

Application Type Renewal  
 Facility Type Industrial  
 Major / Minor Minor

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

Application No. PA0087734  
 APS ID 795604  
 Authorization ID 1464213

**Applicant and Facility Information**

Applicant Name	<u>Columbia Water Co.</u>	Facility Name	<u>Hellam Gravity Water System Dugan Facility</u>
Applicant Address	<u>PO Box 350 220 Locust Street</u> <u>Columbia, PA 17512-0350</u>	Facility Address	<u>Dugan's Run</u> <u>York, PA 17406</u>
Applicant Contact	<u>David Lewis</u>	Facility Contact	<u>David Lewis</u>
Applicant Phone	<u>(717) 684-2188</u>	Facility Phone	<u>(717) 684-2188</u>
Client ID	<u>74974</u>	Site ID	<u>450567</u>
SIC Code	<u>4941</u>	Municipality	<u>Hellam Township</u>
SIC Description	<u>Trans. &amp; Utilities - Water Supply</u>	County	<u>York</u>
Date Application Received	<u>December 5, 2023</u>	EPA Waived?	<u>Yes</u>
Date Application Accepted	<u>December 22, 2023</u>	If No, Reason	<u></u>
Purpose of Application	<u>Renewal of existing NPDES Permit</u>		

**Summary of Review**

The Columbia Water Company has applied to the Pennsylvania Department of Environmental Protection (DEP) for reissuance of a NPDES permit for the Dugan WTP. The permit was last reissued on June 27, 2019 with an effective date of July 1, 2019. The permit expired on July 1, 2024, but the terms and conditions of the permit have been administratively extended since that time.

Based on the review outlined in this fact sheet, it is recommended that the permit be drafted, and a notice of the draft permit be published in the *Pennsylvania Bulletin* for public comments for 30 days.

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.

Approve	Deny	Signatures	Date
x		<i>Aaron Baar</i> Aaron Baar / Project Manager	December 26, 2025
x		<i>Daniel W. Martin</i> Daniel W. Martin, P.E. / Environmental Engineer Manager	January 15, 2026

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	<u>001</u>	Design Flow (MGD)	<u>.0045</u>
Latitude	<u>40° 2' 49.00"</u>	Longitude	<u>-76° 35' 16.00"</u>
Quad Name	<u></u>	Quad Code	<u></u>
Wastewater Description: <u>Water Treatment Effluent</u>			
Receiving Waters	<u>Dugan Run</u>	Stream Code	<u>08024</u>
NHD Com ID	<u>57465167</u>	RMI	<u>0.64</u>
Drainage Area	<u>0.53</u>	Yield (cfs/mi <sup>2</sup> )	<u>0.0798</u>
Q <sub>7-10</sub> Flow (cfs)	<u>0.0423</u>	Q <sub>7-10</sub> Basis	<u>USGS StreamStats</u>
Elevation (ft)	<u>427.78</u>	Slope (ft/ft)	<u></u>
Watershed No.	<u>7-I</u>	Chapter 93 Class.	<u></u>
Existing Use	<u></u>	Existing Use Qualifier	<u></u>
Exceptions to Use	<u></u>	Exceptions to Criteria	<u></u>
Assessment Status	<u>Attaining Use(s)</u>		
Cause(s) of Impairment	<u></u>		
Source(s) of Impairment	<u></u>		
TMDL Status	<u>Name</u>		
Nearest Downstream Public Water Supply Intake	<u>Wrightsville Water Supply Co.</u>		
PWS Waters	<u>Susquehanna River</u>	Flow at Intake (cfs)	<u></u>
PWS RMI	<u>28.51</u>	Distance from Outfall (mi)	<u>5.01</u>

**Drainage Area**

The discharge is to Dugan Run at RMI 0.64. A drainage area upstream of the discharge is determined to be 0.53 sq.mi. according to USGS PA StreamStats available at <https://streamstats.usgs.gov/ss/>.

**Stream Flow**

According to StreamStats, the watershed has a Q<sub>7-10</sub> of 0.0423 cfs. This information was used to obtain a Low Flow Yield (LFY) for the discharge point as follows (Guidance No. 391-2000-023).

$$Q_{7-10} = 0.0423 \text{ cfs}$$

$$LFY = 0.0423 \text{ cfs} / 0.53 \text{ mi}^2 = 0.0798 \text{ cfs/mi}^2$$

**Dugan Run**

25 Pa Code §93.9 classifies the receiving water, Dugan Run, with no Existing Use designation. Effluent limits for this discharge have been developed to ensure that existing in-stream water uses and the level of water quality necessary to protect the existing uses are maintained and protected.

**Local Watershed Total Maximum Daily Loads (TMDLs)**

According to PA's 2024 Integrated Water Quality Monitoring and Assessment Report, Dugan Run in the vicinity of the point of discharge is in a stream segment listed as supporting aquatic life and recreation. No TMDL has been developed for Dugan Run to date, so no local watershed TMDL has been taken into consideration during this review.

**Public Water Supply Intake**

The nearest downstream public water supply intake is the Wrightsville Water Supply Co. intake, located on the Susquehanna River approximately 5 miles from the point of discharge. Considering the nature of the discharge and distance, the discharge is not expected to impact the water supply.

*Class A Wild Trout Streams*

The receiving stream is not a Class A Wild Trout stream; therefore, no Class A Wild Trout Fishery is impacted by this discharge.

<b>Treatment Facility Summary</b>				
<b>Treatment Facility Name:</b> Columbia Water Company				
<b>WQM Permit No.</b>		<b>Issuance Date</b>		
0798201 T-1		May 24, 2013		
0798201		July 8, 1998		
<b>Waste Type</b>	<b>Degree of Treatment</b>	<b>Process Type</b>	<b>Disinfection</b>	<b>Avg Annual Flow (MGD)</b>
Industrial			Gas Chlorine	0.0045
<b>Hydraulic Capacity (MGD)</b>	<b>Organic Capacity (lbs/day)</b>	<b>Load Status</b>	<b>Biosolids Treatment</b>	<b>Biosolids Use/Disposal</b>
0.0045		Not Overloaded		

The Columbia Water Company operates and owns the industrial wastewater treatment facility located Hellam Township, York County. The facility currently only treats industrial wastewater generated at the Dugan Water Treatment Plant. The facility has a permitted annual average design flow of 0.0045 MGD.

According to the inspection reports, the plant primarily serves as a backup water source for approximately 50 customers. There is another plant (Lancaster) on the east side of the Susquehanna River to which this facility is connected via a pipe under the river. The tanks on each side of the river are about at the same elevation and their levels drop in synchronization as water is drawn from one. The Hellam facility uses four wells for its water source and must treat the water for iron with potassium permanganate. The Lancaster plant does not treat for iron.

Two Greensand iron filters are used to treat the raw well water – alternating between them each month. Treated water is used to perform the backwash of these filters after approximately 15,000 gallons of flow. Each backwash lasts for about 50 minutes and consists of six cycles. Backwash water is sent to holding tanks and is allowed to settle in the holding tanks for about one day before being discharged to a sand bed for further reduction of its iron content.

According to permit historical records, the supernatant in the holding tanks is only discharged once every three or four months. Composite sampling is performed by taking samples from the top, middle, and bottom of the supernatant water column in the holding tanks. The iron-rich fluid at the bottom of the tanks is pumped and hauled using a residential septage hauler.

Compliance History	
<b>Summary of DMRs:</b>	DMR results for the past year are presented below.
<b>Summary of Inspections:</b>	<p>Since the last renewal of the facility's NPDES permit, the following inspection has been logged in WMS:</p> <p>April 23, 2023: A routine CEI was conducted by Shawn Lesitsky. No violations were noted. Recommendations were made to complete pH readings within 15-minute hold time and using a calibrated field meter at facility.</p>

Other Comments: As of December 26, 2025, no open violations are associated with this facility.

Existing Effluent Limitations and Monitoring Requirements

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) <sup>(1)</sup>		Concentrations (mg/L)				Minimum <sup>(2)</sup> Measurement Frequency	Required Sample Type
	Average Monthly	Average Weekly	Minimum	Average Monthly	Maximum	Instant. Maximum		
Flow (MGD)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Inst Min	XXX	XXX	9.0	1/day	Grab
Total Residual Chlorine (TRC)	XXX	XXX	XXX	0.5	XXX	1.0	1/day	Grab
Total Suspended Solids	XXX	XXX	XXX	30.0	XXX	60.0	1/month	8-Hr Composite
Aluminum, Total	XXX	XXX	XXX	4.0	XXX	8.0	1/month	8-Hr Composite
Iron, Total	XXX	XXX	XXX	2.0	XXX	4.0	1/month	8-Hr Composite
Manganese, Total	XXX	XXX	XXX	1.0	XXX	2.0	1/month	8-Hr Composite

Compliance Sampling Location: Outfall 001

Compliance History

DMR Data for Outfall 001 (from November 1, 2024 to October 31, 2025)

Parameter	OCT-25	SEP-25	AUG-25	JUL-25	JUN-25	MAY-25	APR-25	MAR-25	FEB-25	JAN-25	DEC-24	NOV-24
Flow (MGD) Average Monthly			0.003196			0.004822			0.0043			0.00488
Flow (MGD) Daily Maximum			0.003196			0.004822			0.0043			0.00488
pH (S.U.) Instantaneous Minimum			7.6			7.3			8.0			7.8
pH (S.U.) Instantaneous Maximum			7.6			7.3			8.0			7.8
TRC (mg/L) Average Monthly			0.14			0.08			0.21			0.03
TRC (mg/L) Instantaneous Maximum			0.14			0.08			0.21			0.03
TSS (mg/L) Average Monthly			4.8			4.0			< 4.0			6.0
TSS (mg/L) Instantaneous Maximum			4.8			4.0			< 4.0			6.0
Total Aluminum (mg/L) Average Monthly			0.05			0.05			< 0.05			0.06
Total Aluminum (mg/L) Instantaneous Maximum			0.05			0.05			< 0.05			0.06
Total Iron (mg/L) Average Monthly			1.31			0.36			1.14			0.69
Total Iron (mg/L) Instantaneous Maximum			1.31			0.36			1.14			0.69
Total Manganese (mg/L) Average Monthly			0.233			0.08			0.182			0.122
Total Manganese (mg/L) Instantaneous Maximum			0.233			0.08			0.182			0.122

**Development of Effluent Limitations**

Outfall No. 001 Design Flow (MGD) .0045  
 Latitude 40° 2' 39.00" Longitude -76° 35' 27.00"  
 Wastewater Description: Water Treatment Effluent

**Technology-Based Limitations**

The following technology-based limitations apply, subject to water quality analysis and BPJ where applicable:

Parameter	Limit (mg/l)	SBC	Federal Regulation	State Regulation
Total Suspended Solids	30	Average Monthly		362-2183-001
Total Suspended Solids	60	Daily Maximum		362-2183-001
Aluminum	4.0	Average Monthly		362-2183-001
Aluminum	8.0	Daily Maximum		362-2183-001
Total Manganese	1.0	Average Monthly		362-2183-001
Total Manganese	2.0	Daily Maximum		362-2183-001
Total Iron	2.0	Average Monthly		362-2183-001
Total Iron	4.0	Daily Maximum		362-2183-001
Total Residual Chlorine	0.5	Average Monthly	-	92a.48(b)(2)
Total Residual Chlorine	1.0	Daily Maximum		362-2183-001
pH	6.0 – 9.0 S.U.	Min – Max	133.102(c)	95.2(1)

Comments: The DEP Guidance “Technology-based Control Requirements for Water Treatment Plant Wastes” (362-2183-001) provides these limits that are based on Best Practical Control Technology (BPT). The Dugan WTP is not subject to Federal Effluent Limitation Guidelines (ELGs) as the SIC code is not listed under 40 CFR parts 405 through 471.

**Water Quality-Based Limitations**

*Toxics*

A reasonable potential (RP) analysis was done for Group 1 and Group 2 priority pollutants. The Department’s Toxics Management Spreadsheet (Version 1.4) was used to perform the RP analysis for these parameters at a pH of 7.7 and a discharge hardness of 78 mg/L. The sample sizes for all analyzed parameters were less than 10, so the maximum reported effluent concentration was utilized in the analysis. The analysis indicates that limits for Total Zinc are appropriate as well as monitoring requirements for Dissolved Iron, Total Iron and Total Lead.

Recommended WQBELs & Monitoring Requirements

No. Samples/Month: 4

Pollutants	Mass Limits		Concentration Limits				Governing WQBEL	WQBEL Basis	Comments
	AML (lbs/day)	MDL (lbs/day)	AML	MDL	IMAX	Units			
Dissolved Iron	Report	Report	Report	Report	Report	µg/L	2.123	THH	Discharge Conc > 10% WQBEL (no RP)
Total Iron	Report	Report	Report	Report	Report	µg/L	10.614	CFC	Discharge Conc > 10% WQBEL (no RP)
Total Lead	Report	Report	Report	Report	Report	µg/L	21.6	CFC	Discharge Conc > 10% WQBEL (no RP)
Total Zinc	0.02	0.031	0.53	0.83	1.32	mg/L	0.53	AFC	Discharge Conc ≥ 50% WQBEL (RP)

In conformity with the Department’s SOP for Establishing Water Quality-Based Effluent Limitations (WQBELs) and Permit Conditions for Toxic Pollutants in NPDES Permits for Existing Dischargers (SOP No. BCW-PMT-037), the Department proposes to establish new limits in the draft permit for Total Zinc due to effluent concentrations exceeding 50% of the WQBEL (i.e., RP is demonstrated). In conformity with the Department’s Standard Operating Procedure (SOP)1 for Clean Water Program New and Reissuance Industrial Waste and Industrial

Stormwater Individual NPDES Permit Applications (SOP No. BCW-PMT-001) and the fact that there are no recent discharge violations at the facility, 1/month monitoring of Total Zinc is proposed.

The facility's existing permit already contains average monthly and instantaneous maximum discharge limits for Total Iron. Due to anti-backsliding provisions, the existing limits are proposed to be continued in the draft permit.

In conformity with the Department's SOP for Establishing Water Quality-Based Effluent Limitations (WQBELs) and Permit Conditions for Toxic Pollutants in NPDES Permits for Existing Dischargers (SOP No. BCW-PMT-037), the Department proposes to establish monitoring requirements in the draft permit for Dissolved Iron due to effluent concentrations exceeding 10% of the WQBEL (i.e., RP is demonstrated). In conformity with the Department's Standard Operating Procedure (SOP)1 for Clean Water Program New and Reissuance Industrial Waste and Industrial Stormwater Individual NPDES Permit Applications (SOP No. BCW-PMT-001) and the fact that there are no recent discharge violations at the facility, 1/month monitoring of Dissolved Iron is proposed.

The analysis does not identify Total Manganese or Total Aluminum as having reasonable potential; however, due to anti-backsliding provisions, the existing Total Manganese and Total Aluminum limits are proposed to be continued in the draft permit.

The full TMS report is presented at the end of this report.

### **Best Professional Judgment (BPJ) Limitations**

#### *PFAS-Related Compounds*

Per guidance from DEP's Central Office, sampling for PFAS is not required when treated potable water is used for backwashing.

#### *TDS / Sulfate / Chloride / Bromide / 1,4-Dioxane:*

Total Dissolved Solids (TDS) and its major constituents including sulfate, chloride, and bromide have emerged as pollutants of concern in several major watersheds in the Commonwealth. The conservative nature of these solids allows them to accumulate in surface waters and they may remain a concern even if the immediate downstream public water supply is not directly impacted. Under the authority of § 92a.61, statewide guidance distributed by the Department's Central Office on January 23, 2014 stated the following:

*For point source discharges and upon issuance or reissuance of an individual NPDES permit:*

- *Where the concentration of TDS in the discharge exceeds 1,000 mg/L, or the net TDS load from a discharge exceeds 20,000 lbs/day, and the discharge flow exceeds 0.1 MGD, Part A of the permit should include monitor and report for TDS, sulfate, chloride, and bromide. Discharges of 0.1 MGD or less should monitor and report for TDS, sulfate, chloride, and bromide if the concentration of TDS in the discharge exceeds 5,000 mg/L.*
- *Where the concentration of bromide in a discharge exceeds 1 mg/L and the discharge flow exceeds 0.1 MGD, Part A of the permit should include monitor and report for bromide. Discharges of 0.1 MGD or less should monitor and report for bromide if the concentration of bromide in the discharge exceeds 10 mg/L.*
- *Where the concentration of 1,4-dioxane (CAS 123-91-1) in a discharge exceeds 10 µg/L and the discharge flow exceeds 0.1 MGD, Part A of the permit should include monitor and report for 1,4-dioxane. Discharges of 0.1 MGD or less should monitor and report for 1,4-dioxane if the concentration of 1,4-dioxane in the discharge exceeds 100 µg/L.*

The table below compares the above thresholds for monitoring requirements with the concentrations documented in the current application:

*Department Monitoring Thresholds and Expected Discharge Concentrations for TDS and Related Parameters*

Parameter	Threshold for Discharges ≤0.1 MGD	Max. Concentration in Application
TDS	5,000 mg/L	122 mg/L
Sulfate	NA	8.08 mg/L
Chloride	NA	6.84 mg/L
Bromide	10 mg/L	<0.2 mg/L
1,4-Dioxane	100 µg/L	Not Tested

Based on the sampling results in the application, no additional limits are proposed in the draft permit. 1,4-Dioxane was not evaluated as drinking water associated Treatment Plants are only required to sample Group 1 and Group 2 priority pollutants.

*Total Residual Chlorine*

Since chlorine is used for disinfection, Total Residual Chlorine (TRC) effluent levels must be regulated in accordance with 25 Pa Code §92a.48(b). DEP's TRC\_CALC worksheet is utilized to determine if the existing BAT TBEL is still appropriate. The worksheet indicates that the existing limits of 0.5 mg/L (average monthly) and 1.0 mg/L (IMAX) are still protective of water quality.

The Department's TRC\_CALC worksheet is presented at the end of this report.

**Additional Considerations**

*Flow Monitoring*

The requirement to monitor the volume of effluent will remain in the draft permit per 40 CFR § 122.44(i)(1)(ii). The current permit requires the flow to be monitored 1/week. No change is proposed.

*Monitoring Frequency and Sample Type*

Unless discussed otherwise above, the permit's monitoring frequency and sample type for all parameters will remain unchanged from the last permit renewal.

*Antidegradation Requirements*

All effluent limitations and monitoring requirements have been developed to ensure that existing instream water uses and the level of water quality necessary to protect the existing uses are maintained and protected.

*Anti-backsliding Requirement*

All effluent limits proposed in this fact sheet are as stringent as effluent limits specified in the existing permit renewal unless noted otherwise above. This approach is in accordance with 40 CFR §122.44(l)(1).

*Annual Fees*

An annual fee clause is continued in the permit in accordance with 25 Pa. Code § 92a.62. The facility covered by the permit is classified in the Minor IW Facility without ELG fee category, which has an annual fee of \$1,500.

**Proposed Effluent Limitations and Monitoring Requirements**

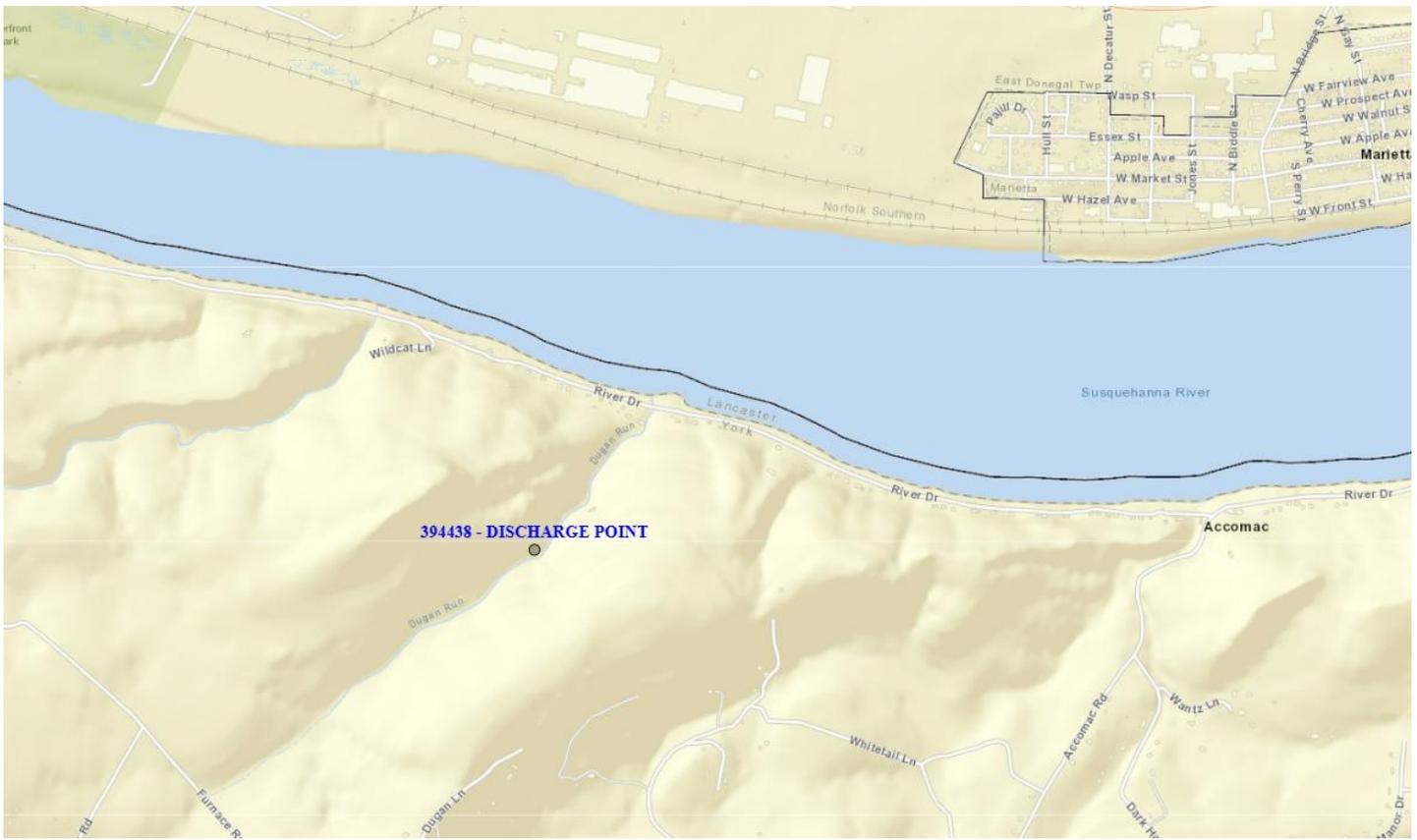
The limitations and monitoring requirements specified below are proposed for the draft permit, and reflect the most stringent limitations amongst technology, water quality and BPJ. Instantaneous Maximum (IMAX) limits are determined using multipliers of 2 (conventional pollutants) or 2.5 (toxic pollutants). Sample frequencies and types are derived from the "NPDES Permit Writer's Manual" (386-0400-001), SOPs and/or BPJ.

**Outfall 001, Effective Period: Permit Effective Date through Permit Expiration Date.**

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) <sup>(1)</sup>		Concentrations (mg/L)				Minimum <sup>(2)</sup> Measurement Frequency	Required Sample Type
	Average Monthly	Average Weekly	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Flow (MGD)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Inst Min	XXX	XXX	9.0	1/day	Grab
Total Residual Chlorine (TRC)	XXX	XXX	XXX	0.5	XXX	1.0	1/day	Grab
TSS	XXX	XXX	XXX	30.0	XXX	60	1/month	8-Hr Composite
Total Aluminum	XXX	XXX	XXX	4.0	XXX	8	1/month	8-Hr Composite
Dissolved Iron (ug/L)	XXX	XXX	XXX	Report	XXX	XXX	1/month	8-Hr Composite
Total Iron	XXX	XXX	XXX	2.0	XXX	4	1/month	8-Hr Composite
Total Lead (ug/L)	XXX	XXX	XXX	Report	XXX	XXX	1/month	8-Hr Composite
Total Manganese	XXX	XXX	XXX	1.0	XXX	2	1/month	8-Hr Composite
Total Zinc	XXX	XXX	XXX	0.53	0.83 Daily Max	1.32	1/month	8-Hr Composite

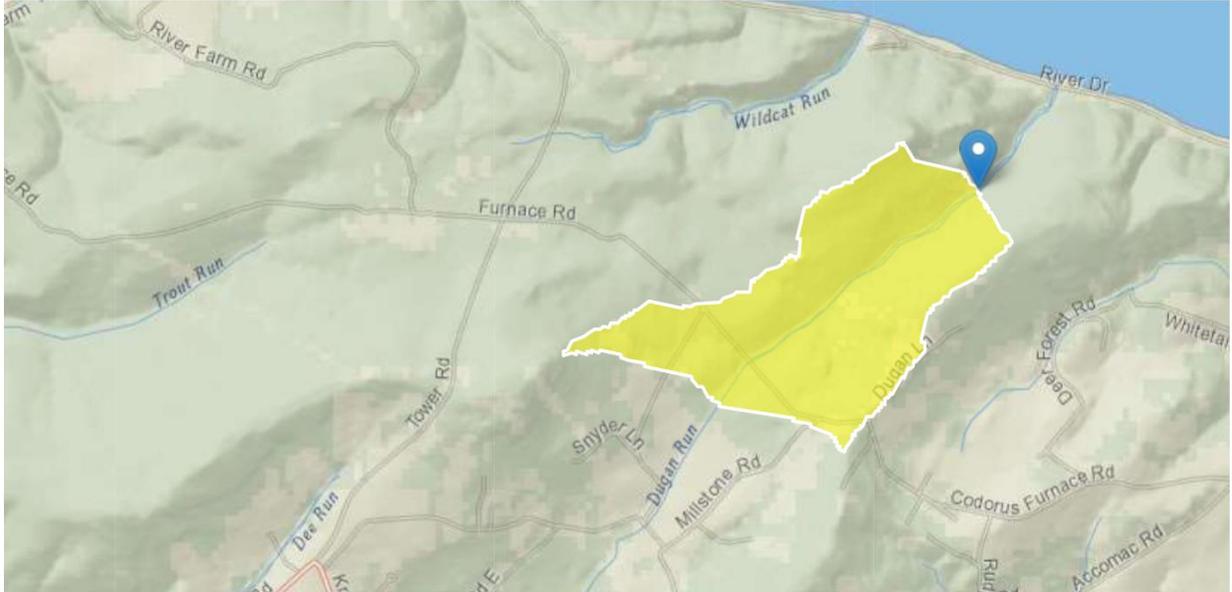
Compliance Sampling Location: Outfall 001

Tools and References Used to Develop Permit	
<input checked="" type="checkbox"/>	WQM for Windows Model (see Attachment [redacted])
<input checked="" type="checkbox"/>	Toxics Management Spreadsheet (see Attachment [redacted])
<input checked="" type="checkbox"/>	TRC Model Spreadsheet (see Attachment [redacted])
<input type="checkbox"/>	Temperature Model Spreadsheet (see Attachment [redacted])
<input type="checkbox"/>	Water Quality Toxics Management Strategy, 361-0100-003, 4/06.
<input checked="" type="checkbox"/>	Technical Guidance for the Development and Specification of Effluent Limitations, 386-0400-001, 10/97.
<input type="checkbox"/>	Policy for Permitting Surface Water Diversions, 386-2000-019, 3/98.
<input type="checkbox"/>	Policy for Conducting Technical Reviews of Minor NPDES Renewal Applications, 386-2000-018, 11/96.
<input checked="" type="checkbox"/>	Technology-Based Control Requirements for Water Treatment Plant Wastes, 386-2183-001, 10/97.
<input type="checkbox"/>	Technical Guidance for Development of NPDES Permit Requirements Steam Electric Industry, 386-2183-002, 12/97.
<input type="checkbox"/>	Pennsylvania CSO Policy, 386-2000-002, 9/08.
<input type="checkbox"/>	Water Quality Antidegradation Implementation Guidance, 391-0300-002, 11/03.
<input type="checkbox"/>	Implementation Guidance Evaluation & Process Thermal Discharge (316(a)) Federal Water Pollution Act, 386-2000-008, 4/97.
<input checked="" type="checkbox"/>	Determining Water Quality-Based Effluent Limits, 386-2000-004, 12/97.
<input type="checkbox"/>	Implementation Guidance Design Conditions, 386-2000-007, 9/97.
<input type="checkbox"/>	Technical Reference Guide (TRG) WQM 7.0 for Windows, Wasteload Allocation Program for Dissolved Oxygen and Ammonia Nitrogen, Version 1.0, 386-2000-016, 6/2004.
<input type="checkbox"/>	Interim Method for the Sampling and Analysis of Osmotic Pressure on Streams, Brines, and Industrial Discharges, 386-2000-012, 10/1997.
<input type="checkbox"/>	Implementation Guidance for Section 95.6 Management of Point Source Phosphorus Discharges to Lakes, Ponds, and Impoundments, 386-2000-009, 3/99.
<input type="checkbox"/>	Technical Reference Guide (TRG) PENTOXSD for Windows, PA Single Discharge Wasteload Allocation Program for Toxics, Version 2.0, 386-2000-015, 5/2004.
<input type="checkbox"/>	Implementation Guidance for Section 93.7 Ammonia Criteria, 386-2000-022, 11/97.
<input type="checkbox"/>	Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers, 386-2000-013, 4/2008.
<input type="checkbox"/>	Implementation Guidance Total Residual Chlorine (TRC) Regulation, 386-2000-011, 11/1994.
<input type="checkbox"/>	Implementation Guidance for Temperature Criteria, 386-2000-001, 4/09.
<input type="checkbox"/>	Implementation Guidance for Section 95.9 Phosphorus Discharges to Free Flowing Streams, 386-2000-021, 10/97.
<input type="checkbox"/>	Implementation Guidance for Application of Section 93.5(e) for Potable Water Supply Protection Total Dissolved Solids, Nitrite-Nitrate, Non-Priority Pollutant Phenolics and Fluorides, 386-2000-020, 10/97.
<input type="checkbox"/>	Field Data Collection and Evaluation Protocol for Determining Stream and Point Source Discharge Design Hardness, 386-2000-005, 3/99.
<input type="checkbox"/>	Implementation Guidance for the Determination and Use of Background/Ambient Water Quality in the Determination of Wasteload Allocations and NPDES Effluent Limitations for Toxic Substances, 386-2000-010, 3/1999.
<input type="checkbox"/>	Design Stream Flows, 386-2000-003, 9/98.
<input type="checkbox"/>	Field Data Collection and Evaluation Protocol for Deriving Daily and Hourly Discharge Coefficients of Variation (CV) and Other Discharge Characteristics, 386-2000-006, 10/98.
<input type="checkbox"/>	Evaluations of Phosphorus Discharges to Lakes, Ponds and Impoundments, 386-3200-001, 6/97.
<input type="checkbox"/>	Pennsylvania's Chesapeake Bay Tributary Strategy Implementation Plan for NPDES Permitting, 4/07.
<input type="checkbox"/>	SOP: [redacted]
<input type="checkbox"/>	Other: [redacted]



## StreamStats Report

Region ID: PA  
 Workspace ID: PA20250114122642342000  
 Clicked Point (Latitude, Longitude): 40.04398, -76.59067  
 Time: 2025-01-14 07:27:04 -0500



[+ Collapse All](#)

### Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLOPD	Mean basin slope measured in degrees	8.1569	degrees
DRNAREA	Area that drains to a point on a stream	0.53	square miles
ROCKDEP	Depth to rock	4	feet
URBAN	Percentage of basin with urban development	0	percent

### Low-Flow Statistics

Low-Flow Statistics Parameters [Low Flow Region 1]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
BSLOPD	Mean Basin Slope degrees	8.1569	degrees	1.7	6.4
DRNAREA	Drainage Area	0.53	square miles	4.78	1150
ROCKDEP	Depth to Rock	4	feet	4.13	5.21

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
URBAN	Percent Urban	0	percent	0	89

Low-Flow Statistics Disclaimers [Low Flow Region 1]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Low-Flow Statistics Flow Report [Low Flow Region 1]

Statistic	Value	Unit
7 Day 2 Year Low Flow	0.1	ft <sup>3</sup> /s
30 Day 2 Year Low Flow	0.13	ft <sup>3</sup> /s
7 Day 10 Year Low Flow	0.0423	ft <sup>3</sup> /s
30 Day 10 Year Low Flow	0.0587	ft <sup>3</sup> /s
90 Day 10 Year Low Flow	0.0825	ft <sup>3</sup> /s

*Low-Flow Statistics Citations*

**Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (<http://pubs.usgs.gov/sir/2006/5130/>)**

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Application Version: 4.25.0

StreamStats Services Version: 1.2.22

NSS Services Version: 2.2.1



## Discharge Information

Instructions **Discharge** Stream

Facility: **Hellam Water Treatment Facility** NPDES Permit No.: **PA0087734** Outfall No.: **001**

Evaluation Type: **Major Sewage / Industrial Waste** Wastewater Description: **Filter Backwash**

Discharge Characteristics								
Design Flow (MGD)*	Hardness (mg/l)*	pH (SU)*	Partial Mix Factors (PMFs)				Complete Mix Times (min)	
			AFC	CFC	THH	CRL	Q <sub>7-10</sub>	Q <sub>h</sub>
0.0045	78	7.7						

Discharge Pollutant	Units	Max Discharge Conc	0 if left blank		0.5 if left blank		0 if left blank			1 if left blank		
			Trib Conc	Stream Conc	Daily CV	Hourly CV	Stream CV	Fate Coeff	FOS	Criteria Mod	Chem Transl	
Group 1	Total Dissolved Solids (PWS)	mg/L	122									
	Chloride (PWS)	mg/L	6.84									
	Bromide	mg/L	< 0.2									
	Sulfate (PWS)	mg/L	8.08									
	Fluoride (PWS)	mg/L										
Group 2	Total Aluminum	µg/L	23									
	Total Antimony	µg/L	< 0.3									
	Total Arsenic	µg/L	< 0.4									
	Total Barium	µg/L	20									
	Total Beryllium	µg/L	< 0.1									
	Total Boron	µg/L	12									
	Total Cadmium	µg/L	< 0.1									
	Total Chromium (III)	µg/L										
	Hexavalent Chromium	µg/L	0.2									
	Total Cobalt	µg/L	< 0.2									
	Total Copper	mg/L	< 0.005									
	Free Cyanide	µg/L										
	Total Cyanide	µg/L	15									
	Dissolved Iron	µg/L	221									
	Total Iron	µg/L	1290									
	Total Lead	µg/L	< 3									
	Total Manganese	µg/L	182									
	Total Mercury	µg/L	< 0.09									
	Total Nickel	µg/L	< 0.6									
	Total Phenols (Phenolics) (PWS)	µg/L	< 5									
	Total Selenium	µg/L	< 0.5									
	Total Silver	µg/L	< 0.2									
	Total Thallium	µg/L	< 0.5									
Total Zinc	mg/L	23										
Total Molybdenum	µg/L	< 0.6										
Acrolein	µg/L	<										
Acrylamide	µg/L	<										
Acrylonitrile	µg/L	<										
Benzene	µg/L	<										
Bromoform	µg/L	<										

Group 3	Carbon Tetrachloride	µg/L	<																		
	Chlorobenzene	µg/L																			
	Chlorodibromomethane	µg/L	<																		
	Chloroethane	µg/L	<																		
	2-Chloroethyl Vinyl Ether	µg/L	<																		
	Chloroform	µg/L	<																		
	Dichlorobromomethane	µg/L	<																		
	1,1-Dichloroethane	µg/L	<																		
	1,2-Dichloroethane	µg/L	<																		
	1,1-Dichloroethylene	µg/L	<																		
	1,2-Dichloropropane	µg/L	<																		
	1,3-Dichloropropylene	µg/L	<																		
	1,4-Dioxane	µg/L	<																		
	Ethylbenzene	µg/L	<																		
	Methyl Bromide	µg/L	<																		
	Methyl Chloride	µg/L	<																		
	Methylene Chloride	µg/L	<																		
	1,1,2,2-Tetrachloroethane	µg/L	<																		
	Tetrachloroethylene	µg/L	<																		
	Toluene	µg/L	<																		
	1,2-trans-Dichloroethylene	µg/L	<																		
1,1,1-Trichloroethane	µg/L	<																			
1,1,2-Trichloroethane	µg/L	<																			
Trichloroethylene	µg/L	<																			
Vinyl Chloride	µg/L	<																			
Group 4	2-Chlorophenol	µg/L	<																		
	2,4-Dichlorophenol	µg/L	<																		
	2,4-Dimethylphenol	µg/L	<																		
	4,6-Dinitro-o-Cresol	µg/L	<																		
	2,4-Dinitrophenol	µg/L	<																		
	2-Nitrophenol	µg/L	<																		
	4-Nitrophenol	µg/L	<																		
	p-Chloro-m-Cresol	µg/L	<																		
	Pentachlorophenol	µg/L	<																		
	Phenol	µg/L	<																		
	2,4,6-Trichlorophenol	µg/L	<																		
Group 5	Acenaphthene	µg/L	<																		
	Acenaphthylene	µg/L	<																		
	Anthracene	µg/L	<																		
	Benzidine	µg/L	<																		
	Benzo(a)Anthracene	µg/L	<																		
	Benzo(a)Pyrene	µg/L	<																		
	3,4-Benzofluoranthene	µg/L	<																		
	Benzo(ghi)Perylene	µg/L	<																		
	Benzo(k)Fluoranthene	µg/L	<																		
	Bis(2-Chloroethoxy)Methane	µg/L	<																		
	Bis(2-Chloroethyl)Ether	µg/L	<																		
	Bis(2-Chloroisopropyl)Ether	µg/L	<																		
	Bis(2-Ethylhexyl)Phthalate	µg/L	<																		
	4-Bromophenyl Phenyl Ether	µg/L	<																		
	Butyl Benzyl Phthalate	µg/L	<																		
	2-Chloronaphthalene	µg/L	<																		
	4-Chlorophenyl Phenyl Ether	µg/L	<																		
	Chrysene	µg/L	<																		
	Dibenzo(a,h)Anthracene	µg/L	<																		
	1,2-Dichlorobenzene	µg/L	<																		
	1,3-Dichlorobenzene	µg/L	<																		
	1,4-Dichlorobenzene	µg/L	<																		
	3,3-Dichlorobenzidine	µg/L	<																		
	Diethyl Phthalate	µg/L	<																		
Dimethyl Phthalate	µg/L	<																			
Di-n-Butyl Phthalate	µg/L	<																			







## Stream / Surface Water Information

Hellam Water Treatment Facility, NPDES Permit No. PA0087734, Outfall 001

Instructions Discharge Stream

Receiving Surface Water Name: Dugan Run No. Reaches to Model: 1

- Statewide Criteria
- Great Lakes Criteria
- ORSANCO Criteria

Location	Stream Code*	RMI*	Elevation (ft)*	DA (mi <sup>2</sup> )*	Slope (ft/ft)	PWS Withdrawal (MGD)	Apply Fish Criteria*
Point of Discharge	008024	0.64	445.67	0.53			Yes
End of Reach 1	008024	0.01	245.33	0.66			Yes

**Q<sub>7-10</sub>**

Location	RMI	LFY (cfs/mi <sup>2</sup> )*	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time (days)	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness*	pH*	Hardness	pH
Point of Discharge	0.64	0.1	0.0423									100	7		
End of Reach 1	0.01	0.1	0.205									100	7		

**Q<sub>h</sub>**

Location	RMI	LFY (cfs/mi <sup>2</sup> )*	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time (days)	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness	pH	Hardness	pH
Point of Discharge	0.64														
End of Reach 1	0.01														



Hellam Water Treatment Facility, NPDES Permit No. PA0087734, Outfall 001

Model Results

**Instructions**

**Results**

RETURN TO INPUTS

SAVE AS PDF

PRINT

All  Inputs  Results  Limits

Hydrodynamics

Wasteload Allocations

AFC

CCT (min): 0.152

PMF: 1

Fate Coef: 1

Analysis Hardness (mg/l): 96.891

Analysis pH: 7.05

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	750	750	5,307	
Total Antimony	0	0		0	1,100	1,100	7,784	
Total Arsenic	0	0		0	340	340	2,406	Chem Translator of 1 applied
Total Barium	0	0		0	21,000	21,000	148,602	
Total Boron	0	0		0	8,100	8,100	57,318	
Total Cadmium	0	0		0	1,953	2.07	14.6	
Hexavalent Chromium	0	0		0	16	16.3	115	Chem Translator of 0.945 applied
Total Cobalt	0	0		0	95	95.0	672	Chem Translator of 0.982 applied
Total Copper	0	0		0	13,045	13.6	96.2	Chem Translator of 0.96 applied
Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	62,397	78.4	555	Chem Translator of 0.796 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	1,400	1.65	11.7	Chem Translator of 0.85 applied
Total Nickel	0	0		0	455,890	457	3,232	Chem Translator of 0.998 applied
Total Phenols (Phenolics) (PWS)	0	0		0	N/A	N/A	N/A	
Total Selenium	0	0		0	N/A	N/A	N/A	Chem Translator of 0.922 applied
Total Silver	0	0		0	3,047	3.58	25.4	Chem Translator of 0.85 applied
Total Thallium	0	0		0	65	65.0	460	
Total Zinc	0	0		0	114,086	117	825	Chem Translator of 0.978 applied

CFC

CCT (min): 0.152

PMF: 1

Analysis Hardness (mg/l): 96.891

Analysis pH: 7.05

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	220	220	1,557	
Total Arsenic	0	0		0	150	150	1,061	Chem Translator of 1 applied
Total Barium	0	0		0	4,100	4,100	29,013	
Total Boron	0	0		0	1,600	1,600	11,322	
Total Cadmium	0	0		0	0.241	0.26	1.87	Chem Translator of 0.91 applied
Hexavalent Chromium	0	0		0	10	10.4	73.6	Chem Translator of 0.962 applied
Total Cobalt	0	0		0	19	19.0	134	
Total Copper	0	0		0	8.717	9.08	64.3	Chem Translator of 0.96 applied
Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	1,500	1,500	10,614	WQC = 30 day average; PMF = 1
Total Lead	0	0		0	2.432	3.06	21.6	Chem Translator of 0.796 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	0.770	0.91	6.41	Chem Translator of 0.85 applied
Total Nickel	0	0		0	50.635	50.8	359	Chem Translator of 0.997 applied
Total Phenols (Phenolics) (PWS)	0	0		0	N/A	N/A	N/A	
Total Selenium	0	0		0	4.600	4.99	35.3	Chem Translator of 0.922 applied
Total Silver	0	0		0	N/A	N/A	N/A	Chem Translator of 1 applied
Total Thallium	0	0		0	13	13.0	92.0	
Total Zinc	0	0		0	115.019	117	825	Chem Translator of 0.986 applied

THH CCT (min): 0.152 PMF: 1 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	500,000	500,000	N/A	
Chloride (PWS)	0	0		0	250,000	250,000	N/A	
Sulfate (PWS)	0	0		0	250,000	250,000	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	5.6	5.6	39.6	
Total Arsenic	0	0		0	10	10.0	70.8	
Total Barium	0	0		0	2,400	2,400	16,983	
Total Boron	0	0		0	3,100	3,100	21,936	
Total Cadmium	0	0		0	N/A	N/A	N/A	
Hexavalent Chromium	0	0		0	N/A	N/A	N/A	
Total Cobalt	0	0		0	N/A	N/A	N/A	
Total Copper	0	0		0	N/A	N/A	N/A	
Dissolved Iron	0	0		0	300	300	2,123	
Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	N/A	N/A	N/A	
Total Manganese	0	0		0	1,000	1,000	7,076	

Total Mercury	0	0	0	0.050	0.05	0.35
Total Nickel	0	0	0	610	610	4,317
Total Phenolics (Phenolics) (PWS)	0	0	0	5	5.0	N/A
Total Selenium	0	0	0	N/A	N/A	N/A
Total Silver	0	0	0	N/A	N/A	N/A
Total Thallium	0	0	0	0.24	0.24	1.7
Total Zinc	0	0	0	N/A	N/A	N/A

**CRL** CCT (min):  PMF:  Analysis Hardness (mg/l):  Analysis pH:

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0	0	0	N/A	N/A	N/A	
Chloride (PWS)	0	0	0	0	N/A	N/A	N/A	
Sulfate (PWS)	0	0	0	0	N/A	N/A	N/A	
Total Aluminum	0	0	0	0	N/A	N/A	N/A	
Total Antimony	0	0	0	0	N/A	N/A	N/A	
Total Arsenic	0	0	0	0	N/A	N/A	N/A	
Total Barium	0	0	0	0	N/A	N/A	N/A	
Total Boron	0	0	0	0	N/A	N/A	N/A	
Total Cadmium	0	0	0	0	N/A	N/A	N/A	
Hexavalent Chromium	0	0	0	0	N/A	N/A	N/A	
Total Cobalt	0	0	0	0	N/A	N/A	N/A	
Total Copper	0	0	0	0	N/A	N/A	N/A	
Dissolved Iron	0	0	0	0	N/A	N/A	N/A	
Total Iron	0	0	0	0	N/A	N/A	N/A	
Total Lead	0	0	0	0	N/A	N/A	N/A	
Total Manganese	0	0	0	0	N/A	N/A	N/A	
Total Mercury	0	0	0	0	N/A	N/A	N/A	
Total Nickel	0	0	0	0	N/A	N/A	N/A	
Total Phenolics (Phenolics) (PWS)	0	0	0	0	N/A	N/A	N/A	
Total Selenium	0	0	0	0	N/A	N/A	N/A	
Total Silver	0	0	0	0	N/A	N/A	N/A	
Total Thallium	0	0	0	0	N/A	N/A	N/A	
Total Zinc	0	0	0	0	N/A	N/A	N/A	

**Recommended WQBELs & Monitoring Requirements**

No. Samples/Month:

Pollutants	Mass Limits			Concentration Limits			Governing WQBEL	WQBEL Basis	Comments
	AML (lbs/day)	MDL (lbs/day)	Report	AML	MDL	IMAX			
Dissolved Iron	Report	Report	Report	Report	Report	Report	2.123	THH	Discharge Conc > 10% WQBEL (no RP)
Total Iron	Report	Report	Report	Report	Report	Report	10.614	CFC	Discharge Conc > 10% WQBEL (no RP)
Total Lead	Report	Report	Report	Report	Report	Report	21.6	CFC	Discharge Conc > 10% WQBEL (no RP)

Total Zinc	0.02	0.031	0.53	0.83	1.32	mg/L	0.53	AFC	Discharge Conc ≥ 50% WQBEL (RP)

**Other Pollutants without Limits or Monitoring**

The following pollutants do not require effluent limits or monitoring based on water quality because reasonable potential to exceed water quality criteria was not determined and the discharge concentration was less than thresholds for monitoring, or the pollutant was not detected and a sufficiently sensitive analytical method was used (e.g., ≤ Target QL).

Pollutants	Governing WQBEL	Units	Comments
Total Dissolved Solids (PWS)	N/A	N/A	PWS Not Applicable
Chloride (PWS)	N/A	N/A	PWS Not Applicable
Bromide	N/A	N/A	No WQS
Sulfate (PWS)	N/A	N/A	PWS Not Applicable
Total Aluminum	3,402	µg/L	Discharge Conc ≤ 10% WQBEL
Total Antimony	N/A	N/A	Discharge Conc < TQL
Total Arsenic	N/A	N/A	Discharge Conc < TQL
Total Barium	16,983	µg/L	Discharge Conc ≤ 10% WQBEL
Total Beryllium	N/A	N/A	No WQS
Total Boron	11,322	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cadmium	1.87	µg/L	Discharge Conc < TQL
Hexavalent Chromium	73.6	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cobalt	134	µg/L	Discharge Conc < TQL
Total Copper	0.062	mg/L	Discharge Conc ≤ 10% WQBEL
Total Cyanide	N/A	N/A	No WQS
Total Manganese	7,076	µg/L	Discharge Conc ≤ 10% WQBEL
Total Mercury	0.35	µg/L	Discharge Conc < TQL
Total Nickel	359	µg/L	Discharge Conc < TQL
Total Phenols (Phenolics) (PWS)		µg/L	Discharge Conc < TQL
Total Selenium	35.3	µg/L	Discharge Conc < TQL
Total Silver	16.3	µg/L	Discharge Conc < TQL
Total Thallium	1.7	µg/L	Discharge Conc < TQL
Total Molybdenum	N/A	N/A	No WQS

TRC\_CALC

1A	B	C	D	E	F	G
2	<b>TRC EVALUATION</b>					
3	Input appropriate values in B4:B8 and E4:E7					
4	0.0423	= Q stream (cfs)		0.5	= CV Daily	
5	0.0045	= Q discharge (MGD)		0.5	= CV Hourly	
6	30	= no. samples		1	= AFC_Partial Mix Factor	
7	0.3	= Chlorine Demand of Stream		1	= CFC_Partial Mix Factor	
8	0	= Chlorine Demand of Discharge		15	= AFC_Criteria Compliance Time (min)	
9	0.5	= BAT/BPJ Value		720	= CFC_Criteria Compliance Time (min)	
	0	= % Factor of Safety (FOS)			=Decay Coefficient (K)	
10	Source	Reference	AFC Calculations		Reference	CFC Calculations
11	TRC	1.3.2.iii	WLA_afc = 1.957		1.3.2.iii	WLA_cfc = 1.901
12	PENTOXSD TRG	5.1a	LTAMULT_afc = 0.373		5.1c	LTAMULT_cfc = 0.581
13	PENTOXSD TRG	5.1b	LTA_afc = 0.729		5.1d	LTA_cfc = 1.105
14						
15	Source	Effluent Limit Calculations				
16	PENTOXSD TRG	5.1f	AML_MULT = 1.231			
17	PENTOXSD TRG	5.1g	AVG_MON_LIMIT (mg/l) = 0.500		BAT/BPJ	
18			INST_MAX_LIMIT (mg/l) = 1.635			
	WLA_afc	$(.019/e^{-k \cdot AFC\_tc}) + [(AFC\_Yc \cdot Qs \cdot .019 / Qd \cdot e^{-k \cdot AFC\_tc}) \dots + Xd + (AFC\_Yc \cdot Qs \cdot Xs / Qd)] \cdot (1 - FOS / 100)$				
	LTAMULT_afc	$EXP((0.5 \cdot LN(cvh^2 + 1)) - 2.326 \cdot LN(cvh^2 + 1)^{0.5})$				
	LTA_afc	wla_afc * LTAMULT_afc				
	WLA_cfc	$(.011/e^{-k \cdot CFC\_tc}) + [(CFC\_Yc \cdot Qs \cdot .011 / Qd \cdot e^{-k \cdot CFC\_tc}) \dots + Xd + (CFC\_Yc \cdot Qs \cdot Xs / Qd)] \cdot (1 - FOS / 100)$				
	LTAMULT_cfc	$EXP((0.5 \cdot LN(cvd^2 / no\_samples + 1)) - 2.326 \cdot LN(cvd^2 / no\_samples + 1)^{0.5})$				
	LTA_cfc	wla_cfc * LTAMULT_cfc				
	AML_MULT	$EXP(2.326 \cdot LN((cvd^2 / no\_samples + 1)^{0.5}) - 0.5 \cdot LN(cvd^2 / no\_samples + 1))$				
	AVG_MON_LIMIT	MIN(BAT_BPJ, MIN(LTA_afc, LTA_cfc) * AML_MULT)				
	INST_MAX_LIMIT	1.5 * (av_mon_limit / AML_MULT) / LTAMULT_afc				