PLAN MAJOR PERMIT MODIFICATION
LITTLE BLUE RUN DISPOSAL AREA
POTENTIOMETRIC CONTOUR MAP (NORTH)
P921-22X.8010F008-1


TRUE NORTH
LITTLE BLUE RUN DISPOSAL AREA
Commonwealth of Pennsylvania
Beaver County, Greene Township
Hancock County, Grant District
State Of West Virginia
LEGEND
NOTES
REFERENCES
SCALE IN FEET
FUNCTIONAL LOCATION NO. MNA-CSP-SSP-WDS-LBR
CLOSURE PLAN MAJOR PERMIT MODIFICATION
LITTLE BLUE RUN DISPOSAL AREA
POTENTIOMETRIC CONTOUR MAP (SOUTH)
P921-22X.8010F008-2