pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Northeast Regional Office
CLEAN WATER PROGRAM

Application Type	**Amendment, Major**
Facility Type	**Industrial**
Major / Minor	**Minor**

NPDES PERMIT FACT SHEET INDIVIDUAL INDUSTRIAL WASTE (IW) AND IW STORMWATER

Application No.	**PA0063304 A-1**
APS ID	**547365**
Authorization ID	**1435121**

Applicant and Facility Information

Applicant Name	**Blythe Township Municipal Authority (BTMA)**	Facility Name	**Crystal Run Water Treatment Plant**
Applicant Address	375 Valley Street	Facility Address	Route 901
	New Philadelphia, PA 17959-1218		New Philadelphia, PA 17959
Applicant Contact	Justin DeAngelo	Facility Contact	Justin DeAngelo
Applicant Phone	(570) 277-6921	Facility Phone	(570) 277-6921
Client ID	83009	Site ID	1532
SIC Code	4941	Municipality	Cass Township
SIC Description	Trans. & Utilities - Water Supply	County	Schuylkill
Date Application Received	March 30, 2023	EPA Waived?	Yes
Date Application Accepted	April 20, 2023	If No, Reason	-

Purpose of Application: AMENDMENT OF EXISTING IW NPDES PERMIT.

Summary of Review

This is a Major NPDES Permit Amendment for modification of proposed WQBELs for a 0.042 MGD WTP discharge to West Creek (CWF, Stream ID# 2339, impaired) aka Crystal Run. Application submitted with the NPDES Permit Part C.II-required Final WQBELs Compliance Report.

Proposed Changes to NPDES Permit:

- **Request for Time Extension for final effective date for the new WQBELs (now effective 3/1/2024) to 2nd Quarter of 2024 (July 1, 2024)**: The Department has moved the effective date for the new WQBELs to **3/1/2025** to allow time for the proposed pilot project (use of a polyacrylamide-based wastewater treatment chemical for metal reduction) and to provide additional time in event the Authority wants to further pursue modification of Final WQBELs prior to their effective date by additional data collection/analysis (via new Major NPDES permit amendment).
    - After the Final WQBELs' effective date, no relief can be granted unless the Authority can demonstrate that a regulatory "Antibacksliding Exception" applies. In the absence of this permit action, the new WQBELs would become effective 3/1/2024. Antibacksliding requests are also subject to US EPA review and comment.
    - Much of the Final WQBEL Compliance Report's sampling data consisted non-detects above the (identified) laboratory MDL (Method Detection Level), which invalidated the Metal Translator Study and potential Chapter 95.2(5) limits for assorted metals. The DEP Target QLs (as discussed within in IW NPDES Permit Application Instructions Attachment C) are intended to meet the requirements of EPA's "Sufficiently Sensitive Methods" rule (79 FR 49001). Where a laboratory's QL is greater than the Target QL in Attachment C, but the Method Detection Limit (MDL) is at or below the Target QL, DEP will accept laboratory-estimated values ("J" values). In practical terms, your laboratory may be able achieve more sensitive QLs and/or able to identify estimated sample concentration levels ("J" value) above the Method Detection Level, to allow for a valid Metal Translator Study and/or Chapter 95.2(5) limits for the assorted metals. Additional time is also being given time in case the permittee wishes to collect additional samples.

Approve	Deny	Signatures	Date
X		James D. Berger (signed) James D. Berger, P.E. / Environmental Engineer	January 8, 2024
X		Amy M. Bellanca (signed) Amy M. Bellanca, P.E. / Program Manager	1-9-24

Summary of Review

- **Request for Removal of WQBELs for Copper, Silver, and Acrylamide on the basis that of discharge results being below the DEP Target Quantitation Limits (QLs)**:
  - **General**: There is no regulatory exemption from Chapter 93-based permit limits for constituents below the DEP TQLs. If detected below the DEP TQL, the reported concentration is used in the Reasonable Potential Analysis to determine if permit limits are required. The Reasonable Potential Analysis also considers other factors including proposed future usage of a polyacrylamide chemical in wastewater treatment.
  - **Silver:** Silver was deleted as unneeded per the updated Reasonable Potential Analysis (which incorporated Final WQBEL Compliance Report information).
  - **Copper: Revised WQBEL per updated Reasonable Potential Analysis (see below). Insufficient data to derive a Chapter 95.2(5) limit.**
    - Copper was retained per the updated Reasonable Potential Analysis (which incorporated Final WQBEL Compliance Report information). The new WQBELs are above the DEP Target Quantification Limit (0.0040 mg/l or 4.0 ug/l).
    - The provided copper effluent data was at an insensitive non-detect (ND) concentration level of 0.0100 mg/l, compared to the DEP Target Quantitation Limit. Per the EPA Sufficiently Sensitive Rule, the Department must treat copper as present at the insensitive ND concentration (above the DEP TQL). In practical terms, future effluent monitoring must be sufficiently sensitivity to show that permit limits are not exceeded in EDMR reporting.
    - No relief from standard weekly toxic minimum monitoring frequency is allowable at this time.
  - **Acrylamide: Revised WQBEL per updated Reasonable Potential Analysis (see below).**
    - Final WQBEL retained, effective 3/1/2025 per the updated Reasonable Potential Analysis (which adjusted limits on the basis of incorporated Final WQBEL Compliance Report information). In addition, the facility intends to use a polyacrylamide wastewater treatment chemical in the WTP's Wastewater Treatment Unit to address metal permit limits. The Report noted that it received a supplier's Certificate of Analysis that indicated a potential Acrylamide residual of 13 PPM (0.013 mg/l) but that it required a site-specific analysis/data to accurately estimate effluent concentrations.
    - See the Part C (WQBELs below Quantitation Limits) condition which has been modified to address the application-identified 11 ug/l Method Detection Limit (MDL). Reporting non-detect at 12 ug/l would be considered an exceedance.
    - No relief from standard weekly toxics minimum monitoring frequency allowable at this time.
- **Request for modification of proposed WQBELs for Aluminum and Lead (to levels set forth in the Final WQBEL Final Compliance Report's Toxic Management Spreadsheet), and requested reduction to monthly monitoring frequency**:
  - **Aluminum:**
    - **Revised WQBEL per updated Reasonable Potential Analysis (see below) will be effective 3/1/2025.** Please note that hypothetical Chapter 95.2(5) limits (0.530 mg/l daily average) would have been more stringent.
    - **2/month standard monitoring frequency granted**. This is the standard Aluminum monitoring frequency for WTPs.
  - **Lead:**
    - **Revised WQBEL per updated Reasonable Potential Analysis (see below) will be effective 3/1/2025. Insufficient data to derive a Chapter 95.2(5) limit.**
    - No relief from the weekly toxics minimum standard monitoring frequency can be granted at this time.
- **Request for modification of proposed WQBEL for Zinc to reflect proposed Chapter 95.2(5) limits as influent reservoir and ambient stream concentrations (upstream of Outfall No. 001) are higher. They requested their own TMS-calculated WQBELs. Requested reduction to monthly monitoring frequency**:
  - **Revised WQBEL per updated Reasonable Potential Analysis (see below) will be effective 3/1/2025.**
  - Please note that hypothetical Chapter 95.2(5) limits (0.025 mg/l) would have been more stringent.
  - No relief from the weekly toxics minimum standard monitoring frequency can be granted at this time.
- **Cadmium**:
  - **Revised WQBEL per updated Reasonable Potential Analysis. Insufficient data to derive a Chapter 95.2(5) limit.**
  - No relief from the weekly toxics minimum standard monitoring frequency can be granted at this time.
- **Other Permit Changes**:
  - **Part A and B**: The updated NPDES Permit Template conditions were incorporated into the permit.
  - **Part A.I.C**: Additional effluent daily max load reporting for TSS and TDS to gather information. No additional sampling required.

Summary of Review

- **Part A.I.D**: Additional Aluminum and Total Hardness (as $CaCO_3$) raw water intake monitoring upon request.
- **Part C.II**: Modified WQBELs for Toxic Pollutant conditions (updated standard language; noting completed actions).
- **Part C.III**: Modified WQBELs below Quantitation Limits (removing those constituents whose WQBELs are above DEP TQLs, and adjusting Acrylamide to reflect application-identified 11 ug/l achievable laboratory MDL). Other constituents WQBELs are now above the DEP QLs.

Background:

- **Existing NPDES Permit**: The 3/1/2021 0.042 MGD (IW Process Effluent without ELG) NPDES Permit Part C.II (WQBELs for Toxic Pollutants) Final WQBEL Compliance Report) for relief from Final NPDES Permit Limits/monitoring requirements (effective March 1, 2024) for the Crystal Run Water Treatment Plant. The previously proposed WQBELs were:

Outfall No.	Pollutant	Average Monthly (mg/L)	Maximum Daily (mg/L)	IMAX (mg/L)	TQL (mg/l)
001	Aluminum, Total	0.973	1.518	2.432	0.010
001	Cadmium, Total	0.00004*	0.00006*	0.00011*	0.0002
001	Copper, Total	0.0029*	0.0046	0.0073	0.0040
001	Lead, Total	0.00046*	0.00071*	0.0011*	0.0010
001	Silver, Total	0.00011*	0.00018*	0.00028*	0.0004
001	Zinc, Total	0.0143	0.0143	0.0143	0.0050
001	Acrylamide	0.0017**	0.0026**	0.0042**	**

*WQBEL below TQL.

**No TQL at present. WQBEL below MDL achievable by 5 PA Certified Laboratories (0.011 mg/l/11 ug/l) per application. Eight NDs between March-December 2022 at either 11 or 12 ug/l.

Chapter 95.2(5) limits: Chapter 95.2(5) states: "When surface waters are used in the industrial plant, the quality of the effluent need not exceed the quality of the raw water supply if the source or supply would normally drain to the point of effluent discharge, unless otherwise required under the act or Federal Act or regulations promulgated thereunder". This facility has applied for coverage under this regulation (see facility description above). Per facility description below, the facility is only using stream water as a source and discharging the WTP's wastewater to the same stream. See Stream Information Section and Effluent Limits Section for related data and analysis.

- Total Aluminum: The (hypothetical) Chapter 95.2(5) limit would be more stringent than the revised WQBELs.
- Total Zinc: The (hypothetical) Chapter 95.2(5) limit would be more stringent than the revised WQBELs.
- Total Cadmium, Total Copper, Total Lead, and Total Silver: There was insufficient information to develop Chapter 95.2(5) limits for these metals (too many ND sample results). See below for revised WQBELs from the updated Reasonable Potential Analysis (which incorporated Final WQBEL Compliance Report information as appropriate).
- Acrylamide: As a man-made chemical not found in stream sampling, Chapter 95.2(5) does not apply.

Summary of Review

☑ ***Recommended WQBELs & Monitoring Requirements***

No. Samples/Month: 4

Pollutants	*Mass Limits* AML (lbs/day)	*Mass Limits* MDL (lbs/day)	*Concentration Limits* AML	*Concentration Limits* MDL	*Concentration Limits* IMAX	*Concentration Limits* Units	Governing WQBEL	WQBEL Basis	Comments
Total Aluminum	0.38	0.67	1.09	1.92	2.72	mg/L	1.09	AFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Cadmium	0.00009	0.0002	0.0002	0.0005	0.0006	mg/L	0.0002	CFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Copper	0.002	0.003	0.006	0.009	0.014	mg/L	0.006	AFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Lead	0.0004	0.0006	0.001	0.002	0.003	mg/L	0.001	CFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Zinc	0.009	0.01	0.026	0.028	0.028	mg/L	0.026	AFC	Discharge Conc ≥ 50% WQBEL (RP)
Acrylamide	0.0006	0.0009	0.002	0.003	0.004	mg/L	0.002	CRL	Discharge Conc ≥ 50% WQBEL (RP)

- **Application**:
  - March 30, 2023 submittal plus 4/20/2023 E-mail Attachments (On-Base submittal needed for DEP file) response to 4/13/2023 DEP Berger Completeness E-mail.
  - Public Notice Requirements: DEP Management gave relief from Major NPDES Permit fee, but major Amendment public notice requirements pertain. Changing Permit limits is a Major NPDES Permit Amendment (per Chapter 92a). Per the NPDES Permit Amendment Application Instructions (3800-PM-BCW0027a), the Major NPDES Amendment Application Fee is identical to the Chapter 92a.62. The fee for a Minor IW Facility without ELG is $1500.
- **BTMA Crystal Run Water Filtration Treatment Plant**: The WTP is a potable water, multi-media filtration plant, with a 400,000-gallon treated water tank. No onsite water treatment plant basin onsite (400,000-gallon tank).
  - The WTP's only water source is the Crystal Run water reservoir that was created by placing a dam on the receiving stream, with WTP Outfall No. 001 discharging wastewater downstream of the reservoir, back into the source stream. The WTP does not use other water sources for its production of potable water.
  - The WTP withdraws stream/reservoir water for processing (Soda Ash, Alum, Potassium Permanganate treatment) prior to filtration with wastewater directed to the onsite clarifier/thickener wastewater treatment unit. The WTP's wastewater (backwash and filter-to waste) goes through a clarifier/thickener wastewater treatment unit, which directs solids to the onsite sludge drying beds, with supernatant discharge to the receiving stream via Outfall No. 001. The filtered water is further treated (Aqua Mag, Soda Ash, Chlorine) prior to potable water usage, but the process flow schematic does not show post-filtration flow going to the wastewater treatment unit.
  - The Crystal Run Reservoir is 38-feet high, 450-feet long earthen embankment water supply dam maintaining a normal pool of 200 acre-foot of water with a maximum pool capacity of 310 acre-feet. The dam is located across West Creek (a.k.a. Crystal Run), CWF.
  - Site Sources: Other than the Stream water:
    - Zinc, Copper, Lead, Silver: No other known site source per Final WQBEL Compliance Report.
    - Aluminum: The facility uses Alum as a water treatment chemical.
    - Acrylamide: Acrylamide is a man-made (breakdown) chemical with no known sources in the watershed (other than future WTP usage of polyacrylamide products for wastewater treatment). The facility is proposing usage of a polyacrylamide chemical product (Superfloc SD-2081) to enhance metal removals. Their technical consultant noted that they would need to define the required dosage level in order to calculate the anticipated Acrylamide residual, taking into account other site-specific parameters (flows, pipe sizes and lengths, treatment facility processes, chemical usages, etc.).
- **Final WQBEL Report Summary of Conclusions**: The permittee was uncertain whether the originally proposed (see above) Aluminum, Lead, and Zinc WQBELs could be met. See Effluent Limit Section for revised WQBELs, effective on 3/1/2025.
  - **Source Inventory Evaluation/Source Reduction**: They do not believe O&M can reduce Aluminum, Lead and Zinc concentrations in the process wastewater. No end-of-pipe treatment was recommended. The treatment option was determined to be (polyacrylamide) polymer addition after the filtration process to produce heavier floc particles (with better settling characteristics).
    - Aluminum: The facility uses alum (aluminum sulfate) for pretreatment but indicates that Alum is not being overdosed. Ferric Chloride and PAC were ruled out as possible replacement for Alum as either not as effective or likewise contributing to metal concentrations.
    - Lead and Zinc: No known site source for Lead and Zinc in terms of site-used chemicals (additives, treatment, chemical impurities, cleaning agents or raw material).

Summary of Review

- Acrylamide: The WTP process flow schematic does not show present use of acrylamide-based polymers, but it is proposed to help reduce metal effluent concentrations. The original Fact sheet imposed an acrylamide limit in the absence of any provided analytical data for acrylamide. Several sources were contacted with recommendation of Superfloc SD-2018 (cationic polyacrylamide). However, the source could not calculate the expected acrylamide effluent concentration due to undefined site-specific factors (polymer dosage rate required, flows, pipe sizes/lengths, treatment facility processes, chemical usages, etc.). The dosage range must be determined upfront. The permittee is waiting to hear back from the supplier in terms of what is the recommended dosage in order to estimate the future acrylamide effluent concentrations.

Public Participation

DEP will publish notice of the receipt of the NPDES permit application and a tentative decision to issue the individual NPDES permit in the *Pennsylvania Bulletin* in accordance with 25 Pa. Code § 92a.82. Upon publication in the *Pennsylvania Bulletin*, DEP will accept written comments from interested persons for a 30-day period (which may be extended for one additional 15-day period at DEP's discretion), which will be considered in making a final decision on the application. Any person may request or petition for a public hearing with respect to the application. A public hearing may be held if DEP determines that there is significant public interest in holding a hearing. If a hearing is held, notice of the hearing will be published in the *Pennsylvania Bulletin* at least 30 days prior to the hearing and in at least one newspaper of general circulation within the geographical area of the discharge.

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	.042
Latitude	40º 41' 42.42"	Longitude	-76º 18' 35.09"
Quad Name	Minersville	Quad Code	1335 (6.18.1)
Wastewater Description:	IW Process Effluent without ELG		
Receiving Waters	West Creek (a.k.a. Crystal Run), CWF	Stream Code	2339
NHD Com ID	25982288	RMI	-
Drainage Area	5.06 square miles	Yield (cfs/mi^2)	0.032
Q_{7-10} Flow (cfs)	0.161 CFS	Q_{7-10} Basis	Reservoir dam low flow release requirement from DEP Dam File (D54-015).
Elevation (ft)	~1140	Slope (ft/ft)	-
Watershed No.	3-A	Chapter 93 Class.	CWF
Existing Use	-	Existing Use Qualifier	-
Exceptions to Use	-	Exceptions to Criteria	-
Assessment Status	Impaired (Aquatic life; Fish Consumption)		
Cause(s) of Impairment	FLOW REGIME MODIFICATION, POLYCHLORINATED BIPHENYLS (PCBS), SILTATION, SILTATION, SILTATION, SILTATION		
Source(s) of Impairment	ACID MINE DRAINAGE, SOURCE UNKNOWN, SOURCE UNKNOWN, SURFACE MINING, SURFACE MINING, URBAN RUNOFF/STORM SEWERS		
TMDL Status	Final, Final, Final	Name	4/7/2007 Schuylkill River PCB TMDL, 4/7/2007 Upper Schuylkill River TMDL (AMD), 3/25/2005 West Branch Schuylkill River Watershed TMDL (AMD)
Background/Ambient Data: **See below**		See below	
Nearest Downstream Public Water Supply Intake		PA AMER WATER CO GLEN ALSACE DIST	
PWS Waters	Schuylkill River	Flow at Intake (cfs)	-
PWS RMI	-	Distance from Outfall (mi)	>20 miles

Changes Since Last Permit Issuance:

- IMP No. 101 Intake Location identified: 40°, 41', 54" and -76°,19',12"
- Outfall No. 001: Corrected coordinates (slight adjustment with change bolded): 40°, 41', 51" and -76°,19', **05**"

Other Comments:

Low Flows: Discharge is located below Crystal Run Reservoir/dam discharge (D54-015, C1 high hazard dam with Dam Emergency Action Plan with the Dam permit specifying a **0.162 MGD (0.251 CFS)** low flow release per DEP Dam Inspection Reports) from which the 0.032 CFS/square mile LFY was calculated.

- As a WTP reservoir, the minimum dam release flow governs. 2005 water quality modeling also used 0.162 MGD for non-AMD metals water quality modeling. No original Water Pollution Control Plan found, but originally only intermittent/short-term discharges proposed (otherwise recycled). DEP NPDES files indicated conversion to continuous discharge in previous permit cycles).
- Downstream, orphan mine discharges exist that might render USGS PAStreamstats and downstream gage data inaccurate.

Causes of Stream Impairment:

- Siltation, PCBs, Water Flow Variability: The facility discharge is not expected to be a significant source of siltation. A WTP is not expected to have any PCBs. The (upstream water reservoir) Dam low flow release will prevent the facility water withdrawal from negatively impacting stream.
- AMD/Low pH: Existing permit has a minimum pH limit of 5.5 SU (retained from prior NPDES Permit, Chapter 95.2(5) cited in IRR, with Applicant letter noting raw intake water (from reservoir) had a pH of 4.5 SU at times). Application indicated minimum pH of 6.0 SU out of 24 sampling events. Per Upper Schuylkill River TMDL: In the case of freestone streams with little or no buffering capacity, the TMDL endpoint for pH will be the natural background water quality. These values are typically as low as 5.4 SU (Pennsylvania Fish and Boat Commission).
- AMD metals (Aluminum, Manganese, and Iron found in WTP effluent): Application indicates only alum is added in plant, with other metals from source water. AMD metals presently have TBELs set by DEP Policy for WTP discharges, but no WLAs in the applicable stream TMDLs (AMD). See Effluent Limits Section for revised permit limits and/or monitoring requirements.
    - Upstream sampling data indicates stream is AMD-impacted upstream of facility.
    - The Upper Schuylkill River TMDL (AMD) did not set WLAs for this WTP. Focused on AMD discharges.
    - The West Branch Schuylkill River TMDL (AMD) did not set WLAs for this WTP. Focused on AMD discharges.

TMDL Parameter	Water Quality Criterion (mg/l)	Recoverable/Dissolved
Aluminum (Al)	0.75	Total Recoverable
Iron (Fe)	1.50	30-day average; Total
Manganese (Mn)	1.00	Total Recoverable
pH*	6.0-9.0	NA

*The pH values shown will be used when applicable. In the case of freestone streams with little or no buffering capacity, the TMDL endpoint for pH will be the natural background water quality. These values are typically as low as 5.4 (Pennsylvania Fish and Boat Commission).

- Other Toxics:
    - Zinc: Zinc found in high concentrations in ambient stream. Source(s) not identified, but AMD discharge likely source.
    - Other Metals (Cadmium, Copper, Lead): Source(s) not identified, but AMD discharges likely contributing.
    - Acrylamide: The facility is proposing use of a polyacrylamide product for metal reduction. Acrylamide is a known breakdown chemical.

Stream Data Table from Previous Renewal Fact Sheet for comparison:

Background/Ambient Data:		Data Source:
pH (SU)	5.05	2/5/2019 DEP upstream Sample No. 2277598 (above water reservoir). **Application noted raw water pH as low as 4.5 SU.**
Temperature (°C)	3.8	See above
Hardness (mg/L)	7.98	10/13/2017 Application grab sampling (more conservative than DEP sample). DEP sample (above) was at 15.
Aluminum (ug/l)	**442.00**	**See DEP sample above. 7/10/2020 Applicant sample was at 140 ug/l.**
Manganese (ug/l)	355.00	See above
Total Iron (ug/l)	258.00	See above. 7/10/2020 Applicant sample was at 180 ug/l.
Barium (ug/l)	176.0	See above.
Cadmium (ug/l)	0.223	See above. 7/10/2020 Applicant sample was at <1.0 ug/l (insensitive ND). Effluent Above WQC per Reasonable Potential Analysis.
Cobalt (ug/l)	6.99	See above
Copper (ug/l)	<4.0	See above. 7/10/2020 Applicant sample was at 2.0 ug/l.
Lead (ug/l)	<1.00	See above. 7/10/2020 Applicant sample was at <1 ug/l.
Nickel (ug/l)	8.120	See above

Selenium (ug/l)	<7.00	See above
Silver (ug/l)	<0.400	See above
Thallium (ug/l)	<2.0	See above
Zinc (ug/l)	**33.80**	**See above. 7/10/2020 Applicant sample was at 37 ug/l.**

Additional DEP Sampling Data (from DEP Biologist):

- West Creek (upstream of Route 209): 40°, 40', 24.0635"; -76°, 16', 58.7208"
- UNT to West Creek (upstream of Township Police Station): 40°, 40', 31.2528"; -76°, 16', 49.5732"
- Aluminum and Zinc is present both above and below the reservoir per DEP sampling. Cadmium was detected upstream of the reservoir, but non-detect downstream. Copper, Lead, and Silver concentrations were ND downstream of the reservoir (which allows for settling of metal-bearing particles in addition to stream variability).

collector	seq	year	location	aluminum	cadmium	copper	lead	silver	zinc	Hardness T
209	385	2019	above reservoir	442.000 ug/L	0.223 ug/L	<4.00 ug/L (U)	<1.00 ug/L (U)	<0.400 ug/L (U	33.800 ug/L	15mg/L
209	501	2021	below reservoir	96.700 ug/L	<0.200 ug/L (U)	<4.00 ug/L (U)	<1.00 ug/L (U)	<0.400 ug/L (U	15.300 ug/L	44mg/L
209	436	2019	UNT to west creek	51.000 ug/L	<0.200 ug/L (U)	<4.00 ug/L (U)	<1.00 ug/L (U)	<0.400 ug/L (U	<5.00 ug/L (U)	37mg/L
209	386	2019	confluence west creek and UNT	221.000 ug/L	<0.200 ug/L (U)	<4.00 ug/L (U)	<1.00 ug/L (U)	<0.400 ug/L (U	22.300 ug/L	57 mg/L

Final WQBEL Compliance Report stream data and analysis:

- Stream Width (from Final WQBEL Report): Average of 11 Feet
- Stream Slope (from Final WQBEL Report): 15.3% average slope for reach between Outfall No. 001 and point used in TMS modeling.
- Report Estimates (ten samples): See DEP calculations below. Report information:
  - Influent Reservoir sampling (10 grab samples): No pH, TSS, TDS, Total Hardness or Acrylamide data.

Date	Aluminum (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Silver (mg/l)	Zinc (mg/l)	Acrylamide
3/7/2022	0.302	0.00017	0.00053	0.00051	0.000032	0.0290	No data
4/5/2022	0.30	<0.00020	<0.0100*	<0.00100	<0.00040	0.0295	No data
5/3/2022	0.32	<0.00020	<0.0100	<0.00100	<0.00040	0.0397	No data
6/8/2022	0.28	<0.00020	<0.0100	<0.00100	<0.00040	0.0413	No data
7/6/2022	0.38	<0.00020	<0.0100	<0.00100	<0.00040	0.0377	No data
8/3/2022	0.11	<0.00020	<0.0100	<0.00100	<0.00040	0.0321	No data
9/6/2022	0.10	<0.00020	<0.0100	<0.00100	<0.00040	0.0277	No data
10/5/2022	0.17	<0.00020	<0.0100	<0.00100	<0.00040	0.0322	No data
11/2/2022	0.22	<0.00020	<0.0100	<0.00100	<0.00040	0.0299	No data
11/9/2022	0.25	<0.00020	<0.0100	<0.00100	<0.00040	0.0317	No data

*Not meeting DEP TQL (0.0040 mg/l Total Copper).

  - Stream Sampling Upstream of Plant/001 (10 grab samples): No pH, TSS, TDS or Acrylamide data. See below for Total Hardness data

Date	Aluminum (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Silver (mg/l)	Zinc (mg/l)	Total Hardness (mg/l)
7/6/2022	0.25	<0.00020	<0.0100*	<0.00100	<0.00040	0.0280	9.61
7/19/2022	0.45	<0.00020	<0.0100	0.00132	<0.00040	0.0242	16.5
8/3/2022	0.21	<0.00020	<0.0100	<0.00100	<0.00040	0.00516	93.0**
8/17/2022	<0.10	0.00054	<0.0100	<0.00100	<0.00040	0.00520	39.7
9/6/2022	0.72	0.00024	<0.0100	0.00169	<0.00040	0.0310	7.43
9/21/2022	1.47	0.00025	<0.0100	0.0032	<0.00040	0.0544	36.2
10/5/2022	0.50	<0.00020	<0.0100	<0.00100	<0.00040	0.0242	9.05
10/12/2022	0.11	<0.00020	<0.0100	<0.00100	<0.00040	0.00739	38.8

11/2/2022	0.29	<0.00020	<0.0100	<0.00100	<0.00040	0.0269	7.89
11/9/2022	0.25	<0.00020	<0.0100	<0.00100	<0.00040	0.0248	9.11

*Not meeting DEP TQL (0.0040 mg/l Total Copper).
**Conflicts with downstream same-day sample results.

- Unidentified Crystal Run sampling location data: This data could not be used in the Chapter 95.2(5) analysis as it was composite sampling data at an unknown location.
  - 3/17/2022: 0.83 mg/l Al
  - 2/16/2022: 1.58 mg/l Al
  - 2/3/2022: 0.93 mg/l Al, 0.00016 mg/l Cadmium, 0.0358 mg/l Zinc, <0.001 mg/l Lead, 0.00313 mg/l Copper
- The "stream below Outfall" stream data (10 grab samples): This data is not used on the TMS Reasonable Potential Analysis or Chapter 95.2(5) analysis, but does help define current stream conditions. pH, TSS data included (see below).

Date	Aluminum (mg/l)	Cadmium (mg/l)	Copper (mg/l)	Lead (mg/l)	Silver (mg/l)	Zinc (mg/l)	Total Hardness (mg/l)
7/6/2022	0.18	<0.00020	<0.0100*	<0.00100	<0.00040	0.0113	19.7
7/19/2022	0.56	<0.00020	<0.0100	0.00132	<0.00040	0.0227	25.1
8/3/2022	0.17	<0.00020	<0.0100	<0.00100	<0.00040	0.0133	18.8
8/17/2022	0.23	<0.00020	<0.0100	<0.00100	<0.00040	0.0141	14.9
9/6/2022	0.91	<0.00020	<0.0100	<0.00100	<0.00040	0.030	32.0
9/21/2022	0.80	<0.00020	<0.0100	<0.00100	<0.00040	0.0312	20.0
10/5/2022	0.54	<0.00020	<0.0100	<0.00100	<0.00040	0.0272	10.7
10/12/2022	0.24	<0.00020	<0.0100	<0.00100	<0.00040	0.0137	27.1
11/2/2022	0.25	<0.00020	<0.0100	<0.00100	<0.00040	0.0217	17.3
11/9/2022	0.48	<0.00020	<0.0100	<0.00100	<0.00040	0.0181	21.1

*Not meeting DEP TQL (0.0040 mg/l Total Copper).

Stream Design Total Hardness Calculation (log-normal calculation per DEP Policy No. 386-2000-005, 6/28/2023):

- The permittee took ten stream samples above the Outfall No. 001, all at detectable concentrations during the normal low flow period (July through November), but one sample appears to be an outlier (inconsistent with other values and same-day downstream sample). They did not calculate effluent discharge Total Hardness.
- The DEP Policy referenced the EPA Technical Support Document for WQBELs Appendix E (Lognormal Distribution and Permit Limits Derivations) which uses a log normal distribution for ≤10 samples. The DEP Policy Variance equation appears to contain a typo, so the Appendix E equation was used.
  - The DEP Policy indicates that when hardness correlates to flow, it is generally an inverse correlation (the higher the flow, the lower the hardness) which is expected due to stormwater contributions generally diluting the stream value, including AMD concentration. No stream flow or precipitation data was provided. The high value of "93 mg/l" was assumed to be an outlier (inconsistent with downstream hardness data), and discarded (to prevent biasing of WQBELs dependent on Total Hardness).
  - The Policy requires calculation of the LTA mean, which was used in the DEP Toxic Management Spreadsheet water quality modeling.

Date	Total Hardness Stream above Outfall, i.e. "x" (mg/l)	Total Hardness Downstream of Outfall for comparison purposes only (mg/l)	Y = ln(x)	Y - u	$(Y - u)^2$
7/6/2022	9.61	19.7	2.2628	-0.6382	0.4072
7/19/2022	16.5	25.1	2.8033	-0.0241	0.00058
~~8/3/2022~~	~~93~~	~~18.8~~	~~4.5325~~	~~1.7051~~	~~2.9073~~
8/17/2022	39.7	14.9	3.6813	0.8539	0.7291
9/6/2022	7.43	32	2.0055	-0.8219	0.6755

9/21/2022	36.2	20	3.5890	0.7616	0.5800
10/5/2022	9.05	10.7	2.2027	-0.6247	0.3902
10/12/2022	38.8	27.1	3.6584	0.831	0.6905
11/2/2022	7.89	17.3	2.0655	-0.7619	0.5804
11/9/2022	9.11	21.1	2.2093	-0.6181	0.3820
Total	-	-	29.0103	-	7.3427

- Number of Samples (k): 9 because outlier (93 mg/l) discarded as inconsistent with downstream same-day sample result.
- Arithmetic Mean of x: 17.4 mg/l (range of 9.05 – 39.7 mg/l)
- Uy = Estimated Mean (log normal): 2.7197 for k = 9
- Vy = Estimated Variance (log normal): 0.5544 for k – 1 (8)
- Estimated Standard Deviation (log normal): 0.9709
- Estimated Coefficient of Variation (log normal): 0.3421
- **Ex = Mean (Daily Average, normal) = Exp (Uy + variance/2) = Exp (2.7197 + 0.5544/2) = Exp(2.9969): 20.02 mg/l (used in updated TMS for ambient stream concentration)**

Aluminum Stream Concentration (above Outfall 001): The Report table mistakenly included a 7/7/2022 Silver Creek sample result. Rounding mg/l to ug/l as needed (third digit assumed to be zero). Delta Log-normal distribution due to one ND sample result. Used EPA TSD for Toxic Pollutants Appendix E statistical methodology (also used in DEP Policy No. 386-2000-005 (Field Data Collection and Evaluation Protocol for Determining Stream and Point Source Discharge Design Hardness for determination of stream mean daily average concentration):

Date	**Total Aluminum, i.e. "x" upstream of 001 (ug/l)**	**Downstream Total Aluminum (for comparison purposes only) (ug/l)**	**Y = ln(x)**	**Y - u**	**$(Y – u)^2$**
7/6/2022	250	180	5.5214	0.2258	0.0509
7/19/2022	450	560	6.1092	0.8136	0.6619
8/3/2022	210	170	5.3471	0.0515	0.0026
~~8/17/2022~~	~~<100~~	230	~~4.6051~~	~~-~~	~~-~~
9/6/2022	720	910	6.5792	1.2836	1.6476
9/21/2022	1470	800	7.2930	1.9974	3.8796
10/5/2022	500	540	6.2146	0.9190	0.8445
10/12/2022	110	240	4.7004	-0.5952	0.3542
11/2/2022	290	250	5.6698	0.3742	0.1400
11/9/2022	250	480	5.5214	0.2258	0.0509
Total	4350 (10 samples) 4250 (9 samples)	4130 (10 samples)	52.9561	-	7.6322

Arithmetic Mean (10 samples including 100 ug/l ND): 435 ug/l
Arithmetic Mean (9 detected samples): 4250 ug/l
D (Detection Limit): 100 ug/l
K (number of samples): 10 (9 for detected samples)
R (number of NDs): 1
K-R (number of values over detection limits): 9
R/K: 0.1
U(y) = Mean (delta log normal) for observations above detection limit: 52.9561/9 = **5.8840**
V(y) = Variance (delta log normal) for observations above detection limit: **0.9540** for k – 2 (8)
Standard Deviation (delta log normal): 0.9767
E(x) = Daily Average (normal): 530.9 ug/l (used in updated TMS for ambient stream concentration and Chapter 95.2(5) limits evaluation)

Zinc Stream Concentration (upstream of Outfall No. 001):

Date	Total Zinc, i.e. "x" (ug/l)	Total Zinc (for comparison purposes only)	Y = ln(x)	Y - Uy	$(Y – Uy)^2$
7/6/2022	28.0	13.3	3.3322	0.4395	0.1931
7/19/2022	24.2	22.7	3.1863	0.2936	0.0862
8/3/2022	5.16	13.3	1.6409	-1.2518	1.5670
8/17/2022	5.20	14.1	1.6486	-1.2441	1.5477
9/6/2022	31.0	30.0	3.4339	0.5412	0.2928
9/21/2022	54.4	31.2	3.9963	1.1036	1.2179
10/5/2022	24.2	27.2	3.1863	0.2936	0.0862
10/12/2022	7.39	13.7	2.0001	-0.8926	0.7967
11/2/2022	26.9	21.7	3.2921	0.3994	0.1595
11/9/2022	24.8	18.1	3.2108	0.3181	0.1011
Total	231.25	205.3	28.9275	-	6.0682

Arithmetic Mean (ten samples): 23.12 ug/l (range of 7.39 – 54.4 ug/l)
Uy = Log normal mean (k = 10): 2.8927
Variance (log normal), k – 1 (9): 0.6720
Standard Deviation (log normal): 0.8197
E(x) = Mean (Daily Average): 25.246 ug/l (greater than WQS). (Used in updated TMS for ambient stream concentration and Chapter 95.2(5) limit evaluation)

Application Data on Effluent Quality for Aluminum and Zinc: When TSS spikes, so did metals.

Date	TSS (mg/l)	TDS (mg/l)	Total Aluminum (mg/l)	Total Zinc (mg/l)	Comment
4/5/2022	9	32	1.08	0.0290	
5/3/2022	**19**	**40**	**4.50**	0.0537	Lead at 0.00310 mg/l
5/12/2022	**30**	**-**	**2.65**	-	
6/8/2022	4	38	0.90	0.0256	Lead at 0.00102 mg/l
7/6/2022	<3	20	0.22	0.0265	
7/13/2022	4	-	0.45	-	
7/19/2022	**5**	**-**	**1.90**	**-**	
8/3/2022	<3	22	0.40	0.0221	
8/10/2022	5	-	0.37	-	
9/6/2022	<3	44	0.44	0.0271	
9/14/2022	4	-	0.70	-	
9/21/2022	<3	-	0.77	-	
9/27/2022	3	-	0.54	-	
10/5/2022	<3	40	0.36	0.0299	
10/26/2022	4	-	0.80	-	
11/2/2022	3	70	0.83	0.0275	
11/9/2022	4	-	0.79		
12/7/2022	4	24	1.14	0.0593	Cadmium at 0.00026 mg/l

Cadmium, Copper, Lead, Silver: There were insufficient data points (sample detections) to allow for calculation of stream ambient conditions for these metals (i.e. no Chapter 95.2(5) potential limits could be determined). Most reported values were reported as non-detect at the DEP Target QL, even when the QL was above the lab MDL (allowing for estimated "J" value).

Other Monitored Metals (Arsenic, Antimony, Cobalt, Hexavalent Chromium, Total Iron, Manganese): No effluent or stream data was provided in the Final WQBEL Compliance Report.

Compliance History

DMR Data for Outfall 001 (from March 1, 2022 to February 28, 2023)

Parameter	FEB-23	JAN-23	DEC-22	NOV-22	OCT-22	SEP-22	AUG-22	JUL-22	JUN-22	MAY-22	APR-22	MAR-22
Flow (MGD) Average Monthly	0.016	0.016	0.017	0.018	0.021	0.029	0.027	0.026	0.026	0.021	0.022	0.02
Flow (MGD) Daily Maximum	0.034	0.052	0.026	0.046	0.041	0.047	0.047	0.048	0.047	0.044	0.044	0.026
pH (S.U.) Instantaneous Minimum	6.4	5.8	6.4	6.4	5.6	6.0	6.4	6.5	6.1	5.5	6.3	5.9
pH (S.U.) Instantaneous Maximum	6.9	6.7	6.5	6.6	7.1	6.8	6.6	7.0	6.6	6.2	6.5	6.6
TRC (mg/L) Average Monthly	0.07	0.04	0.04	0.04	0.06	0.04	0.03	0.04	0.02	0.04	0.0525	0.055
TRC (mg/L) Instantaneous Maximum	0.19	0.08	0.06	0.09	0.08	0.06	0.05	0.05	0.04	0.05	0.10	0.14
TSS (lbs/day) Average Monthly	< 0.7	0.2	< 0.4	0.5	< 0.4	< 1.0	< 0.6	< 1.0	2	4.0	2.6271	0.055
TSS (mg/L) Average Monthly	**< 3.0**	**4.0**	**< 3.5**	**3.5**	**< 3.0**	**< 3.5**	**< 4.0**	**< 3.5**	**4.0**	**24.5**	**9.0**	< 4.5
TSS (mg/L) Daily Maximum	**< 3.0**	**4.0**	**4.0**	**4.0**	**3.0**	**4.0**	**5.0**	**4.0**	**4.0**	**30.0**	**9.0**	6.0
Total Dissolved Solids (lbs/day) Average Monthly	8.0	1.0	24.0	6.0	7.0	11.0	5.0	8.0	15.0	3.0	6.93888	2.10168
Total Dissolved Solids (mg/L) Average Monthly	52.0	22.0	4.0	70.0	40.0	44.0	22.0	20.0	38.0	40.0	32.0	36.0
Total Dissolved Solids (mg/L) Daily Maximum	**52.0**	**22.0**	**4.0**	**70.0**	**40.0**	**44.0**	**22.0**	**20.0**	**38.0**	**40.0**	**32.0**	**36.0**
Total Aluminum (lbs/day) Average Monthly	0.1	0.04	0.1	0.1	0.05	0.2	0.07	0.1	0.2	0.5	0.406992	0.1194705
Total Aluminum (lbs/day) Daily Maximum	0.2	0.05	0.2	0.1	0.06	0.2	0.09	0.2	0.4	0.6	0.5797968	0.1799772

Total Aluminum (mg/L) Average Monthly	**0.520**	**0.630**	**0.755**	**0.810**	**0.495**	**0.570**	**0.385**	**0.335**	**0.705**	**3.575**	**1.330**	0.920
Total Aluminum (mg/L) Daily Maximum	**0.600**	**0.770**	**1.140**	**0.830**	**0.630**	**0.700**	**0.400**	**0.450**	**0.900**	**4.500**	**1.580**	**1.010**
Total Antimony (lbs/day) Average Monthly	< 0.001	< 0.0003	< 0.001	< 0.0007	< 0.0006	< 0.001	< 0.0009	< 0.002	< 0.002	< 0.0008	< 0.00145 95	< 0.00054 8521
Total Antimony (lbs/day) Daily Maximum	< 0.001	< 0.0003	0.002	< 0.0009	< 0.0008	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.00183 48	< 0.005
Total Antimony (ug/L) Average Monthly	< 0.005	< 0.005	< 0.009	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.00261
Total Antimony (ug/L) Daily Maximum	< 0.005	< 0.005	0.012	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.0 05	< 0.005	**< 0.005**
Total Arsenic (lbs/day) Average Monthly	< 0.001	< 0.0003	< 0.0005	< 0.0007	< 0.0006	< 0.001	< 0.0009	< 0.002	< 0.002	< 0.0008	< 0.00145 95	< 0.00055 5527
Total Arsenic (lbs/day) Daily Maximum	< 0.001	< 0.0003	< 0.0009	< 0.0009	< 0.0008	< 0.002	< 0.001	< 0.002	< 0.002	< 0.001	< 0.00183 48	< 0.00108 42
Total Arsenic (ug/L) Average Monthly	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.00546
Total Arsenic (ug/L) Daily Maximum	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	**< 0.005**
Total Cadmium (lbs/day) Average Monthly	< 0.00003	< 0.00001	0.00005	< 0.00002	< 0.00003	< 0.00005	< 0.00004	< 0.00008	< 0.00008	0.00002	< 0.00004 3368	0.00000 9924
Total Cadmium (lbs/day) Daily Maximum	< 0.00003	< 0.00001	0.00005	< 0.00002	< 0.00003	< 0.00005	< 0.00004	< 0.00008	< 0.00008	0.00002	< 0.00004 3368	0.00000 9924
Total Cadmium (mg/L) Average Monthly	**< 0.0002**	**< 0.0002**	**0.00026**	**< 0.0002**	**< 0.0002**	**< 0.0002**	**< 0.0002**	**< 0.0002**	**< 0.0002**	**0.00022**	**< 0.0002**	0.00017
Total Cadmium (mg/L) Daily Maximum	**< 0.0002**	**< 0.0002**	**0.00026**	**< 0.0002**	**< 0.002**	**< 0.0002**	**< 0.0002**	**< 0.0002**	**< 0.0002**	**0.00022**	**< 0.0002**	**0.00017**
Hexavalent Chromium (lbs/day) Average Monthly	< 0.000009	< 0.000003	< 0.00001	< 0.000006	< 0.00001	< 0.00001	< 0.000007	< 0.00001	< 0.00001	< 0.000003	< 0.00001 1675	< 0.00000 2835
Hexavalent Chromium (lbs/day) Daily Maximum	< 0.00001	< 0.000003	0.00002	< 0.000007	0.00002	< 0.00001	< 0.000009	< 0.00002	< 0.00002	< 0.000003	< 0.00001 4678	< 0.00000 3336

Hexavalent Chromium (ug/L) Average Monthly	< 0.00004	< 0.00005	< 0.00007	< 0.00004	< 0.00008	< 0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00004
Hexavalent Chromium (ug/L) Daily Maximum	< 0.00004	0.00006	0.0001	< 0.00004	0.00011	< 0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00004	**< 0.00004**
Total Cobalt (lbs/day) Average Monthly	0.001	0.0003	0.0007	0.001	0.0008	0.002	0.0009	0.002	0.002	0.001	0.00164298	0.00069 7682
Total Cobalt (lbs/day) Daily Maximum	0.002	0.0003	0.001	0.001	0.001	0.002	0.001	0.002	0.002	0.001	0.00220176	0.00108 42
Total Cobalt (ug/L) Average Monthly	0.006	0.006	0.006	0.008	0.008	0.007	0.006	0.006	0.006	0.008	0.0055	0.00516 5
Total Cobalt (ug/L) Daily Maximum	0.006	0.006	0.006	0.008	0.009	0.007	0.006	0.006	0.006	0.01	0.006	0.00533
Total Copper (lbs/day) Average Monthly	< 0.002	0.003	< 0.002	< 0.0009	< 0.002	< 0.002	< 0.002	< 0.004	< 0.004	< 0.0008	< 0.00216 84	0.00010 2165
Total Copper (lbs/day) Daily Maximum	< 0.002	0.003	< 0.002	< 0.0009	< 0.002	< 0.002	< 0.002	< 0.004	< 0.004	< 0.0008	< 0.00216 84	0.00010 2165
Total Copper (mg/L) Average Monthly	**< 0.01**	**0.0513**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	0.00175
Total Copper (mg/L) Daily Maximum	**< 0.01**	**0.0513**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	0.00175
Total Iron (lbs/day) Average Monthly	0.01	0.01	0.01	0.01	0.01	0.05	0.05	0.05	0.04	0.05	0.0259374	0.01159 26
Total Iron (lbs/day) Daily Maximum	0.02	0.03	0.02	0.01	0.02	0.07	0.06	0.08	0.06	0.08	0.036696	0.01734 72
Total Iron (mg/L) Average Monthly	0.050	0.220	0.100	0.080	0.105	0.175	0.325	0.150	0.105	0.360	0.085	0.090
Total Iron (mg/L) Daily Maximum	0.060	0.410	0.130	0.080	0.120	0.200	0.380	0.220	0.160	0.370	0.100	0.100
Total Lead (lbs/day) Average Monthly	< 0.0002	0.0002	< 0.0002	< 0.00009	< 0.0002	< 0.0002	< 0.0002	< 0.0004	0.0004	0.0003	< 0.00021684	0.00004 0282
Total Lead (lbs/day) Daily Maximum	< 0.0002	0.0002	< 0.0002	< 0.00009	< 0.0002	< 0.0002	< 0.0002	< 0.0004	0.0004	0.0003	< 0.00021684	0.00004 0282
Total Lead (mg/L) Average Monthly	**< 0.001**	**0.00235**	**< 0.001**	**< 0.001**	**< 0.001**	**< 0.001**	**< 0.001**	**< 0.001**	**0.00102**	**0.0031**	**< 0.001**	**0.00069**
Total Lead (mg/L) Daily Maximum	**< 0.001**	**0.00235**	**< 0.001**	**< 0.001**	**< 0.001**	**< 0.001**	**< 0.001**	**< 0.001**	**0.00102**	**0.0031**	**< 0.001**	0.00069
Total Manganese (lbs/day) Average Monthly	0.07	0.01	0.04	0.06	0.05	0.1	0.06	0.1	0.1	0.1	0.0930744	0.04347 642

Total Manganese (lbs/day) Daily Maximum	0.09	0.01	0.06	0.08	0.06	0.1	0.08	0.1	0.2	0.1	0.12109 68	0.06722 04
Total Manganese (mg/L) Average Monthly	0.330	0.260	0.330	0.435	0.440	0.415	0.350	0.305	0.425	0.800	0.315	0.324
Total Manganese (mg/L) Daily Maximum	**0.350**	**0.300**	**0.370**	**0.460**	**0.500**	**0.440**	**0.360**	**0.320**	**0.500**	**0.980**	**0.330**	0.338
Total Zinc (lbs/day) Average Monthly	0.007	0.009	0.01	0.003	0.005	0.007	0.005	0.01	0.01	0.004	0.00628 836	0.00180 3942
Total Zinc (lbs/day) Daily Maximum	0.007	0.009	0.01	0.003	0.005	0.007	0.005	0.01	0.01	0.004	0.00628 836	0.00180 3942
Total Zinc (mg/L) Average Monthly	**0.048**	**0.137**	**0.0593**	**0.0275**	**0.0299**	**0.0271**	**0.0221**	**0.0265**	**0.0256**	**0.537**	**0.029**	0.0309
Total Zinc (mg/L) Daily Maximum	**0.048**	**0.137**	**0.0593**	**0.0275**	**0.0299**	**0.0271**	**0.0221**	**0.0265**	**0.0256**	**0.0537**	**0.029**	0.0309
Acrylamide (lbs/day) Average Monthly	< 0.002	< 0.0007	< 0.002	< 0.002	< 0.002	< 0.003	0.002	0.005	< 0.005	0.001	< 0.00260 208	< 0.00070 056
Acrylamide (lbs/day) Daily Maximum	< 0.002	< 0.0007	< 0.002	< 0.002	< 0.002	< 0.003	0.002	0.005	< 0.005	0.001	< 0.00260 208	< 0.00070 056
Acrylamide (mg/L) Average Monthly	**< 0.012**	**< 0.011**	**< 0.011**	**< 0.012**	**< 0.012**	**< 0.012**	**0.011**	**0.012**	**< 0.012**	**0.012**	**< 0.012**	< 0.012
Acrylamide (mg/L) Daily Maximum	**< 0.012**	**< 0.011**	**< 0.011**	**< 0.012**	**< 0.012**	**< 0.012**	**0.011**	**0.012**	**< 0.012**	**0.012**	**< 0.012**	< 0.012

DMR Data for Outfall 101 (from March 1, 2022 to February 28, 2023)

Parameter	FEB-23	JAN-23	DEC-22	NOV-22	OCT-22	SEP-22	AUG-22	JUL-22	JUN-22	MAY-22	APR-22	MAR-22
Flow (MGD) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Flow (MGD) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
pH (S.U.) Intake Instantaneous Minimum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG

pH (S.U.) Intake Instantaneous Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Antimony (lbs/day) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Antimony (lbs/day) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Antimony (mg/L) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Antimony (mg/L) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Arsenic (lbs/day) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Arsenic (lbs/day) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Arsenic (mg/L) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Arsenic (mg/L) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Cadmium (lbs/day) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Cadmium (lbs/day) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Cadmium (mg/L) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Cadmium (mg/L) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG

Hexavalent Chromium (lbs/day) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Hexavalent Chromium (lbs/day) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Hexavalent Chromium (mg/L) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Hexavalent Chromium (mg/L) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Cobalt (lbs/day) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Cobalt (lbs/day) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Cobalt (mg/L) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Cobalt (mg/L) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Copper (lbs/day) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Copper (lbs/day) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Copper (mg/L) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Copper (mg/L) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Lead (lbs/day) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG

Total Lead (lbs/day) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Lead (mg/L) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Lead (mg/L) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Nickel (lbs/day) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Nickel (lbs/day) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Nickel (mg/L) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Nickel (mg/L) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Silver (lbs/day) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Silver (lbs/day) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Silver (mg/L) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Silver (mg/L) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Zinc (lbs/day) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Zinc (lbs/day) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Zinc (mg/L) Intake Average Monthly	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG
Total Zinc (mg/L) Intake Daily Maximum	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG

Compliance History

Compliance History: No open violations per 1/4/2024 WMS query (open violation by client number):

Client ID: 83009
Client: All

Open Violations: 0
No data was found using the criteria entered. Please revise your choices and try again

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** .042
Latitude 40º 41' 51.00" **Longitude** -76º 19' 0.00"
Wastewater Description: IW Process Effluent without ELG

Modified Permit Limits and/or Monitoring (Changes bolded):

Parameter	Limit (mg/l unless otherwise specified)	SBC	Model/Basis
TSS	Report (lb/d) **Report (lb/d)** 30.0 60.0 75.0	Monthly Average **Daily Max** Monthly Average Daily Max IMAX	Existing Technology limit per 10/1/97 DEP Policy ID# 362-2183-003 (Technology-based control requirements for water treatment plant wastes) for filter backwash plants**. Daily mass load reporting added to gather information.** Previous Application data: 14.7 mg/l max out of 26 samples. eDMR indicated 24.0 mg/l in 2016.
pH	5.5 – 9.0 SU	Inst. Min - IMAX	Existing WQBEL minimum pH limit (Chapter 95.2(5)) and TBEL max limit. Previous Application data: Range of 6.0 to 6.95 SU out of 24 samples. EDMR: 5.7 - 6.9 SU discharges.
Total Aluminum (Interim – February 28, 2025)	Report (lb/d) Report (lb/d) 4.0 8.0 10.0	Monthly Average Daily Max Monthly Average Daily Max IMAX	Existing Technology limit Previous Application data: 2.74 mg/l max out of 26 samples. EDMR: 0.312 – 2.56 mg/l 4-Samples: 120 – 720 ug/l range.
Total Aluminum **(Final – 3/1/2025)**	**0.38 (lb/d)** **0.67 (lb/d)** **1.090** **1.920** **2.720**	**Monthly Average** **Daily Max** **Monthly Average** **Daily Max** **IMAX**	**New WQBELs per Reasonable Potential Analysis. See below.** See Stream Information Section, EDMR data and TOXCONC spreadsheet for available data. **EDMR data indicates 2 exceedance of proposed monthly average limits and 1 exceedance of proposed daily max limit in 12 months.**
Total Zinc Interim – February 28, 2025)	Report (lb/d) Report (lb/d) Report Report	Monthly Average Daily Max Monthly Average Daily Max	Existing Monitoring requirement. Previous Application data: 24.5 ug/l max and 22.3 mg/l average (3 samples). 4-Samples: 31 – 187 ug/l
Total Zinc **(Final – 3/1/2025)**	**0.009 (lb/d)** **0.01 (lb/d)** **0.026** **0.028** **0.028**	**Monthly Average** **Daily Max** **Monthly Average** **Daily Max** **IMAX**	**New WQBELs per Reasonable Potential Analysis. See below.** See Stream Information Section, EDMR data and TOXCONC spreadsheet for available data. **EDMR data indicates 8 exceedance of proposed monthly average limits and 7 exceedances of proposed daily max limit in 12 months.**
Total Cadmium	Report (lb/d) Report (lb/d)	Monthly Average Daily Max	Existing monitoring requirement.

Interim – February 28, 2025)	Report Report	Monthly Average Daily Max	Previous Application data: **0.324 ug/l max** and 0.16 ug/l average (3 samples) 4-Samples: <1.0 ug/l **(insensitive ND)** DEP TQL: 0.2 ug/l (0.0002 mg/l)
Cadmium **(Final – 3/1/2025)**	**0.00009 (lb/d)** **0.0002 (lb/d)** **0.0002** **0.0005** **0.0006**	**Monthly Average** **Daily Max** **Monthly Average** **Daily Max** **IMAX**	**New WQBEL required per updated Reasonable Potential Analysis.** See Stream Information Section, EDMR data and TOXCONC spreadsheet for available data. **No exceedances of the proposed limits in 12 month EDMR period.**
Total Copper Interim – February 28, 2025)	Report (lb/d) Report (lb/d) Report Report	Monthly Average Daily Max Monthly Average Daily Max	Existing monitoring requirement. Previous Application data: 5.0 ug/l max and 2.7 ug/l average (3 samples). 4-Samples: 1 – **45 ug/l** DEP TQL: 4.0 ug/l (0.0040 mg/l)
Copper **(Final – 3/1/2025)**	**0.002 (lb/d)** **0.003 (lb/d)** **0.006** **0.009** **0.014**	**Monthly Average** **Daily Max** **Monthly Average** **Daily Max** **IMAX**	**New WQBEL required per updated Reasonable Potential Analysis.** See Stream Information Section, EDMR data and TOXCONC spreadsheet for available data. **Insensitive ND reporting in 10 months in 12-month EDMR period.**
Total Lead Interim – February 28, 2025)	Report (lb/d) Report (lb/d) Report Report	Monthly Average Daily Max Monthly Average Daily Max	Existing monitoring requirement. Application data: <3.0 ug/l (ND 3 samples) 4-Samples: <1 ug/l – **2 ug/l** **DEP TQL:** 1.0 ug/l (0.0010 mg/l)
Lead **(Final – 3/1/2025)**	**0.0004 (lb/d)** **0.0006 (lb/d)** **0.001** **0.002** **0.003**	**Monthly Average** **Daily Max** **Monthly Average** **Daily Max** **IMAX**	**New WQBEL required per updated Reasonable Potential Analysis.** See Stream Information Section, EDMR data and TOXCONC spreadsheet for available data. **Two exceedances of proposed monthly average limits in 12-month EDMR period.**
Acrylamide Interim – February 28, 2025)	Report (lb/d) Report (lb/d) Report Report	Monthly Average Daily Max Monthly Average Daily Max	Existing monitoring requirement. Previous Application data: None. Facility proposes use of polyacrylamide treatment chemical for metal reduction.
Acrylamide **(Final – 3/1/2025)**	**Report (lb/d)** **Report (lb/d)** **0.002** **0.003** **0.004**	**Monthly Average** **Daily Max** **Monthly Average** **Daily Max** **IMAX**	**New WQBEL required per updated Reasonable Potential Analysis.** See Stream Information Section, EDMR data and TOXCONC spreadsheet for available data. **Due to proposed usage of polyacrylamide in pilot project/future, previous non-detect as 11 ug/l lab MDL (see Part C.III.A) is not representative of future discharges.**
Total Dissolved Solids	Report (lb/d) **Report (lb/d)** Report Report	Annual Average **Daily Max** Annual Average Daily Max	Annual TDS monitoring due to discharging to Delaware River watershed. (Chapter 92a.61) **Daily mass load reporting added to gather information.**

			Previous Application data: 43.5 mg/l max and 37.13 mg/l average (3 samples)
Silver, Total	-	-	Updated Reasonable Potential Analysis indicated no need for monitoring or limits.
Other Existing monitoring and permit limits	-	-	Not changed.
Intake Monitoring Point No. 101 (Raw water influent)	**-**	**-**	**Added Aluminum and Total Hardness Monitoring (upon request) as relevant to Chapter 95.2(5) limits.**

Comments:

Updated Reasonable Potential Analysis: See revised Toxics Management Spreadsheet (TMS) output (below) which incorporated Final WQBEL Compliance Report information. Additional considerations:

- The proposed usage of a polyacrylamide-based wastewater treatment chemical did not allow for dropping of the acrylamide limits. Silver dropped out.
- TMS inputs: The updated TMS was updated with Final WQBEL Compliance Report information.
  - LTAMEC: The TOXCONC calculated the Long Term Average Monthly Effluent Concentrations and Daily COV, using application information. The Daily COV for Cadmium and Lead exceeded TMS value range and were left out.
  - pH: The discharge and stream pH was estimated at 6.9 SU, which was incorporated into the TMS. However, the applicable Chapter WQS are not impacted by pH.
  - Ambient Stream Data: The calculated ambient daily average values were inputted for Aluminum and Zinc. Given stream sampling results at ND, no ambient concentrations were used for the other constituents.
  - Discharge Total Hardness: The WQBEL Final Compliance Report only included 2017 discharge hardness data (8.24 mg/l, 9.14 mg/l, 8.22 mg/), i.e. not following DEP policy to further refine water quality modeling. Therefore, 8.22 mg/l used in updated TMS modeling.
  - Stream Total Hardness (from Final WQBEL Report): The Final WQBEL Compliance Report estimated an average 24.70 mg/l but did not use EPA-approved statistical methodology set forth in the DEP Policy No. 386-2000-005 “Field Data Collection and Evaluation Protocol for Determining Stream and Point Discharge Design Hardness” which resulted in 20.02 mg/l (excluding the 93 mg/l Total Hardness result as an outlier).
  - Stream Width and Slope: Final WQBEL Compliance Report information was included.
  - Retained Original Assumptions:
    - Discharge Design Flow: 0.042 MGD was retained as the NPDES Permit-basis flow.
    - Stream LFY: 0.032 CFS/Square Mile (per original Fact Sheet from minimum dam release value).

☑ ***Recommended WQBELs & Monitoring Requirements***

No. Samples/Month: 4

	Mass Limits		*Concentration Limits*						
Pollutants	AML (lbs/day)	MDL (lbs/day)	AML	MDL	IMAX	Units	Governing WQBEL	WQBEL Basis	Comments
Total Aluminum	0.38	0.67	1.09	1.92	2.72	mg/L	1.09	AFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Cadmium	0.00009	0.0002	0.0002	0.0005	0.0006	mg/L	0.0002	CFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Copper	0.002	0.003	0.006	0.009	0.014	mg/L	0.006	AFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Lead	0.0004	0.0006	0.001	0.002	0.003	mg/L	0.001	CFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Zinc	0.009	0.01	0.026	0.028	0.028	mg/L	0.026	AFC	Discharge Conc ≥ 50% WQBEL (RP)
Acrylamide	0.0006	0.0009	0.002	0.003	0.004	mg/L	0.002	CRL	Discharge Conc ≥ 50% WQBEL (RP)

CrystalWTPToxconc.pdf CrysalRunTMSRev.pdf

Chapter 95.2(5) Limits: Chapter 95.2(5) states: “When surface waters are used in the industrial plant, the quality of the effluent need not exceed the quality of the raw water supply if the source or supply would normally drain to the point of

effluent discharge, unless otherwise required under the act or Federal Act or regulations promulgated thereunder". Chapters 93 and 96 requirements otherwise govern. Upon compliance with Chapter 95.2(5) limits, the facility will not be adding any net mass loadings to the receiving stream (i.e. TMDL Waste Load Allocations will not be needed). **In this case, the hypothetical Chapter 95.2(5) limits for Total Aluminum and Total Zinc (based on calculated daily average concentrations in the ambient stream) would have been more stringent than the revised WQBELs, and therefore not incorporated into the NPDES Permit. There was insufficient application information to determine potential Chapter 95.2(5) limits for Cadmium, Copper, or Lead.**

- **Practical Considerations**: The facility qualifies for coverage as discussed above, but this requires scientifically-supported determination of the receiving stream's ambient water quality to be used as the effective permit limit(s),
    - This regulation is comparing the ambient stream quality (in terms of concentrations) to the effluent concentrations and vice versa. The industrial plant is not required to treat the discharge to have substantially lower concentrations than scientifically determined to be present in the source stream above the Outfall No. 001 under this regulation. The Chapter 95.2(5) permit limits must address the variability of the receiving stream's water quality (as shown in Stream Information Section above) via scientifically-supported statistical methodology.
    - The facility is removing a fraction of stream water for the potable water supply. This reduces the overall stream flow and would increase the stream's ambient concentrations for the same given mass loading. Wastewater Effluent treatment is required to prevent deterioration of stream quality.
    - The stream is presently impaired, with variable metal levels and Total Hardness levels as discussed in the Stream Information Section and shown in the Final WQBEL Compliance Report. The Department expects impaired streams in Pennsylvania to improve over time, meaning that any Chapter 95.2(5) permit limits will become more stringent in the future.
        - Re-evaluation of Chapter 95.2(5) limits will be required in each NPDES Permit Renewal. The general requirement is every ten years or so for Site-specific stream standards, metal translators, etc. The facility can collect raw reservoir intake sampling to gather information or conduct additional stream monitoring, but ten samples (minimum) will be required during low flow periods (generally July through November, with no stream sampling within 24 hours of a precipitation event).
    - Aluminum and Zinc stream sampling data allowed for scientifically-based determination of receiving stream quality in terms of daily average concentrations, allowing for Chapter 95.2(5) limits. See Stream Information Section for available stream information and calculation of the Daily Average ambient stream concentration.
    - The Cadmium, Copper, and Lead sampling results had too many ND results to allow for calculation of a valid and accurate Daily Average concentration. The ambient stream concentration could not be determined.
    - Acrylamide was not found in the receiving stream and is expected from proposed usage of a polyacrylamide product for metal removal.
- **Statistical Methodology**: The March 1991 EPA/505/2-90-001 "Technical Support Document for Water Quality-based Toxic Control" Appendix E (Lognormal Distribution and Permit Limit Derivations) was followed to scientifically determine the ambient Daily Average concentrations in the receiving stream.
    - Daily pollutant measurements are approximately lognormally distributed for values above the detection limit per Appendix E.
    - Maximum n-day monthly averages for n (# of samples) ≤ 10 are approximately lognormally distributed above the detection limits. (Ten samples were taken by the permittee). Delta Log Normal distributions are applied when there are non-detects. (Appendix E)
    - Recommendation of the use of the lognormal distribution for daily pollutant measurements is based on practical rather than theoretical consideration. Usually environmental data sets possess the basic lognormal characteristics of positive values and positive skewness. In addition, the lognormal distribution is flexible enough to model a range of nearly symmetric data. Furthermore, in comparison to other positive valued, positively skewed distributions that could be used to model environmental data, the lognormal is relatively easy to use. Environmental data rarely are symmetric, which is a fundamental property of the normal distribution. (Appendix E)
    - **The calculated Daily Average concentrations were converted into Chapter 95.2(5) Daily Max limits to protect the receiving stream's water quality.** The TSD Appendix E equations for calculating daily maximum and monthly average effluent limits were not suitable for Chapter 95.2(5) ambient stream water quality-based limits that have an additional constraint of not substantially lowering the existing overall ambient water quality during short-term excursions. There was insufficient information and analysis to support any less stringent permit limits.
- **Reservoir Influent versus Upstream Sampling Points (relative to Outfall No. 001)**: The Upstream (of Outfall No. 001) stream data was used in this analysis as most relevant to the Outfall discharge. The Report indicated the

influent sampling point was at the reservoir. In practical terms, any WTP reservoir influent point would be ideally located to take advantage of the reservoir's settling characteristics to improve captured process water quality. Therefore, the (upstream of Outfall No. 001) sampling point data was considered more representative in terms of actual stream water quality. Both sets of data indicated continuous Aluminum and Zinc concentrations with intermittent spiking for the other metals. See Stream section for Stream information.

- **Acrylamide MDL/ND Level for WQBELs Below Quantitation Limit Condition**: The permittee indicates that the most sensitive MDL achievable by 5 laboratories was 0.011 mg/l. This value will be incorporated into the WQBELs Below Quantitative Limits condition in this permit term. The facility plans to use Superfloc SD-2081 (a cationic emulsion polyacrylamide) for wastewater treatment to meet metal permit limits, and indicates acrylamide will be present in the effluent. The permittee indicated it could not quantify expected acrylamide concentrations in the effluent. Reported results (prior to pilot project using polyacrylamide) included:
  - 11/16/2022: ND at 12 ug/l MDL
  - 10/5/2022: ND at 11 ug/l MDL
  - 9/6/2022: ND at 12 ug/l MDL
  - 8/3/2022: ND at 11 ug/l MDL
  - 7/6/2022: ND at 12 ug/l MDL
  - 4/5/2022: ND at 12 ug/l MDL
  - 3/7/2022: ND at 12 ug/l MDL

TOXCONC Output (Effluent LTAMEC and Daily COV): The Amendment Application effluent data was used to generate the Long Term Average Monthly Effluent Concentration (LTAMEC) and daily Coefficient of Variability (COV) for use in the updated Reasonable Potential Analysis.

- Per Final WQBEL Compliance Report, discarded previous 2020-2021 data due to mismatch ND concentrations and lack of copies of applicable lab sheets. Final WQBEL Compliance Report lacked 2023 data despite request.
- Silver and Acrylamide sample results were all ND, which did not allow for calculation of an LTAMEC or daily COV.
- COV (daily) results for Copper and Lead were outside TMS values, and therefore not entered.
- Acrylamide column was corrupted, but redone to show result.

		Reviewer/Permit Engineer:	Berger
Facility:	Crystal Run WTP		
NPDES #:	PA0063304		
Outfall No:	001		
n (Samples/Month):	4		
Parameter	**Distribution Applied**	**Coefficient of Variation (daily)**	**Avg. Monthly**
Aluminum (mg/L)	Lognormal	0.7940304	2.3755386
Cadmium (mg/L)	Delta-Lognormal	1.1492012	0.0002127
Copper (mg/L)	Delta-Lognormal	27.2151022	0.0045389
Lead (mg/L)	Delta-Lognormal	24.2759626	0.0162420
Silver (mg/L)	Delta-Lognormal	#DIV/0!	#DIV/0!
Zinc (mg/L)	Lognormal	0.4839472	0.0862876
Acrylamide (mg/L)	Delta-Lognormal	#NAME?	#REF!
Acrylamide (mg/l)	Delta-Lognormal	#DIV/0!	#DIV/0!

Metal Translator Study: The Metal Translator Study did not provide meaningful results due to too many Non-detect sampling results (resulting in too few usable sample data points). The regulatory defaults were retained in the TMS.

- Background:
  - The metal translator is the fraction of recoverable metal in the downstream water that is dissolved. The translator can be calculated as the geometric mean of the dissolved faction by the EPA Guidance-

identified equations (when log normal distribution per EPA Technical Support Document). Dissolved metal is operationally defined as that which passes through filtration (0.45 um or lower). Translators do not address bioaccumulation of metals. A statistically valid field study with attendant QA/QC (including adequate number of samples) is required. Changes in pH over a specific range can have a marked effect on metal solubility, which is of concern in areas with little buffering capacity and on "acid sensitive streams" (such as the facility's receiving stream).

- The June 1996 EPA Technical Guidance No. EPA 823-B-96-007 ("The Metal Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion) is referenced in the Part C.II permit condition. The most direct procedure for determining a site-specific metal translator is simply to determine f_D by measuring C_T and C_D, and to develop the dissolved fraction as the ratio C_D/C_T. The translator is calculated as the geometric mean of the dissolved fractions. Other factors, such as TSS-dependence can require additional data collection and analysis.
- Chapter 93.8c Table 5 indicates the applicable Water Quality Criteria/Standards for Cadmium, Copper, Lead, Zinc are dissolved metal criteria. The 0.750 mg/l Aluminum WQC is <u>not</u> a dissolved metal criterion (i.e. metal translator does not apply). Nor do metal translators apply to organics (i.e. the 0.00007 mg/l acrylamide CRL WQC).

- <u>Submitted Study</u>:
  - They did not calculate the translator using the EPA Guidance-approved statistical methodology (only calculating the Total Average and Dissolved Average), that is the dissolved metal concentration divided by the total recoverable metal translator.
  - There was insufficient meaningful data to calculate the metal translator. Analytical Results had too many ND sample results. Most results were ND Total Metal and ND Dissolved Metal. This situation (when the numerator and denominator were often identical) equates to translator of "1" (dissolved metal must be assumed to be equal to total metal concentration). In other cases, the Dissolved metal ND level was less sensitive than the Total Metal ND concentration level, i.e. the dissolved metal concentration had to be assumed equal to the Total Metal Concentration (translator of ">1").
    - The Chapter 93 Aluminum Water Quality Criteria is not based on dissolved metal concentration (i.e. no metal translator applies).
    - Five (5) Dissolved Zinc results were non-detect, resulting in too few sampling points for a valid statistical analysis.
    - Copper ND (0.010 mg/l) did not meet DEP Target QL.
    - In terms of the Report's dissolved/total metal ratio:
      - 11/9/2022: Cd, Cu, Lead, Silver: Dissolved/Total fraction of 1
      - 11/2/2022: Cd, Cu, Lead, Silver: Dissolved/Total fraction of 1
      - 10/12/2022: Cd, Cu, Lead, Silver: Dissolved/Total fraction of 1
      - 10/5/2022: Cd, Cu, Lead, Silver: Dissolved/Total fraction of 1
      - 9/21/2022: Cd, Cu, Lead, Silver: Dissolved/Total fraction of 1
      - 9/6/2022: Cd, Copper, Lead, Silver: Dissolved/Total fraction of >1
      - 8/17/2022: Cd, Copper, Lead, Silver, Zinc: Dissolved/Total fraction of ≥1
      - 8/3/2022: Cd, Copper, Lead, Silver, Zn: Dissolved/Total fraction of ≥1
      - 7/19/2022: Cd, Lead, Silver: Dissolved/Total fraction of >1
      - 7/6/2022: Cd, Copper, Lead, Silver, Zinc: Dissolved/Total fraction of >1

<u>Zinc Metal Translator Calculation for example</u>: k = 10, f_D (ratio of C_D/C_T, i.e. metal translator between dissolved and total Zinc). The table is based on a Guidance example.

Date	pH (SU)	TSS (mg/l)	C_T (mg/l)	C_D (mg/l)	f_D	$\ln(f_D)$
7/6/2022	7.18	<3	0.0113	<0.02	1.7699	0.5709
7/19/2022	6.96	4	0.0227	<0.02	0.8810	-0.1266
8/3/2022	7.23	<3	0.0133	<0.02	1.5037	0.4079
8/17/2022	7.26	3	0.0141	<0.02	1.4184	0.3495
9/6/2022	7.66	11	0.0300	<0.20	6.6666	1.8971
9/21/2022	6.98	5	0.0312	0.0112	0.3589	-1.0247
10/5/2022	5.33	<3	0.0272	0.0223	0.8566	-0.1547
10/12/2022	7.19	<3	0.0137	0.0104	0.7591	-0.2756
11/2/2022	6.59	<3	0.0217	0.0149	1.2147	0.1944

11/9/2022	6.99	<3	0.0181	0.00666	0.3679	-0.9999
Arithmetic Mean	-	4.1	0.02033	0.0345	1.57968	0.08383
Total	-	-	-	-	-	0.8383

Arithmetic Mean: 0.8383

Geo Mean (GM) = nth root of all numbers multiplied together per EPA Guidance equation (Guidance Box 1, page 18) for the simplest case where the translator is not dependent on TSS: 1.087 (n = 10) with the caveat that the insensitive ND levels (4 of 10 dissolved samples were greater than Total Zinc value, 4 samples had insensitive ND concentrations) plus additional ND of 0.20 mg/l rendered the calculation invalide).

Anti-Backsliding: No Antibacksliding exception request at present.

Communication Log:

- **3/1/2021**: NPDES Permit issued with Part C.II (WQBELs for Toxic Pollutant Conditions): See original NPDES Permit renewal Fact Sheet/Addendum for original permitting-related communications.
- **7/13/2021**: Authority (Volk) E-mails asking if TRE Work Plan submittals were required.
- **7/14/2021**: DEP (Berger) E-mail noting the TRE Work Plan submittals was only a voluntary requirement, but also noting any relief from proposed limits "is dependent on the permittee making an adequate technical case" for relief (via the Part C condition listed options and Chapter 95 when the pollutants are from the source water)".
- **9/21/2021**: Authority (Volk) E-mail asking for feedback on **Silver Creek WTP** TRE Work Plan.
- **9/22/2021**: DEP (Berger) E-mail providing feedback on the **Silver Creek WTP** TRE Work Plan.
- **10/26/2021**: Authority (Volk) E-mail question on Acylamide QL for Crystal Run discussing options.
- **11/15/2021**: DEP (Berger) E-mail responding on Acrylamide QL. Response cited the Part C (WQBELs below Quantitation Limits) language and estimated "J" reporting option.
- **1/25/2022**: Authority (Volk) e-mail asking about minimum number of samples required.
- **1/25/2022**: DEP (Berger) E-mail referencing (NPDES Permit Part C.II-referenced) technical guidance recommendations for results to support amending permit limits.
- **2/2/2022**: Authority (Volk) e-mail indicating difficulty in Acrylamide detection and whether daily/hourly COVs are required.
- **2/2/2022**: DEP (Berger) E-mail response giving option of contacting multiple labs for acrylamide detection limits, discussing need for at least 10 samples for LTAMEC calculation, and that hourly COVs are not required for Acrylamide.
- **2/15/2022**: Authority (Volk) E-mail indicating multiple lab's MDL limitations for acrylamide.
- **6/10/2022**: Authority (Volk) E-mail indicating question on whether certain parameters should be sampled in the TRE background/ambient sampling.
- **6/21/2023**: DEP (Berger) E-mail directing them to focus on Total Hardness and parameters with proposed future permit limits and acrylamide MDL.
- **3/2/2023**: Authority (Volk) E-mail asking for site-specific data collection studies and how to complete the DEP Toxic Management Spreadsheet (TMS).
- **3/2/2023**: DEP (Berger) E-mail discussing how and if to complete the TMS. Metals are not Volatile Organic Compounds, and acrylamide is not likely a VOC either.
- **3/21/2023**: Authority (Volk) e-mail asking for application fee amount.
- **3/22/2023**: DEP (Berger) e-mail communicating DEP requiring only $200 fee for this application.
- **3/30/2023**: Final WQBEL Compliance Report (with NPDES Permit amendment application) submitted.
- **4/13/2023**: DEP Incompleteness Letter issued for NPDES permit amendment application.
- **4/20/2023**: Authority (Volk) response to Incompleteness letter
- **11/15/2023**: DEP (Berger) E-mail asking for additional information for the technical review.
- **12/8/2023**: Response to 11/15/2023 DEP E-mail submitted. No 2023 sampling data for metals was included. Four acrylamide ND samples