Pennsylvania Department of Environmental Protection

Southwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0205800**
Facility Type	**Industrial**	APS ID	**1127926**
Major / Minor	**Minor**	Authorization ID	**1510515**

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

Applicant and Facility Information

Applicant Name	**Southwestern Pennsylvania Water Authority**	Facility Name	**Southwestern Pennsylvania Water Authority Water Treatment Plant**
Applicant Address	1442 Jefferson Street PO Box 187	Facility Address	310 Tin Can Hollow Road
	Jefferson, PA 15344-4159		Rices Landing, PA 15357
Applicant Contact	Thomas Goughenour	Facility Contact	Thomas Goughenour
Applicant Phone	(724) 350-6237	Facility Phone	724-350-6237
Client ID	38513	Site ID	461059
SIC Code	4941	Municipality	Cumberland Township
SIC Description	Trans. & Utilities - Water Supply	County	Greene
Date Application Received	December 23, 2024	EPA Waived?	Yes
Date Application Accepted	December 23, 2024	If No, Reason	

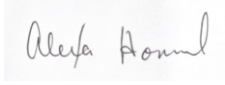
Purpose of Application: NPDES permit renewal

Summary of Review

The Department received an NPDES permit renewal application from the Southwestern Pennsylvania Water Authority on December 23, 2024 for coverage of its water treatment plant on Tin Can Hollow Road. This facility is a public water supply system that provides treated potable water from the Monongahela River for domestic use. The standard industrial classification (SIC) code for this type of facility is 4941, water supply.

The authority has a raw water intake and pumping station which withdraws water from the Monongahela River and pumps it to the treatment plant. Pre-treatment chemicals for disinfection, coagulation, pH adjustment, and iron and manganese removal are injected into the plant influent line. Rapid mix is provided by in-line static mixers. Two plate settler clarifiers provide flocculation and clarification. These clarifiers are then followed by eight high-rate mixed media filters. Each filter has a continuous turbidity monitor on the filter effluent line. Filter effluent is discharged to the clearwell where chemicals for disinfection, corrosion control and fluoridation are injected. Finished water is pumped from the clearwell into the distribution system by high service pumps. Support facilities on site include chemical feed area, storage area, laboratory, office, locker room and control room.

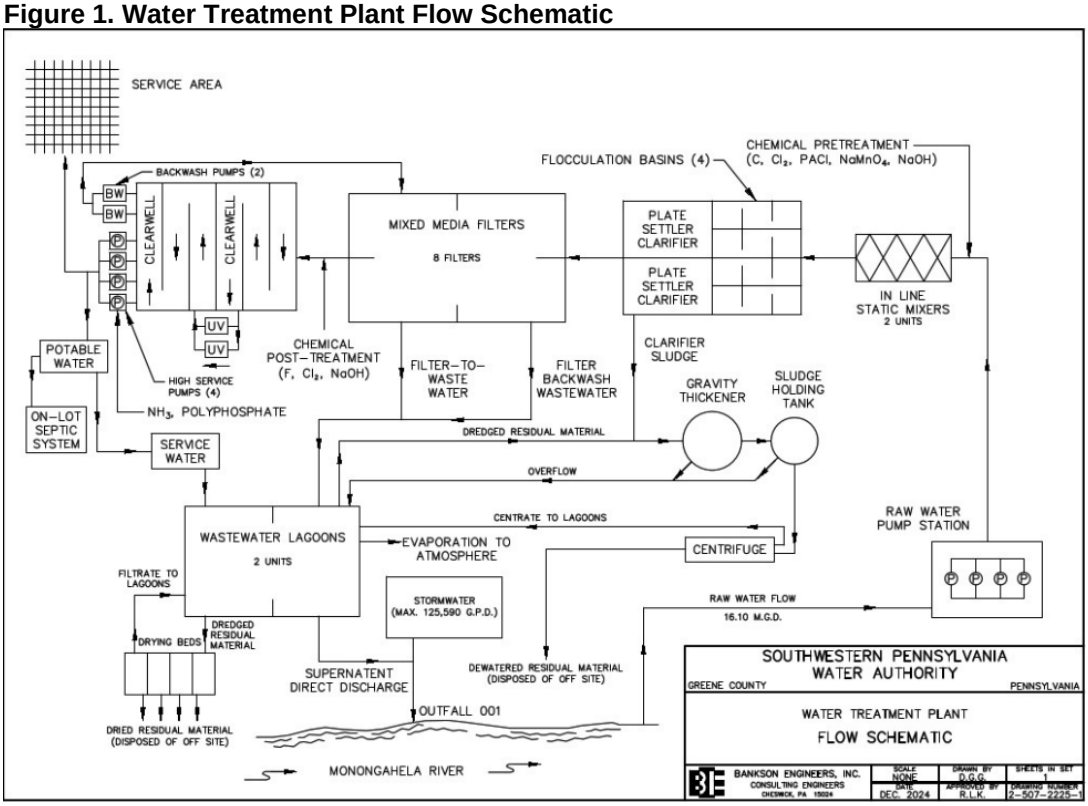
Most of the waste generated at the water treatment plant is produced during sludge withdrawal from the clarifiers and the backwash of the mixed media filters. Suspended material in the raw water and the suspended material generated during pretreatment is removed during clarification. Suspended material removed by filtration is washed out during the backwash process. Process wastewater is also generated during the filter-to-waste periods. Following the backwash process, effluent is discharged to the two wastewater lagoons. The settled solids in the clarifiers are intermittently withdrawn and conveyed to a gravity thickener. The sludge is then periodically transferred to the sludge holding tank and completely mixed. Feed sludge from the sludge holding tank is then periodically dewatered with polymer addition immediately ahead of a solid-bowl

Approve	Deny	Signatures	Date
X		 Alexa Howard / Environmental Engineering Trainee	April 23, 2025
X		 Michael E. Fifth, P.E. / Environmental Engineer Manager	April 23, 2025

Summary of Review

decanting centrifuge. Sludge cake from the centrifuge is conveyed to a roll-off dumpster and properly disposed of offsite. The supernatant from the lagoons is discharged via Outfall 001 to the Monongahela River, designated in 25 PA Code Chapter 93 as a Warm Water Fishery. Stormwater comingles with the wastewater from the lagoons prior to the discharge to Outfall 001; therefore, the effluent from the lagoons is monitored and the effluent limitations are applied at Internal Monitoring Point 101 prior to the comingling of the stormwater.

Figure 1. Water Treatment Plant Flow Schematic



The site was last inspected on September 17, 2021; no violations were noted. The Permittee has no open violations.

Effluent limits for IMP 101 in the draft permit originate from DEP Best Practicable Technology Currently Available (BPT) effluent limits for wastewater from treatment of WTP sludge and filter backwash. Issuance of the Draft permit is recommended.

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)	0.418
Latitude	39º 56' 50"	Longitude	-79º 57' 00"
Quad Name	Carmichaels	Quad Code	1906
Wastewater Description:	Effluent from IMP 101 (filter backwash water, filter-to-waste water, and effluent from sludge drying beds) and plant area stormwater.		
Receiving Waters	Monongahela River (WWF)	Stream Code	37185
NHD Com ID	134839924	RMI	71.76
Drainage Area	4600 mi^2	Yield (cfs/mi^2)	0.115
Q_{7-10} Flow (cfs)	530	Q_{7-10} Basis	USACE Q_{7-10} Flows of Major Rivers
Elevation (ft)	762	Slope (ft/ft)	0.217
Watershed No.	19-B	Chapter 93 Class.	WWF
Existing Use	N/A	Existing Use Qualifier	N/A
Exceptions to Use	N/A	Exceptions to Criteria	N/A
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment	N/A		
Source(s) of Impairment	N/A		
TMDL Status	Final	Name	Monongahela River TMDL
Nearest Downstream Public Water Supply Intake	Tri County Joint Municipal Authority		
PWS Waters	Monongahela River	Flow at Intake (cfs)	530
PWS RMI	65.268	Distance from Outfall (mi)	6.36

Changes Since Last Permit Issuance: No Significant Changes

Discharge, Receiving Waters and Water Supply Information

Outfall No.	101	Design Flow (MGD)	0.418
Latitude	39º 56' 50"	Longitude	-79º 57' 00"
Quad Name	Carmichaels	Quad Code	1906
Wastewater Description:	Filter backwash water, filter-to-waste water and effluent, from sludge drying beds		
Receiving Waters	Monongahela River (WWF)	Stream Code	37185
NHD Com ID	134839924	RMI	71.76
Drainage Area	4600 mi^2	Yield (cfs/mi^2)	0.115
Q_{7-10} Flow (cfs)	530	Q_{7-10} Basis	USACE Q_{7-10} Flows of Major Rivers
Elevation (ft)	762	Slope (ft/ft)	0.217
Watershed No.	19-B	Chapter 93 Class.	WWF
Existing Use	N/A	Existing Use Qualifier	N/A
Exceptions to Use	N/A	Exceptions to Criteria	N/A
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment	N/A		
Source(s) of Impairment	N/A		
TMDL Status	Final	Name	Monongahela River TMDL
Nearest Downstream Public Water Supply Intake	Tri County Joint Municipal Authority		
PWS Waters	Monongahela River	Flow at Intake (cfs)	530
PWS RMI	65.268	Distance from Outfall (mi)	6.36

Changes Since Last Permit Issuance: No Significant Changes

Compliance History

Effluent Violations for Outfall 101, from: January 1, 2024 To: November 30, 2024

Parameter	Date	SBC	DMR Value	Units	Limit Value	Units
Total Manganese	06/30/24	Daily Max	2.79	mg/L	2.0	mg/L

Summary of Inspections: An inspection was conducted on September 17th, 2021. No violations were noted.

Development of Effluent Limitations

Outfall No.	001	**Design Flow (MGD)**	0.418
Latitude	39º 56' 50.00"	**Longitude**	-79º 57' 0.00"
Wastewater Description:	Effluent from IMP 101 (filter backwash water, filter-to-waste water, and effluent from sludge drying beds) and plant area stormwater.		

This discharge shall consist solely of sources monitored at Internal Monitoring Point 101 and uncontaminated storm water runoff from plant area. No monitoring will be imposed on Outfall 001, all limitations will be applied to the discharge from IMP 101 to isolate the process wastewater from the stormwater portion.

The Southwestern PA Water Authority sampled the stormwater discharge at Outfall 001 and the sample results indicate that the discharge is below the no exposure stormwater benchmarks, indicating that the discharge is uncontaminated stormwater. Stormwater sampling will not be imposed but semi-annual inspections will be required as part of an annual stormwater report. A part C condition is included in the permit requiring the submission of the annual stormwater report.

Table 1 shows that the stormwater sampling results from Outfall 001 meet the No Exposure Thresholds.

Table 1. Applicant Sample Result and Benchmarks

Parameter	Application Concentration (mg/L)	No Exposure Thresholds (mg/L)
Oil and Grease	<5.0	≤ 5.0
Biochemical Oxygen Demand (5-day)	<3.00	≤ 10.0
Chemical Oxygen Demand	<10.00	≤ 30.0
Total Suspended Solids	17.00	≤ 30.0
Total Nitrogen	<1.20	≤ 2.0 (Tot. N)
Total Iron	0.00007	≤ 7.0
Total Phosphorus	<0.10	≤ 1.0
pH (s.u.)	7.25	6.0 – 9.0 s.u.

Development of Effluent Limitations

Outfall No.	101	**Design Flow (MGD)**	0.418
Latitude	39º 56' 50"	**Longitude**	-79º 57' 00"
Wastewater Description:	Filter backwash water, filter-to-waste water and effluent, from sludge drying beds		

Technology-Based Limitations

The Southwestern PA Water Treatment Plant is not subject to Federal Effluent Limitation Guidelines (ELGs) as the SIC code is not listed under 40 CFR parts 405 through 471.

Regulatory Effluent Standards and Monitoring Requirements

Flow monitoring is required pursuant to 25 Pa. Code § 92a.61(d)(1) which is displayed in **Table 2** below.

Effluent standards for pH and dissolved iron are also imposed on industrial wastes by 25 Pa. Code §§ 95.2(1) and 95.2 (4) which is displayed in **Table 2** 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 2** below.

Table 2. Regulatory Effluent Standards

Parameter	Monthly Avg	Daily Max	Instantaneous Max
Flow	Monitor	–	–
pH	6-9 at all times		
Total Residual Chlorine (TRC)	0.5 mg/l	–	1.6 mg/l
Dissolved Iron	–	–	7.0 mg/l

Total Dissolved Solids (TDS)

This facility is exempt from 25 Pa. Code § 95.10 which outlines treatment requirements for new and expanding mass loadings of TDS and clarifies which facilities are exempt. The relevant section qualifying the exemption states:

> *(a) The following are not considered new and expanding mass loadings of TDS and are exempt from the treatment requirements in this section:*
>
> *(1) Maximum daily discharge loads of TDS or specific conductivity levels that were authorized by the Department prior to August 21, 2010. These discharge loads will be considered existing mass loadings by the Department.*

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 3** below.

Table 3. 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 Limitations

Toxics Management Spread Sheet

The Department of Environmental Protection 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 TMS 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 TMS 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 TMS recommends average monthly and maximum daily WQBELs.

Reasonable Potential Analysis and WQBEL Development for Internal Monitoring Point 101

Discharges from Internal Monitoring Point 101 are evaluated based on concentrations reported on the application and on DMRs; data from those sources are entered into the TMS. The maximum reported value of the parameters from the application form or from previous DMRs is used as the input concentration in the TMS. 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 TMS is run with the discharge and receiving stream characteristics shown in **Table 4**. 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.

An average flow was not given in the application, so it was determined through eDMR data from the past two years that the design flow of 0.418 MGD is representative of the discharge flow. No WQBELs were recommended. The Output from the TMS is included in **Attachment A**.

Table 4. TMS Inputs for Outfall 001

Discharge Information	
Parameter	**Value**
River Mile Index	71.76
Discharge Flow (MGD)	0.418
Basin/Stream Information	
Parameter	**Value**
Drainage Area (mi^2)	4600
Q_{7-10} (cfs)	530
Low-flow yield (cfs/mi^2)	0.115
Elevation (ft)	762
Slope (ft/ft)	0.217

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 discharge chlorine demands for the receiving stream, 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 then proposed. The results of the modeling, included in **Attachment B**, indicate that average monthly limits of 0.5 mg/L and daily maximum limits of 1.635 mg/L are required for TRC.

Table 5. TRC limits from TRC_CALC

Parameter	Monthly Avg (mg/L)	Daily Max (mg/L)
Total Residual Chlorine	0.5	1.170

Anti-Backsliding

Previous limits can be used pursuant to EPA's anti-backsliding regulation, 40 CFR 122.44(l). The limits below in **Table 6** are from the current permit. The parameters listed are from the DEPs Technology-Based Control Requirements for Water Treatment Plant Wastes Document.

Table 6. Current Permit Effluent Limits

Parameters	Mass (lb/day)		Concentration (mg/l)			
	Average Monthly	Daily Maximum	Instant. Minimum	Average Monthly	Daily Maximum	Instant. Maximum
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX
Total Suspended Solids	XXX	XXX	XXX	30.0	60.0	XXX
Total Residual Chlorine	XXX	XXX	XXX	0.5	1.0	XXX
Total Aluminum	XXX	XXX	XXX	4.0	8.0	XXX
Total Iron	XXX	XXX	XXX	2.0	4.0	XXX
Total Manganese	XXX	XXX	XXX	1.0	2.0	XXX
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0

Proposed Effluent Limitations for IMP 101

The proposed effluent limitations and monitoring requirements for IMP 101 are shown below in **Table 7**. The monitoring frequency will remain the same as the current permit, twice per month.

Table 7. Proposed Effluent Limitation for IMP 101

Parameters	Mass (lb/day)		Concentration				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	2/Month	Measure
Total Suspended Solids (mg/L)	XXX	XXX	XXX	30.0	60.0	XXX	2/Month	Grab
Total Residual Chlorine (mg/L)	XXX	XXX	XXX	0.5	1.0	XXX	2/Month	Grab
Total Aluminum (mg/L)	XXX	XXX	XXX	4.0	8.0	XXX	2/Month	Grab
Total Iron (mg/L)	XXX	XXX	XXX	2.0	4.0	XXX	2/Month	Grab
Total Manganese (mg/L)	XXX	XXX	XXX	1.0	2.0	XXX	2/Month	Grab
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0	2/Month	Grab

Tools and References Used to Develop Permit	
☐	WQM for Windows Model
☒	Toxics Management Spreadsheet (see Attachment **A**)
☒	TRC Model Spreadsheet (see Attachment **B**)
☐	Temperature Model Spreadsheet
☐	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: Establishing Effluent Limits for Individual Industrial Permits (BCW-PMT-032)
☒	Other: USGS Stream Stats (See Attachment **C**)

Attachments

Attachment A: Toxics Management Spreadsheet
Attachment B: TRC Model Spreadsheet
Attachment C: USGS Stream Stats
Attachment D: Aerial Site Map

Attachment A:
Toxics Management Spreadsheet

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.4, May 2023

Discharge Information

Instructions | Discharge | Stream

Facility: **Southwestern Pennsylvania Water Authority Wa** NPDES Permit No.: **PA0205800** Outfall No.: **001**

Evaluation Type: Wastewater Description: **IW Process Effluent without ELG, Stormwa**

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
0.418	118	7.46						

					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		208									
	Chloride (PWS)	mg/L		19.7									
	Bromide	mg/L		0.1									
	Sulfate (PWS)	mg/L		100									
	Fluoride (PWS)	mg/L		0.57									
Group 2	Total Aluminum	µg/L		1090									
	Total Antimony	µg/L		2									
	Total Arsenic	µg/L		2									
	Total Barium	µg/L		38.1									
	Total Beryllium	µg/L		1									
	Total Boron	µg/L		0.13									
	Total Cadmium	µg/L		0.2									
	Total Chromium (III)	µg/L		4									
	Hexavalent Chromium	µg/L		0.005									
	Total Cobalt	µg/L		1									
	Total Copper	mg/L		0.0416									
	Free Cyanide	µg/L											
	Total Cyanide	µg/L		5									
	Dissolved Iron	µg/L		0.02									
	Total Iron	µg/L		0.07									
	Total Lead	µg/L		1									
	Total Manganese	µg/L		397									
	Total Mercury	µg/L		0.2									
	Total Nickel	µg/L		3.02									
	Total Phenols (Phenolics) (PWS)	µg/L		40									
	Total Selenium	µg/L		0.005									
	Total Silver	µg/L		0.4									
	Total Thallium	µg/L		2									
	Total Zinc	mg/L		0.005									
	Total Molybdenum	µg/L		2									
	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)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	µg/L	<										
	Isophorone	µg/L	<										
	Naphthalene	µg/L	<										
	Nitrobenzene	µg/L	<										
	n-Nitrosodimethylamine	µg/L	<										
	n-Nitrosodi-n-Propylamine	µg/L	<										
	n-Nitrosodiphenylamine	µg/L	<										
	Phenanthrene	µg/L	<										
	Pyrene	µg/L	<										
	1,2,4-Trichlorobenzene	µg/L	<										
Group 6	Aldrin	µg/L	<										
	alpha-BHC	µg/L	<										
	beta-BHC	µg/L	<										
	gamma-BHC	µg/L	<										
	delta BHC	µg/L	<										
	Chlordane	µg/L	<										
	4,4-DDT	µg/L	<										
	4,4-DDE	µg/L	<										
	4,4-DDD	µg/L	<										
	Dieldrin	µg/L	<										
	alpha-Endosulfan	µg/L	<										
	beta-Endosulfan	µg/L	<										
	Endosulfan Sulfate	µg/L	<										
	Endrin	µg/L	<										
	Endrin Aldehyde	µg/L	<										
	Heptachlor	µg/L	<										
	Heptachlor Epoxide	µg/L	<										
	PCB-1016	µg/L	<										
	PCB-1221	µg/L	<										
	PCB-1232	µg/L	<										
	PCB-1242	µg/L	<										
	PCB-1248	µg/L	<										
	PCB-1254	µg/L	<										
	PCB-1260	µg/L	<										
	PCBs, Total	µg/L	<										
	Toxaphene	µg/L	<										
	2,3,7,8-TCDD	ng/L	<										
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											

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.4, May 2023

Stream / Surface Water Information

ern Pennsylvania Water Authority Water Treatment Plant, NPDES Permit No. PA0205800, Outfall 001

Instructions | Discharge | *Stream*

Receiving Surface Water Name: **Monongahela River**

No. Reaches to Model: 1

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

Location	Stream Code*	RMI*	Elevation (ft)*	DA (mi²)*	Slope (ft/ft)	PWS Withdrawal (MGD)	Apply Fish Criteria*
Point of Discharge	037185	71.758837	762	4600			Yes
End of Reach 1	037185	71.592297	758	4601			Yes

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

Location	RMI	LFY (cfs/mi²)*	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	71.758837	0.115										100	7		
End of Reach 1	71.592297	0.115													

Q_h

Location	RMI	LFY (cfs/mi²)	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	71.758837														
End of Reach 1	71.592297														

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.4, May 2023

Model Results

Southwestern Pennsylvania Water Authority Water Treatment Plant, NPDES Permit No. PA0205800, Outfall 001

Instructions | Results | RETURN TO INPUTS | SAVE AS PDF | PRINT | (•) All | ( ) Inputs | ( ) Results | ( ) Limits

☐ ***Hydrodynamics***

☑ ***Wasteload Allocations***

☑ ***AFC*** CCT (min): 12.974 PMF: 0.086 Analysis Hardness (mg/l): 100.25 Analysis pH: 7.00

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	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	750	750	53,264	
Total Antimony	0	0		0	1,100	1,100	78,121	
Total Arsenic	0	0		0	340	340	24,146	Chem Translator of 1 applied
Total Barium	0	0		0	21,000	21,000	1,491,400	
Total Boron	0	0		0	8,100	8,100	575,254	
Total Cadmium	0	0		0	2.019	2.14	152	Chem Translator of 0.944 applied
Total Chromium (III)	0	0		0	570.946	1,807	128,317	Chem Translator of 0.316 applied
Hexavalent Chromium	0	0		0	16	16.3	1,157	Chem Translator of 0.982 applied
Total Cobalt	0	0		0	95	95.0	6,747	
Total Copper	0	0		0	13.471	14.0	997	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	64.760	81.9	5,817	Chem Translator of 0.791 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	1.400	1.65	117	Chem Translator of 0.85 applied
Total Nickel	0	0		0	469.240	470	33,392	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	3.231	3.8	270	Chem Translator of 0.85 applied
Total Thallium	0	0		0	65	65.0	4,616	
Total Zinc	0	0		0	117.432	120	8,528	Chem Translator of 0.978 applied

☑ ***CFC*** CCT (min): 720 PMF: 0.593 Analysis Hardness (mg/l): 100.04 Analysis pH: 7.00

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	
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	106,943	
Total Arsenic	0	0		0	150	150	72,916	Chem Translator of 1 applied
Total Barium	0	0		0	4,100	4,100	1,993,035	
Total Boron	0	0		0	1,600	1,600	777,770	
Total Cadmium	0	0		0	0.246	0.27	132	Chem Translator of 0.909 applied
Total Chromium (III)	0	0		0	74.137	86.2	41,905	Chem Translator of 0.86 applied
Hexavalent Chromium	0	0		0	10	10.4	5,053	Chem Translator of 0.962 applied
Total Cobalt	0	0		0	19	19.0	9,236	
Total Copper	0	0		0	8.959	9.33	4,536	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	1,228,601	WQC = 30 day average; PMF = 1
Total Lead	0	0		0	2.518	3.18	1,547	Chem Translator of 0.791 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	0.770	0.91	440	Chem Translator of 0.85 applied
Total Nickel	0	0		0	52.023	52.2	25,365	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	2,425	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	6,319	
Total Zinc	0	0		0	118.176	120	58,262	Chem Translator of 0.986 applied

☑ ***THH*** CCT (min): 720 PMF: 0.593 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	
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	2,722	
Total Arsenic	0	0		0	10	10.0	4,861	
Total Barium	0	0		0	2,400	2,400	1,166,655	
Total Boron	0	0		0	3,100	3,100	1,506,929	
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	145,832	
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	486,106	
Total Mercury	0	0		0	0.050	0.05	24.3	
Total Nickel	0	0		0	610	610	296,525	
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	117	
Total Zinc	0	0		0	N/A	N/A	N/A	

☑ ***CRL*** CCT (min): 720 PMF: 0.885 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	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	34,140	µg/L	Discharge Conc ≤ 10% WQBEL
Total Antimony	2,722	µg/L	Discharge Conc ≤ 10% WQBEL
Total Arsenic	4,861	µg/L	Discharge Conc ≤ 10% WQBEL
Total Barium	955,927	µg/L	Discharge Conc ≤ 10% WQBEL
Total Beryllium	N/A	N/A	No WQS
Total Boron	368,715	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cadmium	97.4	µg/L	Discharge Conc ≤ 10% WQBEL
Total Chromium (III)	41,905	µg/L	Discharge Conc ≤ 10% WQBEL
Hexavalent Chromium	742	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cobalt	4,324	µg/L	Discharge Conc ≤ 10% WQBEL
Total Copper	0.64	mg/L	Discharge Conc ≤ 10% WQBEL
Total Cyanide	N/A	N/A	No WQS
Dissolved Iron	145,832	µg/L	Discharge Conc ≤ 10% WQBEL
Total Iron	1,228,601	µg/L	Discharge Conc ≤ 10% WQBEL
Total Lead	1,547	µg/L	Discharge Conc ≤ 10% WQBEL
Total Manganese	486,106	µg/L	Discharge Conc ≤ 10% WQBEL
Total Mercury	24.3	µg/L	Discharge Conc ≤ 10% WQBEL
Total Nickel	21,403	µg/L	Discharge Conc ≤ 10% WQBEL
Total Phenols (Phenolics) (PWS)		µg/L	PWS Not Applicable
Total Selenium	2,425	µg/L	Discharge Conc ≤ 10% WQBEL
Total Silver	173	µg/L	Discharge Conc ≤ 10% WQBEL
Total Thallium	117	µg/L	Discharge Conc ≤ 10% WQBEL
Total Zinc	5.47	mg/L	Discharge Conc ≤ 10% WQBEL
Total Molybdenum	N/A	N/A	No WQS

Attachment B:
TRC Model Spreadsheet

TRC EVALUATION

Input appropriate values in A3:A9 and D3:D9

530	= Q stream (cfs)	0.5	= CV Daily
0.418	= Q discharge (MGD)	0.5	= CV Hourly
4	= no. samples	1	= 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)
0	= % Factor of Safety (FOS)		=Decay Coefficient (K)

Source	Reference	AFC Calculations	Reference	CFC Calculations
TRC	1.3.2.iii	WLA afc = 261.476	1.3.2.iii	WLA cfc = 254.911
PENTOXSD TRG	5.1a	LTAMULT afc = 0.373	5.1c	LTAMULT cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc= 97.432	5.1d	LTA_cfc = 148.193

Source		Effluent Limit Calculations	
PENTOXSD TRG	5.1f	AML MULT = 1.720	
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.500	BAT/BPJ
		INST MAX LIMIT (mg/l) = 1.170	

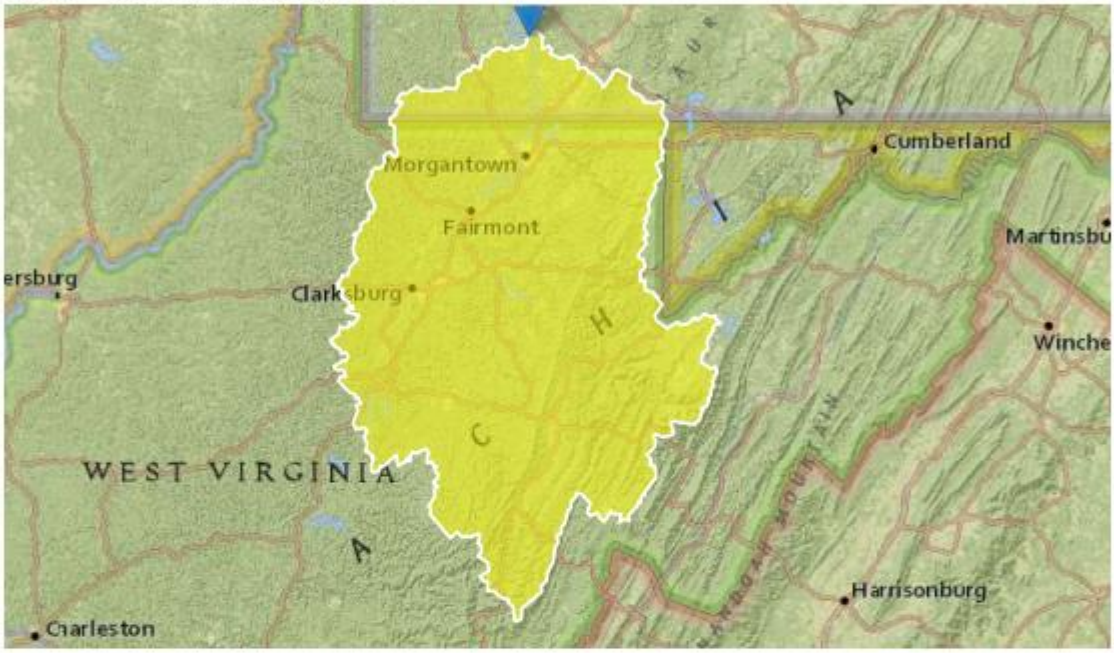
WLA afc	**(.019/e(-k*AFC_tc)) + [(AFC_Yc*Qs*.019/Qd*e(-k*AFC_tc))...** **...+ Xd + (AFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**
LTAMULT afc	EXP((0.5*LN(cvh^2+1))-2.326*LN(cvh^2+1)^0.5)
LTA_afc	wla_afc*LTAMULT_afc
WLA_cfc	**(.011/e(-k*CFC_tc) + [(CFC_Yc*Qs*.011/Qd*e(-k*CFC_tc))...** **...+ Xd + (CFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**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

Attachment C:
USGS Stream Stats

PA0205800 StreamStats Report

Region ID: PA
Workspace ID: PA20250128174927524000
Clicked Point (Latitude, Longitude): 39.94845, -79.94989
Time: 2025-01-28 12:50:10 -0500



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLOPD	Mean basin slope measured in degrees	12.2203	degrees
DRNAREA	Area that drains to a point on a stream	4600	square miles
ELEV	Mean Basin Elevation	1934	feet

Low-Flow Statistics

Low-Flow Statistics Parameters [Low Flow Region 4]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4600	square miles	2.26	1400
ELEV	Mean Basin Elevation	1934	feet	1050	2580

Low-Flow Statistics Disclaimers [Low Flow Region 4]

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

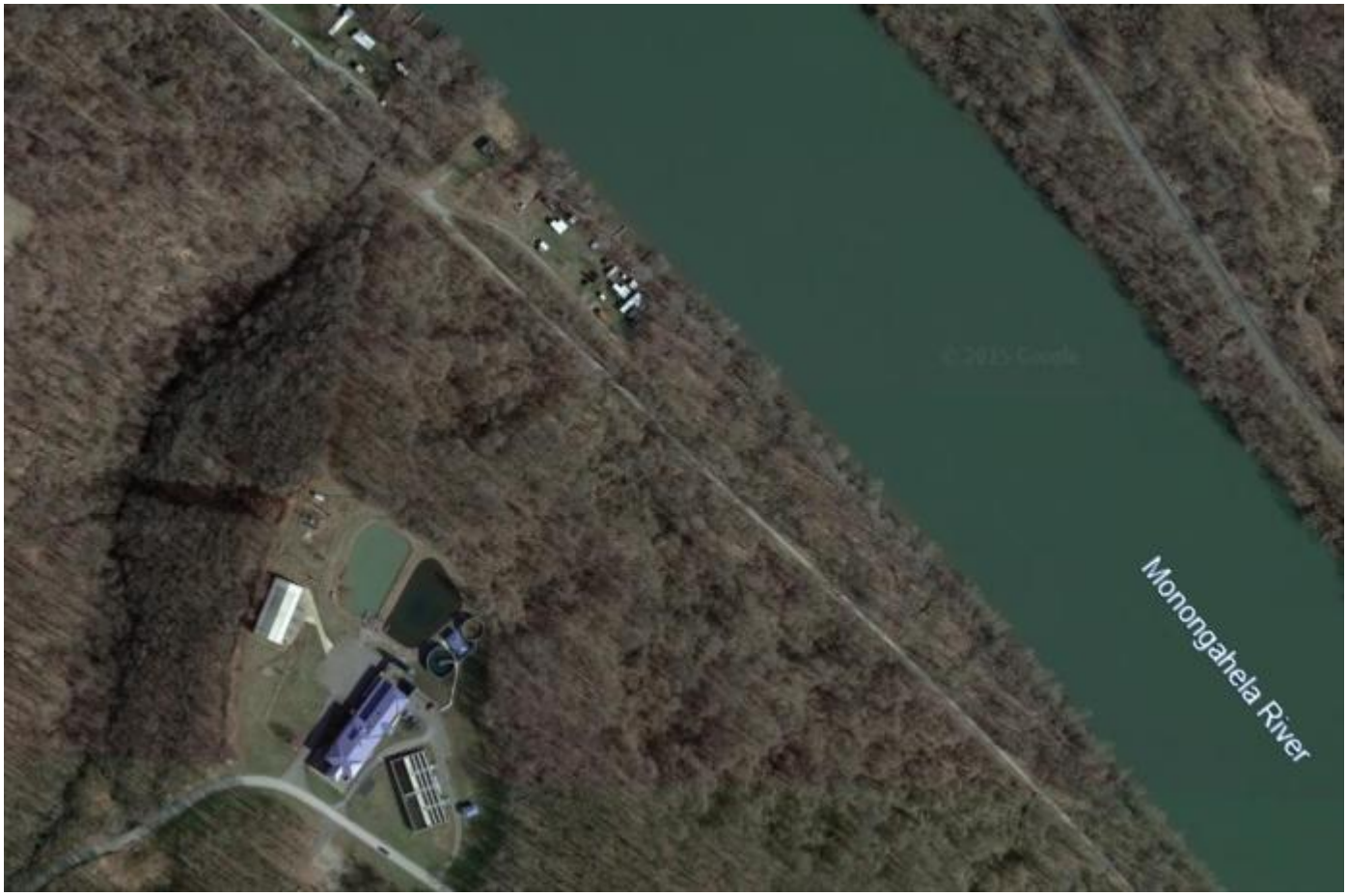
Low-Flow Statistics Flow Report [Low Flow Region 4]

Statistic	Value	Unit
7 Day 2 Year Low Flow	622	ft^3/s
30 Day 2 Year Low Flow	833	ft^3/s
7 Day 10 Year Low Flow	354	ft^3/s
30 Day 10 Year Low Flow	420	ft^3/s
90 Day 10 Year Low Flow	634	ft^3/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/)

Attachment D:
Aerial Site Map


Monongahela River