Pennsylvania Department of Environmental Protection

Southwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0221970**
Facility Type	**Industrial**	APS ID	**1062498**
Major / Minor	**Minor**	Authorization ID	**1394860**

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

Applicant and Facility Information

Applicant Name	**Greenville Municipal Water Authority**	Facility Name	**Greenville Borough Water Treatment Plant**
Applicant Address	44 Clinton Street	Facility Address	44 Clinton Street
	Greenville, PA 16125-2281		Greenville, PA 16125
Applicant Contact	Carol Paul	Facility Contact	Same as Applicant
Applicant Phone	(724) 588-4340	Facility Phone	Same as Applicant
Applicant email	carol.paul@gmwa.info	Facility email	Same as Applicant
Client ID	25179	Site ID	262460
SIC Code	4941	Municipality	Hempfield Township
SIC Description	Trans. & Utilities - Water Supply	County	Mercer
Date Application Received	May 3, 2022	EPA Waived?	Yes
Date Application Accepted		If No, Reason	

Purpose of Application: Renewal NPDES Permit Coverage

Summary of Review

On May 3, 2022, Greenville Municipal Water Authority submitted an application to renew the NPDES Permit PA0221970 for their water treatment plant located in Hempfield Township, Mercer County. The Facility has a SIC Code of 4941 (Water Supply) and a NAICS code of 221310 (Water supply and irrigation systems).

The Greenville Municipal Water Authority (GMWA) provides drinking water for about 2,600 customers located in Hempfield Township, West Salem Township, and the Borough of Greenville in northwest Mercer County, Pennsylvania. The GMWA public water system is supplied by a 2.0-MGD rapid filtration plant, which withdraws raw water from the Shenango River and utilizes Super-Pulsator clarifiers and Greenleaf dual-media filters for treatment.

Following disinfection, finished water pumps transmit water from the WTP into the western side of the distribution system, where it is either stored in one of the three (3) West Tanks, consumed, or pumped into the eastern side of the distribution system. The West Tank gallery consists of two (2) 750,000 gallon tanks, and one (1) 250,000-gallon tank. Once in the eastern side of the system, the water is then either stored in one of the two (2) East Tanks or consumed. The East Tank gallery consists of one (1) 250,000-gallon tank and one (1) 1,000,000-gallon tank. Blowdown from the Super-Pulsator clarifiers, backwash water from the Greenleaf dual-media filters, and filtrate from the belt filter press filtrate are directed to a backwash holding tank and thickener system for gravity solids separation. Sludge from the thickener is further processed through the belt filter press; dewatered solids from the press are landfilled off-site. Supernatant from the holding tank and thickener are directed to Outfall 001 on the Shenango River.

The facility's most recent inspection was conducted by Melissa Carver on September 22, 2021, and no violations were noted.

The facility has no open violations.

Approve	Deny	Signatures	Date
X		Angela Rohrer / Environmental Engineering Specialist	July 23, 2025
X		Michael E. Fifth, P.E. / Environmental Engineer Manager	July 25, 2025

Summary of Review
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)	0.18
Latitude	41º 24' 08"	Longitude	-80º 23' 28"
Quad Name	Greenville West	Quad Code	0702
Wastewater Description:	Treated filter backwash		

Receiving Waters	Shenango River (WWF)	Stream Code	35482
NHD Com ID	130027752	RMI	56.98
Drainage Area	295 mi^2	Yield (cfs/mi^2)	0.03
Q_{7-10} Flow (cfs)	8.86	Q_{7-10} Basis	StreamStats
Elevation (ft)	943	Slope (ft/ft)	0.002
Watershed No.	20-A	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	

Nearest Downstream Public Water Supply Intake	Reynolds Water Company (1.6 MGD)		
PWS Waters	Shenango River	Flow at Intake (cfs)	-
PWS RMI	53.71	Distance from Outfall (mi)	3.3

Other Comments: Although the facility reported an average flow of 0.10 MGD during production, a review of the Discharge Monitoring Reports (DMRs) revealed that the average flow over the last two years was actually 0.18 MGD. This higher value was used in the calculations.

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** 0.18
Latitude 41º 24' 08" **Longitude** -80º 23' 28"
Wastewater Description: Settled filter backwash water

Technology-Based Effluent limitations:

Regulatory Effluent Standards and Monitoring Requirements

Flow monitoring is required pursuant to 25 Pa. Code § 92a.61(d)(1) which is displayed in Table 1 below.

Effluent standards for pH are also imposed on industrial wastes by 25 Pa. Code §§ 95.2(1) which is displayed in Table 1 below.

Pennsylvania regulations at 25 Pa. Code § 92a.48(b) require the imposition of technology-based TRC limits for facilities that use chlorination and that are not already subject to TRC limits based on applicable federal ELGs or a facility-specific BPJ evaluation which is displayed in Table 1 below.

Table 1: Regulatory Effluent Standards

Parameter	Monthly Avg	Daily Max	IMAX
Flow	Monitor	Monitor	----
pH	6-9 at all times		----
TRC	0.5 mg/l	----	1.6 mg/l

Best Practicable Control Technology Currently Achievable (BPT)

BPT for wastewater from treatment of WTP sludges and filter backwash is found in DEPs Technology-Based Control Requirements for Water Treatment Plant Wastes Document which falls under Best Professional Judgement under 40 CFR § 125.3 and the limits imposed are displayed in Table 2 below.

Table 2: BPT Limits for WTP sludge and filter backwash wastewater

Parameter	Monthly Avg (mg/l)	Daily Max (mg/l)
Suspended solids	30.0	60.0
Iron (total)	2.0	4.0
Aluminum (total)	4.0	8.0
Manganese (total)	1.0	2.0
Flow	Monitor	----
pH	6-9 at all times	
Total Residual Chlorine	0.5	1.0

Water Quality-Based Effluent limitations:

Toxics Management Spread Sheet

The Department of Environmental Protection (DEP) has developed the DEP Toxics Management Spreadsheet ("TMS") to facilitate calculations necessary for completing a reasonable potential (RP) analysis and determining water quality-based effluent limitations for discharges of toxic pollutants. The Toxics Management Spreadsheet is a macro-enabled Excel binary file that combines the functions of the PENTOXSD model and the Toxics Screening Analysis spreadsheet to evaluate the reasonable potential for discharges to cause excursions above water quality standards and to determine WQBELs. The Toxics Management Spread Sheet is a single discharge, mass-balance water quality calculation spread sheet that includes consideration for mixing, first-order decay and other factors to determine recommended WQBELs for toxic substances and several non-toxic substances. Required input data including stream code, river mile index, elevation, drainage area, discharge name, NPDES permit number, discharge flow rate and the discharge concentrations for parameters in the permit application or in DMRs, which are entered into the spread sheet to establish site-specific discharge conditions. Other data

such as low flow yield, reach dimensions and partial mix factors may also be entered to further characterize the conditions of the discharge and receiving water. Discharge concentrations for the parameters are chosen to represent the "worst case" quality of the discharge (i.e., maximum reported discharge concentrations). The spread sheet then evaluates each parameter by computing a Waste Load Allocation for each applicable criterion, determining a recommended maximum WQBEL and comparing that recommended WQBEL with the input discharge concentration to determine which is more stringent. Based on this evaluation, the Toxics Management Spread sheet recommends average monthly and maximum daily WQBELs.

Reasonable Potential Analysis and WQBEL Development for Outfall 001

Discharges from Outfall 001 are evaluated based on concentrations reported on the application and on DMRs; data from those sources are entered into the Toxics Management Spread Sheet. The maximum reported value of the parameters from the application form or from previous DMRs is used as the input concentration in the Toxics Management Spread Sheet. All toxic pollutants whose maximum concentrations, as reported in the permit application or on DMRs, are greater than the most stringent applicable water quality criterion are considered to be pollutants of concern. [This includes pollutants reported as "Not Detectable" or as "<MDL" where the method detection limit for the analytical method used by the applicant is greater than the most stringent water quality criterion]. The Toxics Management Spread Sheet is run with the discharge and receiving stream characteristics shown in Table 3. For IW discharges, the design flow used in modeling is the average flow during production or operation taken from the permit application. Pollutants for which water quality standards have not been promulgated (e.g., TSS, oil and grease) are excluded from the analysis. All the parameters are evaluated using the model to determine the water quality-based effluent limits applicable to the discharge and the receiving stream. The spreadsheet then compares the reported discharge concentrations to the calculated water quality-based effluent limitations to determine if a reasonable potential exists to exceed the calculated WQBELs. Effluent limitations are established in the draft permit where a pollutant's maximum reported discharge concentration equals or exceeds 50% of the WQBEL. For non-conservative pollutants, monitoring requirements are established where the maximum reported concentration is between 25% - 50% of the WQBEL. For conservative pollutants, monitoring requirements are established where the maximum reported concentration is between 10% - 50% of the WQBEL. The information described above including the maximum reported discharge concentrations, the most stringent water quality criteria, the pollutant-of-concern (reasonable potential) determinations, the calculated WQBELs, and the WQBEL/monitoring recommendations are displayed in the Toxics Management Spread Sheet in Attachment C of this Fact Sheet. The Toxics Management Spread Sheet did not recommend any WQBELS Outfall 001.

Table 3: TMS Inputs for Outfall 001

Parameter	**Value**
River Mile Index	56.98
Discharge Flow (MGD)	0.18
Basin/Stream Characteristics	
Parameter	**Value**
Area in Square Miles	295
$Q_{7\text{-}10}$ (cfs)	8.86
Low-flow yield (cfs/mi^2)	0.03
Elevation (ft)	943
Slope	0.002

Threatened and Endangered Mussel Species Concerns and Considerations

This section of the Shenango River was designated by the United States Fish and Wildlife Services (USFWS) as "Critical Habitat" for the Rabbitsfoot Mussel, a federally listed threatened species, and is known to also contain other threatened and endangered mussel species. Since this discharge is directly to the Shenango River, potential impacts were evaluated.

The USFWS has indicated in comment letters on other NPDES permits that in order to protect threatened and endangered mussel species, wastewater discharges containing ammonia-nitrogen (NH_3-N), chloride (Cl^-), nickel, zinc, and copper where mussels or their habitat exist, can be no more than 1.9 mg/l, 78 mg/l, 7.3 µg/l, 13.18 µg/l, and 10 µg/l respectively.

A summary of effluent sampling results for Ammonia-Nitrogen, Nickel, Chloride, Zinc and Copper is shown in Table 4 below.

Table 4: Effluent sampling results

Parameter	Maximum Value	No. Samples
Ammonia-Nitrogen (mg/l)	<0.0475	3
Nickel, Total (µg/l)	<2.5	3
Chloride (mg/l)	33.8	3
Zinc, Total (µg/l)	11.8	3
Copper, Total (µg/l)	5.5	3

Based on the sampling data, the existing discharge from Greenville Borough Water Treatment Plant is not expected to adversely affect threatened or endangered mussel species in the Shenango River. The Department's impact area calculations (Attachment D) determined the stream area required to assimilate maximum reported effluent concentrations of Ammonia-Nitrogen, Chloride, Zinc, Nickel, and Copper to meet USFWS criteria.

These calculations show that the discharge will dilute rapidly in the stream, within 2 square meters of the discharge pipe. Given this, the Department has concluded that the discharge will protect threatened and endangered mussels in the Shenango River. Furthermore, the reported concentrations are below USFWS criteria at the end of the pipe, indicating no impact on threatened and endangered mussels. Based on this assessment, the Department has determined that no additional monitoring requirements are necessary for the discharge.

Total Residual Chlorine

To determine if WQBELs are required for discharges containing total residual chlorine (TRC), a discharge evaluation is performed using a DEP program called TRC_CALC created with Microsoft Excel for Windows. TRC_CALC calculates TRC Waste Load Allocations (WLAs) through the application of a mass balance model which considers TRC losses due to stream and discharge chlorine demands and first-order chlorine decay. Input values for the program include flow rates and chlorine demands for the receiving stream and the discharge, the number of samples taken per month, coefficients of TRC variability, partial mix factors, and an optional factor of safety. The mass balance model calculates WLAs for acute and chronic criteria that are then converted to long term averages using calculated multipliers. The multipliers are functions of the number of samples taken per month and the TRC variability coefficients (normally kept at default values unless site specific information is available). The most stringent limitation between the acute and chronic long-term averages is converted to an average monthly limit for comparison to the BAT average monthly limit of 0.5 mg/l from 25 Pa. Code § 92a.48(b)(2). The more stringent of these average monthly TRC limitations is imposed in the permit. The results of the modeling, included in Attachment E, indicate that no WQBELs are required for TRC.

Anti-Backsliding

Previous limits can be used pursuant to EPA's anti-backsliding regulation, 40 CFR 122.44(l). The previous limitations for Outfall 001 are displayed below in Table 5.

Table 5: Current Effluent Limitation at Outfall 001

Parameters	Mass (lb/day)		Concentration (mg/L)				Monitoring Requirements	
	Average Monthly	Daily Maximum	Instant Minimum	Average Monthly	Daily Maximum	Instant. Maximum	Frequency	Sample Type
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	1/day	Measured
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0	1/day	Grab
Total Residual Chlorine	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
Total Suspended Solids	XXX	XXX	XXX	30.0	60.0	XXX	2/Month	8-Hr Composite
Total Aluminum	XXX	XXX	XXX	4.0	8.0	10.0	2/Month	8-Hr Composite
Total Iron	XXX	XXX	XXX	2.0	4.0	5.0	2/Month	8-Hr Composite
Total Manganese	XXX	XXX	XXX	1.0	2.0	2.5	2/Month	8-Hr Composite

Proposed Effluent Limitations and Monitoring Requirements

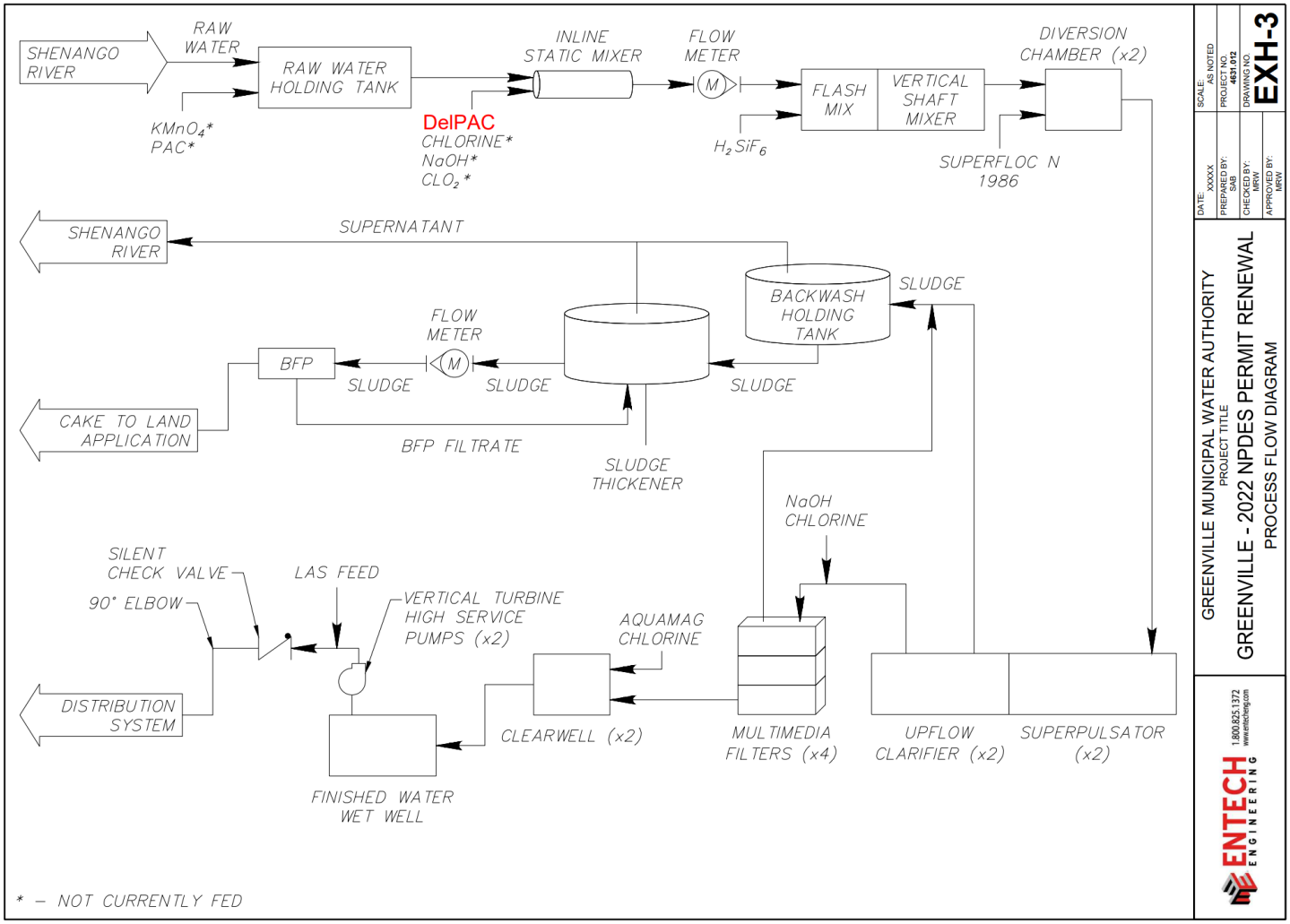
The proposed effluent limitations and monitoring requirements for Outfall 001 are outlined in Table 5, reflecting the most stringent values from the analysis. A notable update includes the establishment of a Daily Maximum limit for Total Residual Chlorine (TRC) of 1.0 mg/L, as required by the Requirements for Water Treatment Plant Wastes. Given that current TRC concentrations already comply with the proposed limits, the TRC effluent limitation will become effective on the permit's effective date.

Table 5: Proposed Effluent Limitation at Outfall 001

Parameters	Mass (lb/day)		Concentration (mg/L)				Monitoring Requirements	
	Average Monthly	Daily Maximum	Instant. Minimum	Average Monthly	Daily Maximum	Instant. Maximum	Frequency	Sample Type
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	1/day	Measured
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0	1/day	Grab
Total Residual Chlorine	XXX	XXX	XXX	0.5	1.0	1.6	1/day	Grab
Total Suspended Solids	XXX	XXX	XXX	30.0	60.0	75.0	2/Month	8-Hr Composite
Total Aluminum	XXX	XXX	XXX	0.75	0.75	10.0	2/Month	8-Hr Composite
Total Iron	XXX	XXX	XXX	1.5	3.0	5.0	2/Month	8-Hr Composite
Total Manganese	XXX	XXX	XXX	1.0	2.0	2.5	2/Month	8-Hr Composite

Tools and References Used to Develop Permit	
☐	WQM for Windows Model (see Attachment)
☒	Toxics Management Spreadsheet (see Attachment C)
☒	TRC Model Spreadsheet (see Attachment E)
☐	Temperature Model Spreadsheet (see Attachment)
☐	Water Quality Toxics Management Strategy, 361-0100-003, 4/06.
☐	Technical Guidance for the Development and Specification of Effluent Limitations, 386-0400-001, 10/97.
☐	Policy for Permitting Surface Water Diversions, 386-2000-019, 3/98.
☐	Policy for Conducting Technical Reviews of Minor NPDES Renewal Applications, 386-2000-018, 11/96.
☐	Technology-Based Control Requirements for Water Treatment Plant Wastes, 386-2183-001, 10/97.
☐	Technical Guidance for Development of NPDES Permit Requirements Steam Electric Industry, 386-2183-002, 12/97.
☐	Pennsylvania CSO Policy, 386-2000-002, 9/08.
☐	Water Quality Antidegradation Implementation Guidance, 391-0300-002, 11/03.
☐	Implementation Guidance Evaluation & Process Thermal Discharge (316(a)) Federal Water Pollution Act, 386-2000-008, 4/97.
☐	Determining Water Quality-Based Effluent Limits, 386-2000-004, 12/97.
☐	Implementation Guidance Design Conditions, 386-2000-007, 9/97.
☐	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.
☐	Interim Method for the Sampling and Analysis of Osmotic Pressure on Streams, Brines, and Industrial Discharges, 386-2000-012, 10/1997.
☐	Implementation Guidance for Section 95.6 Management of Point Source Phosphorus Discharges to Lakes, Ponds, and Impoundments, 386-2000-009, 3/99.
☐	Technical Reference Guide (TRG) PENTOXSD for Windows, PA Single Discharge Wasteload Allocation Program for Toxics, Version 2.0, 386-2000-015, 5/2004.
☐	Implementation Guidance for Section 93.7 Ammonia Criteria, 386-2000-022, 11/97.
☐	Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers, 386-2000-013, 4/2008.
☐	Implementation Guidance Total Residual Chlorine (TRC) Regulation, 386-2000-011, 11/1994.
☐	Implementation Guidance for Temperature Criteria, 386-2000-001, 4/09.
☐	Implementation Guidance for Section 95.9 Phosphorus Discharges to Free Flowing Streams, 386-2000-021, 10/97.
☐	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.
☐	Field Data Collection and Evaluation Protocol for Determining Stream and Point Source Discharge Design Hardness, 386-2000-005, 3/99.
☐	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.
☐	Design Stream Flows, 386-2000-003, 9/98.
☐	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.
☐	Evaluations of Phosphorus Discharges to Lakes, Ponds and Impoundments, 386-3200-001, 6/97.
☐	Pennsylvania's Chesapeake Bay Tributary Strategy Implementation Plan for NPDES Permitting, 4/07.
☐	SOP:
☐	Other:

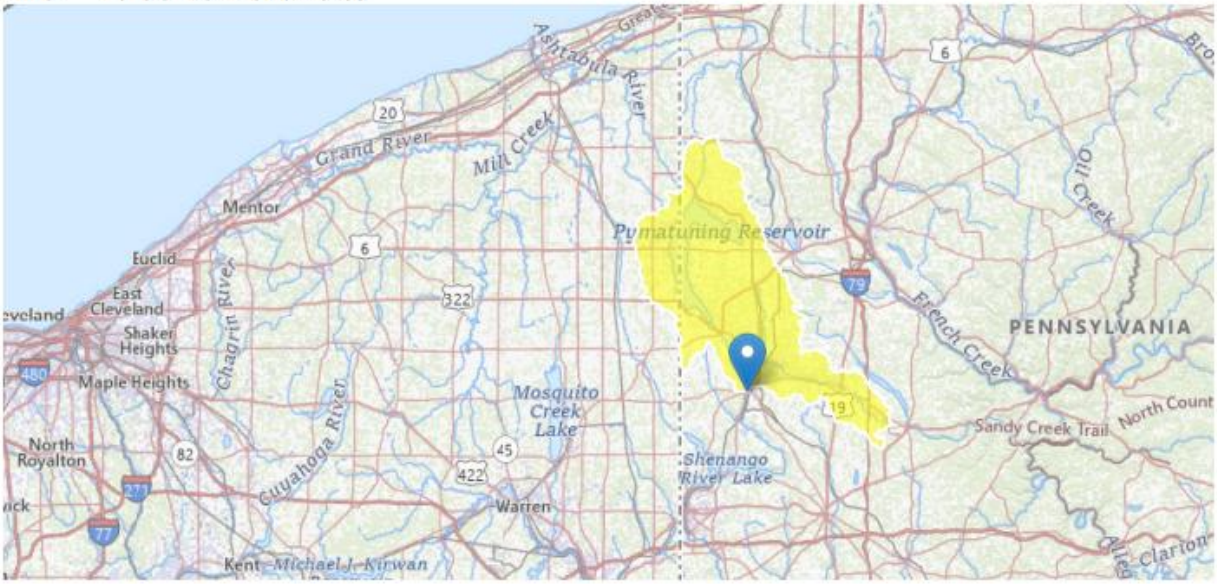
ATTACHMENT A. PROCESS FLOW DIAGRAM



Attachment B.
StreamStats Report

PA0221970 - StreamStats Report

Region ID: PA
Workspace ID: PA20250723185338870000
Clicked Point (Latitude, Longitude): 41.40221, -80.39128
Time: 2025-07-23 14:54:02 -0400



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CARBON	Percentage of area of carbonate rock	0	percent
DRNAREA	Area that drains to a point on a stream	295	square miles
ELEV	Mean Basin Elevation	1136	feet
FOREST	Percentage of area covered by forest	40.3296	percent
PRECIP	Mean Annual Precipitation	41	inches
URBAN	Percentage of basin with urban development	4.5644	percent

Low-Flow Statistics

Low-Flow Statistics Parameters [Low Flow Region 4]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	295	square miles	2.26	1400

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
ELEV	Mean Basin Elevation	1136	feet	1050	2580

Low-Flow Statistics Flow Report [Low Flow Region 4]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	SE	ASEp
7 Day 2 Year Low Flow	17.5	ft^3/s	43	43
30 Day 2 Year Low Flow	25.8	ft^3/s	38	38
7 Day 10 Year Low Flow	8.86	ft^3/s	66	66
30 Day 10 Year Low Flow	12.3	ft^3/s	54	54
90 Day 10 Year Low Flow	18.8	ft^3/s	41	41

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/)

Base Flow Statistics

Base Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CARBON	Percent Carbonate	0	percent	0	99
DRNAREA	Drainage Area	295	square miles	2.26	1720
FOREST	Percent Forest	40.3296	percent	5.1	100
PRECIP	Mean Annual Precipitation	41	inches	33.1	50.4
URBAN	Percent Urban	4.5644	percent	0	89

Base Flow Statistics Flow Report [Statewide Mean and Base Flow]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	SE	ASEp
Base Flow 10 Year Recurrence Interval	124	ft^3/s	21	21
Base Flow 25 Year Recurrence Interval	108	ft^3/s	21	21
Base Flow 50 Year Recurrence Interval	98.4	ft^3/s	23	23

Base 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/)

Application Version: 4.29.2
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

Attachment C
Toxic Management Spreadsheet for Outfall 001

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.4, May 2023

Discharge Information

Instructions | Discharge | Stream

Facility: **Greenville Borough Water Treatment Plant** NPDES Permit No.: **PA0221970** Outfall No.: **001**

Evaluation Type **Major Sewage / Industrial Waste** Wastewater Description: **Settled filter backwash water**

Discharge Characteristics								
Design Flow (MGD)*	Hardness (mg/l)*	pH (SU)*	Partial Mix Factors (PMFs)				Complete Mix Times (min)	
			AFC	CFC	THH	CRL	Q_{7-10}	Q_h
0.185	74.2	7.38						

					0 if left blank		0.5 if left blank		0 if left blank			1 if left blank	
	Discharge Pollutant	Units	Max Discharge Conc		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		180									
	Chloride (PWS)	mg/L		33.8									
	Bromide	mg/L	<	0.072									
	Sulfate (PWS)	mg/L		16.1									
	Fluoride (PWS)	mg/L		1.29									
Group 2	Total Aluminum	µg/L		359									
	Total Antimony	µg/L	<	1									
	Total Arsenic	µg/L	<	1.5									
	Total Barium	µg/L		18.1									
	Total Beryllium	µg/L	<	0.676									
	Total Boron	µg/L	<	100									
	Total Cadmium	µg/L		0.035									
	Total Chromium (III)	µg/L	<	1.99									
	Hexavalent Chromium	µg/L	<	0.25									
	Total Cobalt	µg/L		0.325									
	Total Copper	µg/L		5.5									
	Free Cyanide	µg/L											
	Total Cyanide	µg/L	<	10									
	Dissolved Iron	µg/L	<	20									
	Total Iron	µg/L		47									
	Total Lead	µg/L	<	0.5									
	Total Manganese	µg/L		626									
	Total Mercury	µg/L	<	0.2									
	Total Nickel	µg/L	<	2.5									
	Total Phenols (Phenolics) (PWS)	µg/L	<	5									
	Total Selenium	µg/L	<	2.5									
	Total Silver	µg/L	<	1.37									
	Total Thallium	µg/L	<	0.5									
	Total Zinc	µg/L		11.8									
	Total Molybdenum	µg/L		0.279									
	Acrolein	µg/L	<										
	Acrylamide	µg/L	<										
	Acrylonitrile	µg/L	<										
	Benzene	µg/L	<										
	Bromoform	µg/L	<										
	Carbon Tetrachloride	µg/L	<										
	Chlorobenzene	µg/L											
	Chlorodibromomethane	µg/L	<										
	Chloroethane	µg/L	<										
	2-Chloroethyl Vinyl Ether	µg/L	<										

Group 3	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	mg/L	<										
	Methyl Bromide	µg/L	<										
	Methyl Chloride	µg/L	<										
	Methylene Chloride	µg/L	<										
	1,1,2,2-Tetrachloroethane	µg/L	<										
	Tetrachloroethylene	mg/L	<										
	Toluene	mg/L	<										
	1,2-trans-Dichloroethylene	µg/L	<										
	1,1,1-Trichloroethane	µg/L	<										
	1,1,2-Trichloroethane	µg/L	<										
	Trichloroethylene	mg/L	<										
	Vinyl Chloride	mg/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	mg/L	<										
	Benzo(a)Pyrene	mg/L	<										
	3,4-Benzofluoranthene	µg/L	<										
	Benzo(ghi)Perylene	mg/L	<										
	Benzo(k)Fluoranthene	mg/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	mg/L	<										
	Dibenzo(a,h)Anthrancene	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	<										
	2,4-Dinitrotoluene	µg/L	<										
	2,6-Dinitrotoluene	µg/L	<										
	Di-n-Octyl Phthalate	µg/L	<										
	1,2-Diphenylhydrazine	µg/L	<										
	Fluoranthene	µg/L	<										
	Fluorene	µg/L	<										
	Hexachlorobenzene	µg/L	<										
	Hexachlorobutadiene	µg/L	<										
	Hexachlorocyclopentadiene	µg/L	<										
	Hexachloroethane	µg/L	<										
	Indeno(1,2,3-cd)Pyrene												

	Isophorone												
	Naphthalene												
	Nitrobenzene												
	n-Nitrosodimethylamine												
	n-Nitrosodi-n-Propylamine												
	n-Nitrosodiphenylamine												
	Phenanthrene												
	Pyrene												
	1,2,4-Trichlorobenzene												
Group 6	Aldrin												
	alpha-BHC												
	beta-BHC												
	gamma-BHC												
	delta BHC												
	Chlordane												
	4,4-DDT												
	4,4-DDE												
	4,4-DDD												
	Dieldrin												
	alpha-Endosulfan												
	beta-Endosulfan												
	Endosulfan Sulfate												
	Endrin												
	Endrin Aldehyde												
	Heptachlor												
	Heptachlor Epoxide												
	PCB-1016												
	PCB-1221												
	PCB-1232												
	PCB-1242												
	PCB-1248												
	PCB-1254												
	PCB-1260												
	PCBs, Total												
	Toxaphene												
	2,3,7,8-TCDD												
Group 7	Gross Alpha	pCi/L											
	Total Beta	pCi/L	<										
	Radium 226/228	pCi/L	<										
	Total Strontium	µg/L	<										
	Total Uranium	µg/L	<										
	Osmotic Pressure	mOs/kg											

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Toxics Management Spreadsheet
Version 1.4, May 2023

Stream / Surface Water Information

Greenville Borough Water Treatment Plant, NPDES Permit No. PA0221970, Outfall 001

Instructions | Discharge | *Stream*

Receiving Surface Water Name: **Shenango River**

No. Reaches to Model: **1**

- (●) Statewide Criteria
- ( ) Great Lakes Criteria
- ( ) ORSANCO Criteria

Location	Stream Code*	RMI*	Elevation (ft)*	DA (mi^2)*	Slope (ft/ft)	PWS Withdrawal (MGD)	Apply Fish Criteria*
Point of Discharge	035482	56.98	943	295			Yes
End of Reach 1	035482	53.71	917	311			Yes

$Q_{7\text{-}10}$

Location	RMI	LFY (cfs/mi^2)*	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness*	pH*	Hardness	pH
Point of Discharge	56.98	0.1	9			74						100	7		
End of Reach 1	53.71	0.1	9			64									

Q_h

Location	RMI	LFY (cfs/mi^2)	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness	pH	Hardness	pH
Point of Discharge	56.98														
End of Reach 1	53.71														

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Toxics Management Spreadsheet
Version 1.4, May 2023

Model Results

Greenville Borough Water Treatment Plant, NPDES Permit No. PA0221970, Outfall 001

Instructions | Results | RETURN TO INPUTS | SAVE AS PDF | PRINT | ◉ All ○ Inputs ○ Results ○ Limits

☐ ***Hydrodynamics***

☑ ***Wasteload Allocations***

☑ ***AFC*** CCT (min): 15 PMF: 0.211 Analysis Hardness (mg/l): 96.573 Analysis pH: 7.04

Pollutants	Stream Conc	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	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	750	750	5,646	
Total Antimony	0	0		0	1,100	1,100	8,281	
Total Arsenic	0	0		0	340	340	2,559	Chem Translator of 1 applied
Total Barium	0	0		0	21,000	21,000	158,084	
Total Boron	0	0		0	8,100	8,100	60,975	
Total Cadmium	0	0		0	1.947	2.06	15.5	Chem Translator of 0.945 applied
Total Chromium (III)	0	0		0	553.720	1,752	13,191	Chem Translator of 0.316 applied
Hexavalent Chromium	0	0		0	16	16.3	123	Chem Translator of 0.982 applied
Total Cobalt	0	0		0	95	95.0	715	
Total Copper	0	0		0	13.005	13.5	102	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	62.174	78.1	588	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	12.4	Chem Translator of 0.85 applied
Total Nickel	0	0		0	454.623	456	3,429	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	3.029	3.56	26.8	Chem Translator of 0.85 applied
Total Thallium	0	0		0	65	65.0	489	
Total Zinc	0	0		0	113.769	116	876	Chem Translator of 0.978 applied

☑ ***CFC*** CCT (min): ####### PMF: 1 Analysis Hardness (mg/l): 99.193 Analysis pH: 7.01

Pollutants	Stream Conc	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	
Fluoride (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	7,031	
Total Arsenic	0	0		0	150	150	4,794	Chem Translator of 1 applied
Total Barium	0	0		0	4,100	4,100	131,027	
Total Boron	0	0		0	1,600	1,600	51,133	
Total Cadmium	0	0		0	0.245	0.27	8.6	Chem Translator of 0.909 applied
Total Chromium (III)	0	0		0	73.624	85.6	2,736	Chem Translator of 0.86 applied
Hexavalent Chromium	0	0		0	10	10.4	332	Chem Translator of 0.962 applied
Total Cobalt	0	0		0	19	19.0	607	
Total Copper	0	0		0	8.894	9.26	296	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	47,937	WQC = 30 day average; PMF = 1
Total Lead	0	0		0	2.495	3.15	101	Chem Translator of 0.792 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	0.770	0.91	29.0	Chem Translator of 0.85 applied
Total Nickel	0	0		0	51.651	51.8	1,656	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	159	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	415	
Total Zinc	0	0		0	117.330	119	3,803	Chem Translator of 0.986 applied

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

Pollutants	Stream Conc	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	
Fluoride (PWS)	0	0		0	2,000	2,000	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	5.6	5.6	179	
Total Arsenic	0	0		0	10	10.0	320	
Total Barium	0	0		0	2,400	2,400	76,699	
Total Boron	0	0		0	3,100	3,100	99,070	
Total Cadmium	0	0		0	N/A	N/A	N/A	
Total Chromium (III)	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	9,587	

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	31,958	
Total Mercury	0	0		0	0.050	0.05	1.6	
Total Nickel	0	0		0	610	610	19,494	
Total Phenols (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	7.67	
Total Zinc	0	0		0	N/A	N/A	N/A	

☑ ***CRL*** CCT (min): ####### PMF: 1 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc	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	
Fluoride (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	N/A	N/A	N/A	
Total Arsenic	0	0		0	N/A	N/A	N/A	
Total Barium	0	0		0	N/A	N/A	N/A	
Total Boron	0	0		0	N/A	N/A	N/A	
Total Cadmium	0	0		0	N/A	N/A	N/A	
Total Chromium (III)	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	N/A	N/A	N/A	
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	N/A	N/A	N/A	
Total Mercury	0	0		0	N/A	N/A	N/A	
Total Nickel	0	0		0	N/A	N/A	N/A	
Total Phenols (Phenolics) (PWS)	0	0		0	N/A	N/A	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	N/A	N/A	N/A	
Total Zinc	0	0		0	N/A	N/A	N/A	

☑ ***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			

☑ ***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
Fluoride (PWS)	N/A	N/A	PWS Not Applicable
Total Aluminum	3,619	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	76,699	µg/L	Discharge Conc ≤ 10% WQBEL
Total Beryllium	N/A	N/A	No WQS
Total Boron	39,083	µg/L	Discharge Conc < TQL
Total Cadmium	8.6	µg/L	Discharge Conc ≤ 10% WQBEL
Total Chromium (III)	2,736	µg/L	Discharge Conc < TQL
Hexavalent Chromium	78.6	µg/L	Discharge Conc < TQL
Total Cobalt	458	µg/L	Discharge Conc ≤ 10% WQBEL
Total Copper	65.4	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cyanide	N/A	N/A	No WQS
Dissolved Iron	9,587	µg/L	Discharge Conc < TQL
Total Iron	47,937	µg/L	Discharge Conc ≤ 10% WQBEL
Total Lead	101	µg/L	Discharge Conc < TQL
Total Manganese	31,958	µg/L	Discharge Conc ≤ 10% WQBEL
Total Mercury	1.6	µg/L	Discharge Conc < TQL
Total Nickel	1,656	µg/L	Discharge Conc < TQL
Total Phenols (Phenolics) (PWS)		µg/L	Discharge Conc < TQL
Total Selenium	159	µg/L	Discharge Conc < TQL
Total Silver	17.2	µg/L	Discharge Conc ≤ 10% WQBEL
Total Thallium	7.67	µg/L	Discharge Conc < TQL
Total Zinc	561	µg/L	Discharge Conc ≤ 10% WQBEL
Total Molybdenum	N/A	N/A	No WQS

Attachment D
T & E Mussel Impact Area Spread Sheet

7/25/2025

Outfall 001

Facility:	Greenville Borough Water Treatment Plant					
Permit Number:	PA0221970	Effective:	7/25/2025	Expiration:	7/25/2030	
Outfall No:	001					
Location:	Hempfield Township - Mercer County					
Discharge to:	Shenango River					
Site Specific Mussel Survey Completed:	N/A					

	Discharge and Stream Characteristics		Comments
Q_S	Stream Flow	6 MGD / 9.45 cfs	
Q_D	Discharge Flow	0.185 MGD / 0.28628 cfs	
$C_{S(Cl^-)}$	Instream chloride Concentration	0 mg/L	
$C_{E(Cl^-)}$	Discharge chloride (existing)	33.8 mg/L	
$C_{P(Cl^-)}$	Discharge chloride (proposed)	33.8 mg/L	
$C_{S(Ni)}$	Instream nickel Concentration	0 µg/L	
$C_{E(Ni)}$	Discharge nickel (existing)	2.5 µg/L	
$C_{P(Ni)}$	Discharge nickel (proposed)	2.5 µg/L	
$C_{S(Zn)}$	Instream zinc Concentration	0 µg/L	
$C_{E(Zn)}$	Discharge zinc (existing)	11.8 µg/L	
$Zn_{P(Zn)}$	Discharge zinc (proposed)	11.8 µg/L	
$C_{S(Cu)}$	Instream copper Concentration	0 µg/L	
$C_{E(Cu)}$	Discharge copper (existing)	5.5 µg/L	
$Zn_{P(Cu)}$	Discharge copper (proposed)	5.5 µg/L	
$C_{S(NH3-N)}$	Instream NH^3-N	0.1 mg/L	
$C_{E(NH3-N)}$	Discharge NH^3-N (existing)	0.0475 mg/L	
$C_{P(NH3-N)}$	Discharge NH^3-N (proposed)	0.0475 mg/L	
pH_S	Instream pH	7.38 S.U.	
T_S	Instream Temp.	25 °C	Default value for a WWF
$C_{C(NH3-N)}$	Ammonia criteria	1.111 mg/L	From ammonia criteria comparison spreadsheet -using instream pH and Temp
$C_{C(Cl^-)}$	Chloride criteria	78 mg/L	USFWS criteria
$C_{C(Ni)}$	Nickel criteria	7.3 µg/L	USFWS criteria
$C_{C(Zn)}$	Zinc criteria	13.18 µg/L	USFWS criteria
$C_{C(Cu)}$	Copper criteria	10 µg/L	USFWS criteria
W_S	Stream width	22.55 meters	

Ammonia Criteria Calculations:

	pH_S	7.38	S.U.	*(Default value is 7.0)*
	T_S	25	°C	*(Default value is 20° for a CWF and 25° for a WWF)*

Acute Criteria

	METHOD and UNITS	CRITERIA	Comments	
	Old CMC (mg TAN/L) =	4.773		
	EPA 2013 CMC (mg TAN/L) =	7.244	Oncorhynchus present	* formula on pg. 41 (plateaus at 15.7 C)
		7.244	Oncorhynchus absent	* formula on pg. 42 (plateaus at 10.2 C)

Chronic Criteria

	METHOD and UNITS	CRITERIA	COMMENTS
	Old CMC (mg TAN/L) =	1.076	
$C_{C(NH3-N)}$	EPA 2013 CMC (mg TAN/L) =	1.111	* formula on pg. 46 (plateaus at 7 C)

Endangered Mussel Species Impact Area Calculations:

Existing Area of Impact

☑ N/A - No Site Specific Mussel Survey Completed for this Discharger

Approximate Area of Impact Determined from Survey =	N/A m^2	(Enter N/A if no site specific survey has been completed)
Existing Mussel Density within Area of Impact =		
Rabbitsfoot *(Quadrula cylindrical)*	per m^2	
Northern Riffleshell *(Epioblasma torulosa rangiana)*	per m^2	
Rayed Bean *(Villosa fabalis)*	per m^2	
Clubshell *(Pleurobema clava)*	per m^2	
Sheepnose *(Plethobasus cyphyus)*	per m^2	
Snuffbox *(Epioblasma triquetra)*	per m^2	
TOTAL	0 per m^2	

Method 1 - Utilizing Site Specific Mussel Survey Information

☑ N/A - No Site Specific Mussel Survey Completed for this Discharger

This method utilizes a simple comparison of the size of the existing area of impact as determined from a site specific mussel survey and the chlorides in the existing discharge compared to the chlorides in the proposed discharge after the facility upgrades treatment technologies. This method is only applicable to where the stream impairment is caused by TDS and/or chlorides as the plume has been delineated through conductivity measurements.

A.	Area of Impact Determined from Survey:	N/A	m^2
B.	Chlorides in Existing Discharge:	34	mg/L
C.	Chlorides in Proposed Discharge after Treatment Facility Upgrades:	33.8	mg/L
D.	Approximate Area of Impact after Treatment Facility Upgrades:	N/A	m^2

A/B = D/C Therefore, D = (A*C)/B

7/25/2025

Outfall 001

Facility:	Greenville Borough Water Treatment Plant				
Permit Number:	PA0221970	Effective:	7/25/2025	Expiration:	7/25/2030
Outfall No:	001				
Location:	Hempfield Township - Mercer County				
Discharge to:	Shenango River				
Site Specific Mussel Survey Completed:	N/A				

Endangered Mussel Species Impact Area Calculations: (continued…)

Method 2 - Mass Balance Relationship of Loading and Assimilative Capacity of Stream

Chloride (Cl^-)	$L_{S(Cl^-)}$ = Available Chloride Loading in Stream = $C_{C(Cl^-)} - C_{S(Cl^-)} \times Q_S(MGD) \times 8.34$ =	3,903 lbs/Day
	$L_{D\text{-}MAX(Cl^-)}$ = Current Maximum Discharge Chloride Loading exceeding criteria = $(C_{E(Cl^-)} - C_{E(Cl^-)}) \times Q_D(MGD) \times 8.34$ =	-68 lbs/Day
	$\%_{E(Cl^-)}$ = Percent of Stream Capacity for Current Loading = $L_{D\text{-}MAX(Cl^-)} / L_{S(Cl^-)}$ =	0% of Stream Capacity
	$L_{D(Cl^-)}$ = Proposed Discharge Cl^- Loading exceeding criteria after Treatment Facility Upgrades = $(C_{P(Cl^-)} - C_{R(Cl^-)}) \times Q_D(MGD) \times 8.34$ =	-68.19618 lbs/Day
	$\%_{P(Cl^-)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(Cl^-)} / L_{S(Cl^-)}$ =	-1.75% of Stream Capacity
	Proposed Area of Impact due to Chloride * = $(\%_{P(Cl^-)} \times W_S)^2 \times 0.5$ = * assuming equal flow across transect and 90° spread at discharge	0.08 m^2
Nickel(Ni)	$L_{S(Ni)}$ = Available Nickel Loading in Stream = $C_{C(Ni)} - C_{S(Ni)} \times Q_S(MGD) \times 8.34$ =	365 lbs/Day
	$L_{D\text{-}MAX(Ni)}$ = Current Maximum Discharge Nickel Loading exceeding criteria = $(C_{E(Ni)} - C_{E(Ni)}) \times Q_D(MGD) \times 8.34$ =	-7 lbs/Day
	$\%_{E(Ni)}$ = Percent of Stream Capacity for Current Loading = $L_{D\text{-}MAX(Ni)} / L_{S(Ni)}$ =	0% of Stream Capacity
	$L_{D(Ni)}$ = Proposed Discharge Ni Loading exceeding criteria after Treatment Facility Upgrades = $(C_{P(Ni)} - C_{R(Ni)}) \times Q_D(MGD) \times 8.34$ =	-7.40592 lbs/Day
	$\%_{P(Ni)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(Ni)} / L_{S(Ni)}$ =	-2.03% of Stream Capacity
	Proposed Area of Impact due to Nickel * = $(\%_{P(Ni)} \times W_S)^2 \times 0.5$ = * assuming equal flow across transect and 90° spread at discharge	0.10 m^2
Zinc (Zn)	$L_{S(Zn)}$ = Available Zinc Loading in Stream = $C_{C(Zn)} - C_{S(Zn)} \times Q_S(MGD) \times 8.34$ =	660 lbs/Day
	$L_{D\text{-}MAX(Zn)}$ = Current Maximum Discharge Zinc Loading exceeding criteria = $(C_{E(Zn)} - C_{E(Zn)}) \times Q_D(MGD) \times 8.34$ =	-2 lbs/Day
	$\%_{E(Zn)}$ = Percent of Stream Capacity for Current Loading = $L_{D\text{-}MAX(Zn)} / L_{S(Zn)}$ =	0% of Stream Capacity
	$L_{D(Zn)}$ = Proposed Discharge Zn Loading exceeding criteria after Treatment Facility Upgrades = $(C_{P(Zn)} - C_{R(Zn)}) \times Q_D(MGD) \times 8.34$ =	-2.129202 lbs/Day
	$\%_{P(Zn)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(Zn)} / L_{S(Zn)}$ =	-0.32% of Stream Capacity
	Proposed Area of Impact due to Zinc * = $(\%_{P(Zn)} \times W_S)^2 \times 0.5$ = * assuming equal flow across transect and 90° spread at discharge	0.00 m^2
Copper (Cu)	$L_{S(Cu)}$ = Available Copper Loading in Stream = $C_{C(Cu)} - C_{S(Cu)} \times Q_S(MGD) \times 8.34$ =	500 lbs/Day
	$L_{D\text{-}MAX(Cu)}$ = Current Maximum Discharge Copper Loading exceeding criteria = $(C_{E(Cu)} - C_{E(Cu)}) \times Q_D(MGD) \times 8.34$ =	-7 lbs/Day
	$\%_{E(Cu)}$ = Percent of Stream Capacity for Current Loading = $L_{D\text{-}MAX(Cu)} / L_{S(Cu)}$ =	0% of Stream Capacity
	$L_{D(Cu)}$ = Proposed Discharge Cu Loading exceeding criteria after Treatment Facility Upgrades = $(C_{P(Cu)} - C_{R(Cu)}) \times Q_D(MGD) \times 8.34$ =	-6.94305 lbs/Day
	$\%_{P(Cu)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(Cu)} / L_{S(Cu)}$ =	-1.39% of Stream Capacity
	Proposed Area of Impact due to Copper* = $(\%_{P(Cu)} \times W_S)^2 \times 0.5$ = * assuming equal flow across transect and 90° spread at discharge	0.05 m^2
Ammonia-Nitrogen (NH3-N)	$L_{S(NH3\text{-}N)}$ = Available NH3-N Loading in Stream = $C_{C(NH3\text{-}N)} - C_{S(NH3\text{-}N)} \times Q_S(MGD) \times 8.34$ =	51 lbs/Day
	$L_{D\text{-}MAX(NH3\text{-}N)}$ = Current Maximium Discharge NH3-N Loading = $C_{E(NH3\text{-}N)} \times Q_D(MGD) \times 8.34$ =	0 lbs/Day
	$\%_{E(NH3\text{-}N)}$ = Percent of Stream Capacity for Current Loading = $L_{D\text{-}MAX(NH3\text{-}N)} / L_{S(NH3\text{-}N)}$ =	0% of Stream Capacity
	$L_{D(NH3\text{-}N)}$ = Proposed Discharge NH3-N Loading after Treatment Facility Upgrades = $C_{P(NH3\text{-}N)} - C_{C(NH3\text{-}N)} \times Q_D(MGD) \times 8.34$ =	-2 lbs/Day
	$\%_{P(NH3\text{-}N)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(NH3\text{-}N)} / L_{S(NH3\text{-}N)}$ =	-3.92% of Stream Capacity
	Proposed Area of Impact due to NH3-N * = $(\%_{P(NH3\text{-}N)} \times W_S)^2 \times 0.5$ = * assuming equal flow across transect and 90° spread at discharge	0.39 m^2

7/25/2025

Outfall 001

Facility:	Greenville Borough Water Treatment Plant				
Permit Number:	PA0221970	Effective:	7/25/2025	Expiration:	7/25/2030
Outfall No:	001				
Location:	Hempfield Township - Mercer County				
Discharge to:	Shenango River				
Site Specific Mussel Survey Completed:	N/A				

Endangered Mussel Species Impact Area Calculations: (continued…)

Method 3 - Mass Balance Relationship of Stream Flow, Proposed Effluent Quality, and Mussel Protection Criteria

Chloride (Cl^-)	$Q_{A[Cl^-]}C_{S[Cl^-]} + Q_DC_{P[Cl^-]} = Q_TC_{C[Cl^-]}$	
	$Q_{A[Cl^-]}$ = Assimilative Stream Flow Required to Achieve Criteria (cfs)	
	$Q_T = Q_S + Q_D$ (cfs)	
	$Q_{A[Cl^-]}C_{S[Cl^-]} + Q_DC_{P[Cl^-]} = (Q_D+Q_S)C_{C[Cl^-]}$	
	SOLVING FOR $\mathbf{Q_{A[Cl^-]}} = [(Q_DC_{P[Cl^-]} / C_{C[Cl^-]}) - Q_D)] / (1 - C_{S[Cl^-]}/C_{C[Cl^-]}) =$	-0.16222533 cfs
	$\%_{P[Cl^-]}$ = Percent of Stream Width Required to Assimilate Chlorides to Criteria Concentration = $Q_{A[Cl^-]} / Q_S$ (cfs) =	-1.7167%
	$W_{I[Cl^-]}$ = Proposed Width of Stream required to Assimilate Chlorides to Criteria Concentration = W_S X $\%_{P[Cl^-]}$	-0.387109 meters
	Proposed Area of Impact due to Chloride * = $(W_{I[Cl^-]})^2$ X 0.5 = * assuming equal flow across transect and 90° spread at discharge	0.07 m^2
Nickel (Ni)	$Q_{A[Ni]}C_{S[Ni]} + Q_DC_{P[Ni]} = Q_TC_{C[Ni]}$	
	$Q_{A[Ni]}$ = Assimilative Stream Flow Required to Achieve Criteria (cfs)	
	$Q_T = Q_S + Q_D$ (cfs)	
	$Q_{A[Ni]}C_{S[Ni]} + Q_DC_{P[Ni]} = (Q_D+Q_S)C_{C[Ni]}$	
	SOLVING FOR $\mathbf{Q_{A[Ni]}} = [(Q_DC_{P[Ni]} / C_{C[Ni]}) - Q_D)] / (1 - C_{S[Ni]}/C_{C[Ni]}) =$	-0.1882389 cfs
	$\%_{P[Cl^-]}$ = Percent of Stream Width Required to Assimilate Nickel to Criteria Concentration = $Q_{A[Ni]} / Q_S$ (cfs) =	-1.9919%
	$W_{I[Ni]}$ = Proposed Width of Stream required to Assimilate Nickel to Criteria Concentration = W_S X $\%_{P[Ni]}$	-0.449184 meters
	Proposed Area of Impact due to Nickel * = $(W_{I[Ni]})^2$ X 0.5 = * assuming equal flow across transect and 90° spread at discharge	0.10 m^2
Zinc (Zn)	$Q_{A[Zn]}C_{S[Zn]} + Q_DC_{P[Zn]} = Q_TC_{C[Zn]}$	
	$Q_{A[Zn]}$ = Assimilative Stream Flow Required to Achieve Criteria (cfs)	
	$Q_T = Q_S + Q_D$ (cfs)	
	$Q_{A[Zn]}C_{S[Zn]} + Q_DC_{P[Zn]} = (Q_D+Q_S)C_{C[Zn]}$	
	SOLVING FOR $\mathbf{Q_{A[Zn]}} = [(Q_DC_{P[Zn]} / C_{C[Zn]}) - Q_D)] / (1 - C_{S[Zn]}/C_{C[Zn]}) =$	-0.02997469 cfs
	$\%_{P[Cl^-]}$ = Percent of Stream Width Required to Assimilate Zinc to Criteria Concentration = $Q_{A[Zn]} / Q_S$ (cfs) =	-0.3172%
	$W_{I[Zn]}$ = Proposed Width of Stream required to Assimilate Zinc to Criteria Concentration = W_S X $\%_{PZn}$	-0.071527 meters
	Proposed Area of Impact due to Zinc * = $(W_{IZn})^2$ X 0.5 = * assuming equal flow across transect and 90° spread at discharge	0.00 m^2
Copper (Cu)	$Q_{A[Cu]}C_{S[Cu]} + Q_DC_{P[Cu]} = Q_TC_{C[Cu]}$	
	$Q_{A[Cu]}$ = Assimilative Stream Flow Required to Achieve Criteria (cfs)	
	$Q_T = Q_S + Q_D$ (cfs)	
	$Q_{A[Cu]}C_{S[Cu]} + Q_DC_{P[Cu]} = (Q_D+Q_S)C_{C[Cu]}$	
	SOLVING FOR $\mathbf{Q_{A[Cu]}} = [(Q_DC_{PCu} / C_{C[Cu]}) - Q_D)] / (1 - C_{S[Cu]}/C_{C[Cu]}) =$	-0.128826 cfs
	$\%_{P[Cu]}$ = Percent of Stream Width Required to Assimilate Copper to Criteria Concentration = $Q_{A[Cu]} / Q_S$ (cfs) =	-1.3632%
	$W_{I[Cu]}$ = Proposed Width of Stream required to Assimilate Copper to Criteria Concentration = W_S X $\%_{PCu}$	-0.307410 meters
	Proposed Area of Impact due to Copper * = $(W_{I[Cu]})^2$ X 0.5 = * assuming equal flow across transect and 90° spread at discharge	0.05 m^2
Ammonia-Nitrogen (NH_3-N)	$Q_{A[NH3-N]}C_{S[NH3-N]} + Q_DC_{P[NH3-N]} = Q_TC_{C[NH3-N]}$	
	$Q_{A[NH3-N]}$ = Assimilative Stream Flow Required to Achieve Criteria (cfs)	
	$Q_T = Q_S + Q_D$ (cfs)	
	$Q_{A[NH3-N]}C_{S[NH3-N]} + Q_DC_{P[NH3-N]} = (Q_D+Q_S)C_{C[NH3-N]}$	
	SOLVING FOR $\mathbf{Q_{A[NH3-N]}} = [(Q_DC_{P[NH3-N]} / C_{C[NH3-N]}) - Q_D)] / (1 - C_{S[NH3-N]}/C_{C[NH3-N]}) =$	-0.301146 cfs
	$\%_{P[NH3-N]}$ = Percent of Stream Width Required to Assimilate NH3-N to Criteria Concentration = $Q_{A[NH3-N]} / Q_S$ (cfs) =	-3.1867%
	$W_{I[NH3-N]}$ = Proposed Width of Stream required to Assimilate NH3-N to Criteria Concentration = W_S X $\%_{P[NH3-N]}$	-0.718608 meters
	Proposed Area of Impact due to NH3-N * = $(W_{I[NH3-N]})^2$ X 0.5 = * assuming equal flow across transect and 90° spread at discharge	0.26 m^2

Attachment E: TRC Modeling Results for Outfall 001

TRC EVALUATION - Outfall 001

8.86	= Q stream (cfs)	0.5	= CV Daily
0.19	= Q discharge (MGD)	0.5	= CV Hourly
30	= no. samples	0.207	= AFC_Partial Mix Factor
0.3	= Chlorine Demand of Stream	1	= CFC_Partial Mix Factor
0	= Chlorine Demand of Discharge	15	= AFC_Criteria Compliance Time (min)
0.5	= BAT/BPJ Value	720	= CFC_Criteria Compliance Time (min)
	= % Factor of Safety (FOS)		=Decay Coefficient (K)

Source	Reference	AFC Calculations		Reference	CFC Calculations	
TRC	1.3.2.iii	WLA afc =	2.063	1.3.2.iii	WLA cfc =	9.639
PENTOXSD TRG	5.1a	LTAMULT afc =	0.373	5.1c	LTAMULT cfc =	0.581
PENTOXSD TRG	5.1b	LTA_afc=	0.769	5.1d	LTA_cfc =	5.604

Source		Effluent Limit Calculations		
PENTOXSD TRG	5.1f	AML MULT =	1.231	
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) =	0.500	BAT/BPJ
		INST MAX LIMIT (mg/l) =	1.635	

WLA afc	**(.019/e(-k*AFC_tc)) + [(AFC_Yc*Qs*.019/Qd*e(-k*AFC_tc))...** **...+ Xd + (AFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**
LTAMULT afc	EXP((0.5*LN(cvh^2+1))-2.326*LN(cvh^2+1)^0.5)
LTA_afc	wla_afc*LTAMULT_afc
WLA_cfc	**(.011/e(-k*CFC_tc) + [(CFC_Yc*Qs*.011/Qd*e(-k*CFC_tc))...** **...+ Xd + (CFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**
LTAMULT_cfc	EXP((0.5*LN(cvd^2/no_samples+1))-2.326*LN(cvd^2/no_samples+1)^0.5)
LTA_cfc	wla_cfc*LTAMULT_cfc
AML MULT	EXP(2.326*LN((cvd^2/no_samples+1)^0.5)-0.5*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)**

(0.011/EXP(-K*CFC_tc/1440))+(((CFC_Yc*Qs*0.011)/(1.547*Qd)....
....*EXP(-K*CFC_tc/1440)))+Xd+(CFC_Yc*Qs*Xs/1.547*Qd))*(1-FOS/100)