pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Southwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0000361**
Facility Type	**Industrial**	APS ID	**701557**
Major / Minor	**Minor**	Authorization ID	**1219272**

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

Applicant and Facility Information

Applicant Name	**Westmoreland County Municipal Authority**	Facility Name	**Beaver Run WTP**
Applicant Address	PO Box 730	Facility Address	Beaver Run George Sweeney Wp
	Greensburg, PA 15601-0730		Saltsburg, PA 15681
Applicant Contact	Chris Kerr	Facility Contact	
Applicant Phone	(724) 834-6500	Facility Phone	
Client ID	64197	Site ID	375260
SIC Code	4941	Municipality	Washington Township
SIC Description	Trans. & Utilities - Water Supply	County	Westmoreland
Date Application Received	March 2, 2018	EPA Waived?	Yes
Date Application Accepted		If No, Reason	

Purpose of Application: Renewal of NPDES Industrial Waste Permit without an ELG.

Summary of Review

The Department received a late NPDES permit renewal application from the Municipal Authority of Westmoreland County for the Beaver Run Water Treatment Plant (WTP) located in Washington Township of Westmoreland County on March 2, 2018. Additional sampling results were provided on April 5, 2018 for a complete renewal application data set.

The Authority treats filter backwash, contact clarifier wash and rinse water, sludge drying bed filtrate, and miscellaneous plant drains with dissolved air flotation. Sludges are dewatered on site through sand drying beds. Treated wastewater could be recycled to the head of the water plant or discharged with storm water to Beaver Run through Outfall 001. Outfall 002 is located in Washington Township, Westmoreland County and discharges storm water from the two sludge lagoons of the former water treatment plant. Both lagoons discharge to a swale that enters Beaver Run. This swale is designated as Outfall 002. The standard industrial classification (SIC) code for this facility is 4941 - municipal water supply.

Part C language in the draft permit provides controls on Floating Solids, Chemical Additives, Residual Solids, Total Residual Chlorine, Stormwater Outfalls and Sedimentation Basin Cleaning.

The Beaver Run WTP has no open violations.

It is recommended that a draft permit be published for public comment in response to this application.

Approve	Deny	Signatures	Date
X		Curtis Holes, P.E. / Environmental Engineer	June 13, 2022
X		Michael E. Fifth, P.E. / Environmental Engineer Manager	June 14, 2022

Summary of Review

Public Participation

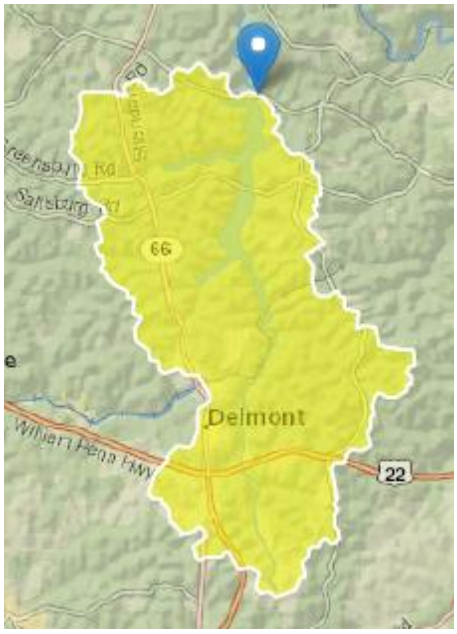
DEP will publish notice of the receipt of the NPDES permit application and a tentative decision to issue the individual NPDES permit in the *Pennsylvania Bulletin* in accordance with 25 Pa. Code § 92a.82. Upon publication in the *Pennsylvania Bulletin*, DEP will accept written comments from interested 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)	1.25 (eDMRs)
Latitude	40º 30' 46.21"	Longitude	-79º 33' 07.20"
Quad Name	Vandergrift	Quad Code	1409
Wastewater Description:	Filter backwash, contact clarifier wash and rinse water, sludge drying bed filtrate, plant drains.		
Receiving Waters	Beaver Run (TSF)	Stream Code	42931
NHD Com ID	125290581	RMI	6.69
Drainage Area	42.8	Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	9.9 (6.5 MGD)*	Q_{7-10} Basis	Min flow required below reservoir
Elevation (ft)	1000	Slope (ft/ft)	0.0071
Watershed No.	18-B	Chapter 93 Class.	TSF
Existing Use		Existing Use Qualifier	
Exceptions to Use	NA	Exceptions to Criteria	None
Assessment Status	Impaired		
Cause(s) of Impairment	Metals, PH, TOTAL SUSPENDED SOLIDS (TSS)		
Source(s) of Impairment	ACID MINE DRAINAGE, ACID MINE DRAINAGE, ACID MINE DRAINAGE		
TMDL Status	Final, 01/29/2010	Name	Kiskiminetas-Conemaugh River Watersheds TMDL
Nearest Downstream Public Water Supply Intake	Buffalo Township Municipal Authority (1.25 MGD)		
PWS Waters	Allegheny River	Flow at Intake (cfs)	1,020
PWS RMI	29.4	Distance from Outfall (mi)	23

Other Comments: * The applicant is required to maintain a minimum flow of 9.9 cfs (6.5 MGD) immediately below the reservoir in the Beaver Run at all times.

Drainage Area



Discharge, Receiving Waters and Water Supply Information

Outfall No.	002	Design Flow (MGD)	0
Latitude	40º 30' 58.87"	Longitude	-79º 33' 12.51"
Quad Name	Vandergrift	Quad Code	1409
Wastewater Description:	Stormwater		
Receiving Waters	Beaver Run (TSF)	Stream Code	42931
NHD Com ID	125290584	RMI	
Assessment Status	Impaired		
Cause(s) of Impairment	Metals, PH, TOTAL SUSPENDED SOLIDS (TSS)		
Source(s) of Impairment	ACID MINE DRAINAGE, ACID MINE DRAINAGE, ACID MINE DRAINAGE		
TMDL Status	Final	Name	Kiskiminetas-Conemaugh River Watersheds TMDL

Compliance History

DMR Data for Outfall 001 (from April 1, 2018 to March 31, 2019)

Parameter	Limit	APR-22	MAR-22	FEB-22	JAN-22	DEC-21	NOV-21	OCT-21	SEP-21	AUG-21	JUL-21	JUN-21	APR-22
Flow (MGD) Average Monthly	**Report**	1.056	1.252	1.212	1.26	1.239	1.327	1.263	1.277	1.279	1.37	1.430	1.056
Flow (MGD) Daily Maximum	**Report**	1.176	1.840	1.335	1.44	1.337	1.579	1.386	1.907	1.985	1.52	1.551	1.176
pH (S.U.) Minimum	**6.0**	6.94	7.04	7.17	7.10	7.09	7.08	7.04	7.06	6.78	7.03	7.0	6.94
pH (S.U.) Maximum	**9.0**	7.48	7.43	7.56	7.46	7.57	7.70	7.48	7.33	7.26	7.33	7.5	7.48
TRC (mg/L) Average Monthly	**0.5**	0.0636	0.068	0.08	0.083	0.075	0.08	0.07	0.08	0.08	0.1	0.078	0.0636
TRC (mg/L) IMAX	**1.0**	0.12	0.15	0.21	0.19	0.23	0.18	0.19	0.24	0.18	0.22	0.16	0.12
TSS (mg/L) Average Monthly	**30.0**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
TSS (mg/L) IMAX	**60.0**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Total Aluminum (mg/L) Average Monthly	**0.75**	0.0635	0.0875	0.062	0.0585	0.0565	0.088	0.0795	0.103	0.074	0.0915	0.0735	0.0635
Total Aluminum (mg/L) IMAX	**1.5**	0.064	0.088	0.063	0.060	0.057	0.089	0.086	0.111	0.077	0.106	0.085	0.064
Total Iron (mg/L) Average Monthly	**1.5**	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200
Total Iron (mg/L) Daily Maximum	**3.0**	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200	< 0.0200
Total Manganese (mg/L) Average Monthly	**1.0**	0.0265	0.034	0.024	0.0385	0.053	0.146	0.102	0.137	0.116	0.11	0.049	0.0265
Total Manganese (mg/L) IMAX	**2.0**	0.027	0.038	0.025	0.041	0.058	0.150	0.138	0.158	0.118	0.124	0.052	0.027

DMR Data for Outfall 002 (from April 1, 2018 to March 31, 2019)

Parameter	Limit	MAR-22	FEB-22	JAN-22	DEC-21	NOV-21	OCT-21	SEP-21	AUG-21	JUL-21	JUN-21	MAR-22	FEB-22
Flow (MGD) Average Monthly	**Report**							0.0005			0.025		
Flow (MGD) Daily Maximum	**Report**							0.0009			0.045		
pH (S.U.) Minimum	**6.0**							7.01			6.98		
pH (S.U.) Maximum	**9.0**							7.11			7.22		
TRC (mg/L) Average Monthly	**0.5**							0.015			0.045		
TRC (mg/L) IMAX	**1.0**							0.02			0.06		
TSS (mg/L) Average Monthly	**30.0**							8.5			< 5		
TSS (mg/L) IMAX	**60.0**							12			< 5		
Total Aluminum (mg/L) Average Monthly	**0.75**							0.059			0.025		
Total Aluminum (mg/L) IMAX	**0.75**							0.092			0.033		
Total Iron (mg/L) Average Monthly	**1.5**							**3.09**			0.177		
Total Iron (mg/L) IMAX	**3.0**							**4.88**			0.238		
Total Manganese (mg/L) Average Monthly	**1.0**							**5.11**			0.82		
Total Manganese (mg/L) IMAX	**2.0**							**7.82**			1.23		

Compliance History

Effluent Violations for Outfall 002, from: June 1, 2021 To: April 30, 2022

Parameter	Date	SBC	DMR Value	Units	Limit Value	Units
Total Iron	09/30/21	Avg Mo	3.09	mg/L	1.5	mg/L
Total Iron	09/30/21	IMAX	4.88	mg/L	3.0	mg/L
Total Manganese	09/30/21	Avg Mo	5.11	mg/L	1.0	mg/L
Total Manganese	09/30/21	IMAX	7.82	mg/L	2.0	mg/L

Summary of Inspections: The last inspection conducted by the Department was on August 18, 2021 by Zachary Flannigan and no violations were noted.

Other Comments: None

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** 1.25 (eDMRs)
Latitude 40º 30' 46.2" **Longitude** -79º 33' 07.2"
Wastewater Description: Filter backwash, contact clarifier wash and rinse water, sludge drying bed filtrate, plant drains.

Technology-Based Limitations

The Beaver Run WTP facility 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

The pH effluent range for all Industrial waste process and non-process discharges pursuant to 25 Pa. Code § 92a.48(a)(2) and 25 Pa. Code § 95.2 is indicated in Table 1 below.

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

Pursuant to 25 Pa. Code § 95.2(4) effluent standards for industrial wastes may not contain more than 7 mg/L of dissolved iron as indicated in Table 1 below.

Pursuant to 25 Pa. Code § 92a.48(b) the imposition of technology-based Total Residual Chlorine (TRC) limits for facilities that use chlorination and that are not already subject to TRC limits based on applicable federal ELG's or a facility specific BPJ evaluation as indicated in Table 1 below.

Table 1. Regulatory Effluent Standards

Parameter	Monthly Avg.	Daily Max	IMAX
Flow (MGD)	Monitor	Monitor	----
Iron, Dissolved	----	----	7.0 mg/L
pH (S.U.)	6.0-9.0 at all times		
TRC	0.5 mg/L	----	1.6 mg/L

Total Dissolved Solids (TDS)

Integral to the implementation of 25 Pa. Code § 95.10 is the principle that existing, authorized mass loadings of TDS are exempt from any treatment requirements under these provisions. Existing mass loadings of TDS up to and including the maximum daily discharge loading for any existing discharge, provided that the loading was authorized prior to August 21, 2010 are exempt. Discharge loadings of TDS authorized by the Department are typically exempt from the treatment requirements of Chapter 95.10 until the net TDS loading is increased, an existing discharge proposes a hydraulic expansion or a change in the waste stream. If there are existing mass or production-based TDS effluent limits, then these are used as the basis for the existing mass loading. The facility is not a new or expanding waste loading of TDS, therefore, the facility is exempt from 25 Pa. Code § 95.10 treatment requirements.

Best Practicable Control Technology Currently Achievable (BPT)

The Department's Technical Support Document, *Technology-Based Control Requirements for Water Treatment Plant Wastes* (DEP-ID 362-2183-003) establishes BAT for discharges of WTPs wastewater, which are illustrated in Table 2 below.

Table 2. BAT Limits for WTP Filter Backwash Wastewater

Parameter	Monthly Avg. (mg/L)	Daily Max (mg/L)
Total Suspended solids (TSS)	30.0	60.0
Iron (total)*	1.5	3.0
Aluminum (total)*	0.75	0.75
Manganese (total)	1.0	2.0
Flow	Monitor	----
pH (S.U.)	6.0-9.0 at all times	
TRC	0.5	1.0

* Kiskiminetas-Conemaugh River watersheds TMDL- January 29, 2010. Refer to Other Considerations section of the Fact Sheet for details.

Water Quality-Based Limitations

Total Maximum Daily Load (TMDL)

Wastewater discharges from Beaver Run Water Filtration Plant are located within the Kiskiminetas-Conemaugh River watershed which the Department has developed a TMDL. The TMDL was finalized on January 29, 2010 to address metals, pH, sediment impairments associated with abandoned mine drainage within the Watershed. The Industrial Waste discharge for the Beaver Run Water Filtration Plant consists of filter backwash, contact clarifier wash and rinse water, sludge drying bed filtrate, plant drains.

Section 303(d) of the Clean Water Act and the U.S. Environmental Protection Agency's (EPA) Water Quality Planning and Management Regulations (codified at Title 40 of the Code of Federal Regulations Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for impaired water bodies. A TMDL establishes the amount of a pollutant that a water body can assimilate without exceeding its water quality standard for that pollutant. TMDLs provide the scientific basis for a state to establish water quality-based controls to reduce pollution from both point and nonpoint sources to restore and maintain the quality of the state's water resources (USEPA 1991a).

Stream reaches in the Kiskiminetas River and Conemaugh River watersheds in southwestern Pennsylvania are included on the state's 2008 Section 303(d) list because of various impairments, including metals, pH, and sediment. TMDLs were developed to address metals, pH, and sediment impairments associated with abandoned mine drainage or discharge using the Mining Data Analysis System (MDAS). MDAS is a comprehensive data management and modeling system capable of representing loads from nonpoint and point sources in the watershed and simulating in-stream processes.

Modeled sub-watershed loadings were iteratively reduced to estimate the load reductions required to meet in-stream concentration targets for metals. The target concentrations were based on established water quality criteria of 0.750 milligrams per liter (mg/L) total aluminum, 1.5 mg/L total iron, 0.3 mg/L dissolved iron, and 1.0 mg/L manganese. Iron reductions were used as a surrogate for sediment reductions. For purposes of this TMDL, sediment includes total suspended solids (TSS). Streams placed on Pennsylvania's Section 303(d) list with a designated use of high quality or exceptional value are subject to additional protection pursuant to the state's anti-degradation policy. Data from a PADEP reference stream was obtained from PADEP and used to develop endpoints for high quality or exceptional value streams. Long-term loads based on the TMDL allocations were identified, as well as median and maximum allowable daily loads.

Toxics Management Analysis

The Department's Toxics Management Spreadsheet (TMS) was utilized to facilitate calculations necessary for completing a reasonable potential analysis and determine Water Quality-Based Effluent Limitations (WQBELs) for discharges containing toxic pollutant concentrations. TMS combines the functionality of two (2) of the Department's analysis tools, Toxics Screening Analysis Spreadsheet and PENTOXSD water quality model.

DEP's procedures for evaluating reasonable potential are as follows:

1. For IW discharges, the design flow to use in modeling is the average flow during production or operation and may be taken form the permit application.

2. Perform a Toxics Screening Analysis to identify toxic pollutants of concern. All toxic pollutants, as reported in the permit application or on DMRs, are modeled by the TMS to determine the parameters 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].

    - Establish limits in the draft permit where the maximum reported concentration equals or exceeds 50% of the WQBEL. Use the average monthly and maximum daily limits for the permit as recommended by TMS. Establish an IMAX limit at 2.5 times the average monthly limit.

    - For non-conservative pollutants, establish monitoring requirements where the maximum reported concentration is between 25% - 50% of the WQBEL.

    - For conservative pollutants, establish monitoring requirements where the maximum reported concentration is between 10% - 50% of the WQBEL.

Discharges from Outfall 001 are evaluated based on concentrations reported on the application and contained in the DMRs; data from those sources are used as inputs into the TMS. A summary of TMS Inputs is contained in Table 3 below.

Table 3. TMS Inputs

Parameter	Value
Discharge Inputs	
Facility	Beaver WTP
Evaluation Type	Industrial
NPDES Permit No.	PA0000361
Wastewater Description	Filter Backwash
Outfall ID	001
Design Flow (MGD)	2.0
Hardness ($^{mg}/_{L}$)	217
pH (S.U.)	7
Partial Mix Factors	Unknown – Calculated by TMS
Complete Mix Times	
Q_{7-10} (min)	
Q_h (min)	
Stream Inputs	
Receiving Surface Water	Beaver Run
Number of Reaches to Model	1
Stream Code	042931
RMI	6.69
Elevation (ft)	1000/995*
Drainage Area (mi^2)	42.8
Slope (ft/ft)	
PWS Withdrawal (MGD)	1.25
Apply Fish Criteria	Yes
Low Flow Yield (cfs/mi^2)	
Flows	
Stream (cfs)	9.9/2070*****
Tributary (cfs)	N/A
Width (ft)	65/840*****
Stream Hardness ($^{mg}/_{L}$)	100
Stream pH (S.U.)	7.0

***** Denotes discharge location/downstream location values.

Based on the recommendations of the TMS, one WQBEL is recommended at Outfall 001 for monitor and report of total aluminum. Analysis Report from the TMS run is included in Attachment A.

WQM 7.0 Model

In general, WQM 7.0 Model is run if the maximum $BOD_5/CBOD_5$ concentrations exceeds 30/25 mg/L respectively in the permit application or the DMRs. The permit application reports $BOD_5/CBOD_5$ concentrations of 2/12 mg/L respectively, therefore, WQM 7.0 Model is not required to be run.

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, identify that BAT is the most stringent criteria for TRC at an average monthly limit of 0.5 mg/L. The maximum daily limit is 2 times the average monthly limit resulting in a 1.0 mg/L limit for maximum daily.

Anti-Backsliding

Section 402(o) of the Clean Water Act (CWA), enacted in the Water Quality Act of 1987, establishes anti-backsliding rules governing two situations. The first situation occurs when a permittee seeks to revise a Technology-Based effluent limitation based on BPJ to reflect a subsequently promulgated effluent guideline which is less stringent. The second situation addressed by Section 402(o) arises when a permittee seeks relaxation of an effluent limitation which is based upon a State treatment standard of water quality standard.

Previous limits can be used pursuant to EPA's anti-backsliding regulation 40 CFR 122.44 (l) Reissued permits. (1) Except as provided in paragraph (l)(2) of this section when a permit is renewed or reissued. Interim effluent limitations, standards or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit (unless the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued and would constitute cause for permit modification or revocation and reissuance under §122.62). (2) In the case of effluent limitations established on the basis of Section 402(a)(1)(B) of the CWA, a permit may not be renewed, reissued, or modified on the basis of effluent guidelines promulgated under section 304(b) subsequent to the original issuance of such permit, to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit.

The facility is not seeking to revise the previously permitted effluent limits.

Effluent Limitations and Monitoring Requirements for Outfall 001

Effluent limits applicable at Outfall 001 are the more stringent of TBELs, WQBELs, regulatory effluent standards, and monitoring requirements as summarized in Table 4. The applicable limits and monitoring requirements provided below are based on in the most stringent limits listed in Tables 1 and 2 of this Fact Sheet.

Table 4. Effluent limits and monitoring requirements for Outfall 001

Parameter	Mass (pounds)		Concentration (mg/L)			Basis
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(d)(1)
Total Residual Chlorine	—	—	0.5	1.0	—	25 Pa. Code § 92a.48(b)
Total Suspended Solids	—	—	30.0	60.0	—	40 CFR § 125.3
Iron (total)	—	—	1.5	3.0	—	40 CFR § 125.3
Aluminum (total)	—	—	0.75	0.75	—	40 CFR § 125.3
Manganese (total)	—	—	1.0	2.0	—	40 CFR § 125.3
pH (S.U.)	Within the range of 6.0 to 9.0					25 Pa. Code § 92a.48(a)(2) & 25 Pa. Code § 95.2

Sample frequencies and types are derived from the "NPDES Permit Writer's Manual" (362-0400-001) and/or as previous permits monitoring requirements for Beaver Run WTP are displayed in Table 5 below.

Table 5. Monitoring Requirements for Outfall 001

Parameter	Sample Type	Minimum Sample Frequency
Flow (MGD)	Meter	2/Month
TRC	Grab	2/Month
Total Suspended Solids	Grab	2/Month
Iron (total)	Grab	2/Month
Aluminum (total)	Grab	2/Month
Manganese (total)	Grab	2/Month
pH (S.U.)	Grab	2/Month

Development of Effluent Limitations

Outfall No. 002 **Design Flow (MGD)** Varied
Latitude 40° 31' 00" **Longitude** -79° 33' 12"

Wastewater Description: Storm water runoff from closed sludge lagoons at the former defunct water treatment plant

Technology-Based Limitations

The discharge through outfall 002 consists of storm water runoff through closed sludge lagoon from the now defunct water treatment plant. Outfall 002 is located in Washington Township, Westmoreland County. Outfall 002 has the same parameters of concern as Outfall 001, since the stormwater is exposed to historic water treatment plant components. Outfall 002 monitoring requirements will continue to mirror Outfall 001 requirements on a twice per quarter monitoring frequency.

Water Quality-Based Limitations

The discharge through outfall 002 consists of storm water runoff through closed sludge lagoon from the now defunct water treatment plant. Outfall 002 is located in Washington Township, Westmoreland County. Water quality analysis was not performed on the discharges from this outfall.

Effluent Limitations and Monitoring Requirements for Outfall 002

Effluent limits applicable at Outfall 002 are the more stringent of TBELs, WQBELs, regulatory effluent standards, and monitoring requirements as summarized in Table 5. The applicable limits and monitoring requirements provided below are based on previously imposed limits.

Table 5. Effluent limits and monitoring requirements for Outfall 002

Parameter	Mass (pounds)		Concentration (mg/L)			Basis
	Average Monthly	Daily Maximum	Average Quarterly	Daily Maximum	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(d)(1)
Total Residual Chlorine	—	—	0.5	1.0	—	25 Pa. Code § 92a.48(b)
Total Suspended Solids	—	—	30.0	60.0	—	40 CFR § 125.3
Iron (total)	—	—	1.5	3.0	—	40 CFR § 125.3
Aluminum (total)	—	—	0.75	0.75	—	40 CFR § 125.3
Manganese (total)	—	—	1.0	2.0	—	40 CFR § 125.3
pH (S.U.)	Within the range of 6.0 to 9.0					25 Pa. Code § 95.2 & 25 Pa. Code § 92a.48(a)(2)

Sample frequencies and types are derived from the "NPDES Permit Writer's Manual" (362-0400-001) and/or as previous permits monitoring requirements for Beaver Run WTP are displayed in Table 6 below.

Table 6. Monitoring Requirements for Outfall 002

Parameter	Sample Type	Minimum Sample Frequency
Flow (MGD)	Measured	2/Quarter
TRC	Grab	2/Quarter
Total Suspended Solids	Grab	2/Quarter
Iron (total)	Grab	2/Quarter
Aluminum (total)	Grab	2/Quarter
Manganese (total)	Grab	2/Quarter
pH (S.U.)	Grab	2/Quarter

Tools and References Used to Develop Permit	
☐	WQM for Windows Model (see Attachment)
☒	TMS Model (see Attachment **B**)
☒	TRC Model Spreadsheet (see Attachment **C**)
☐	Temperature Model Spreadsheet (see Attachment)
☐	Toxics Screening Analysis Spreadsheet (see Attachment)
☐	Water Quality Toxics Management Strategy, 361-0100-003, 4/06.
☐	Technical Guidance for the Development and Specification of Effluent Limitations, 362-0400-001, 10/97.
☐	Policy for Permitting Surface Water Diversions, 362-2000-003, 3/98.
☐	Policy for Conducting Technical Reviews of Minor NPDES Renewal Applications, 362-2000-008, 11/96.
☐	Technology-Based Control Requirements for Water Treatment Plant Wastes, 362-2183-003, 10/97.
☐	Technical Guidance for Development of NPDES Permit Requirements Steam Electric Industry, 362-2183-004, 12/97.
☐	Pennsylvania CSO Policy, 385-2000-011, 9/08.
☐	Water Quality Antidegradation Implementation Guidance, 391-0300-002, 11/03.
☐	Implementation Guidance Evaluation & Process Thermal Discharge (316(a)) Federal Water Pollution Act, 391-2000-002, 4/97.
☐	Determining Water Quality-Based Effluent Limits, 391-2000-003, 12/97.
☐	Implementation Guidance Design Conditions, 391-2000-006, 9/97.
☐	Technical Reference Guide (TRG) WQM 7.0 for Windows, Wasteload Allocation Program for Dissolved Oxygen and Ammonia Nitrogen, Version 1.0, 391-2000-007, 6/2004.
☐	Interim Method for the Sampling and Analysis of Osmotic Pressure on Streams, Brines, and Industrial Discharges, 391-2000-008, 10/1997.
☐	Implementation Guidance for Section 95.6 Management of Point Source Phosphorus Discharges to Lakes, Ponds, and Impoundments, 391-2000-010, 3/99.
☐	Technical Reference Guide (TRG) PENTOXSD for Windows, PA Single Discharge Wasteload Allocation Program for Toxics, Version 2.0, 391-2000-011, 5/2004.
☐	Implementation Guidance for Section 93.7 Ammonia Criteria, 391-2000-013, 11/97.
☐	Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers, 391-2000-014, 4/2008.
☐	Implementation Guidance Total Residual Chlorine (TRC) Regulation, 391-2000-015, 11/1994.
☐	Implementation Guidance for Temperature Criteria, 391-2000-017, 4/09.
☐	Implementation Guidance for Section 95.9 Phosphorus Discharges to Free Flowing Streams, 391-2000-018, 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, 391-2000-019, 10/97.
☐	Field Data Collection and Evaluation Protocol for Determining Stream and Point Source Discharge Design Hardness, 391-2000-021, 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, 391-2000-022, 3/1999.
☐	Design Stream Flows, 391-2000-023, 9/98.
☐	Field Data Collection and Evaluation Protocol for Deriving Daily and Hourly Discharge Coefficients of Variation (CV) and Other Discharge Characteristics, 391-2000-024, 10/98.
☐	Evaluations of Phosphorus Discharges to Lakes, Ponds and Impoundments, 391-3200-013, 6/97.
☐	Pennsylvania's Chesapeake Bay Tributary Strategy Implementation Plan for NPDES Permitting, 4/07.
☐	SOP:
☒	Other: USGS StreamStats (see Attachment **D**)

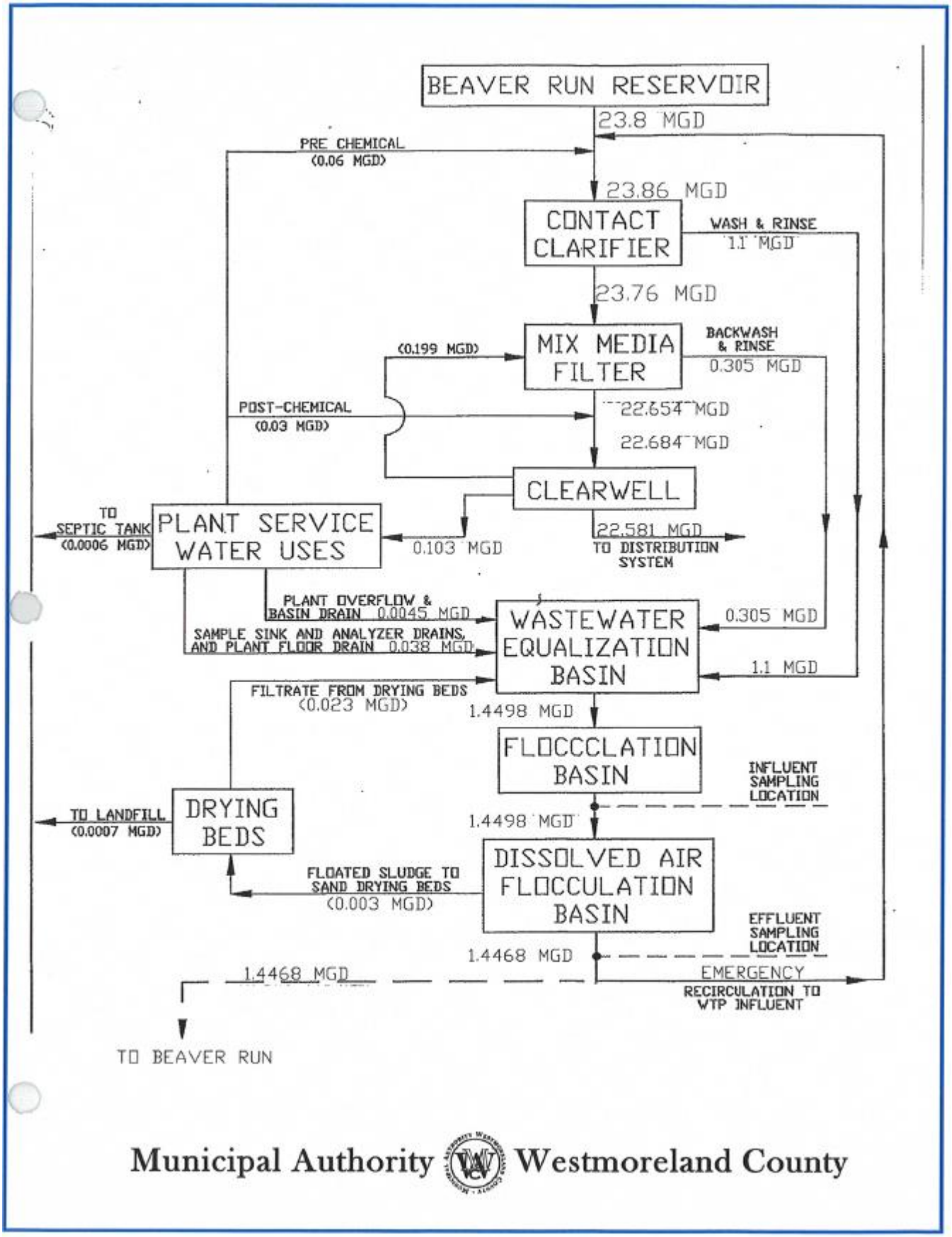
Appendix A – Facility Site Plan

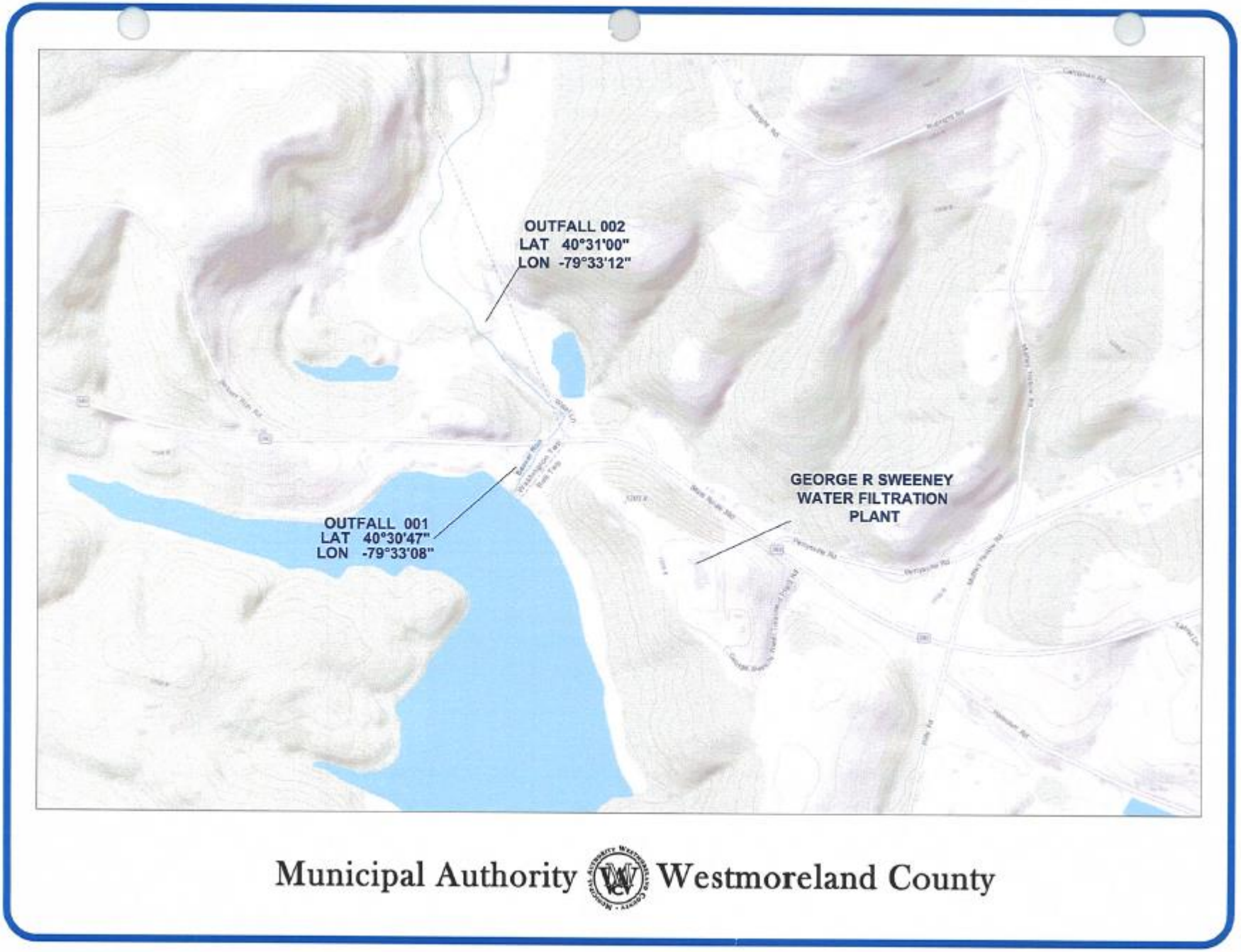
Appendix B - TMS Model Summary

Appendix C – TRC Model Summary

Appendix D – USGS StreamStats

Appendix A – Facility Site Plan


BEAVER RUN RESERVOIR
23.8 MGD
PRE CHEMICAL
(0.06 MGD)
23.86 MGD
CONTACT CLARIFIER
WASH & RINSE
1.1 MGD
23.76 MGD
(0.199 MGD)
MIX MEDIA FILTER
BACKWASH & RINSE
0.305 MGD
POST-CHEMICAL
(0.03 MGD)
22.654 MGD
22.684 MGD
CLEARWELL
TO SEPTIC TANK
(0.0006 MGD)
PLANT SERVICE WATER USES
0.103 MGD
22.581 MGD
TO DISTRIBUTION SYSTEM
PLANT OVERFLOW & BASIN DRAIN 0.0045 MGD
SAMPLE SINK AND ANALYZER DRAINS, AND PLANT FLOOR DRAIN 0.038 MGD
WASTEWATER EQUALIZATION BASIN
0.305 MGD
1.1 MGD
FILTRATE FROM DRYING BEDS
(0.023 MGD)
1.4498 MGD
FLOCCCLATION BASIN
INFLUENT SAMPLING LOCATION
TO LANDFILL
(0.0007 MGD)
DRYING BEDS
1.4498 MGD
DISSOLVED AIR FLOCCULATION BASIN
FLOATED SLUDGE TO SAND DRYING BEDS
(0.003 MGD)
EFFLUENT SAMPLING LOCATION
1.4468 MGD
1.4468 MGD
EMERGENCY RECIRCULATION TO WTP INFLUENT
TO BEAVER RUN
Municipal Authority Westmoreland County


OUTFALL 002
LAT 40°31'00"
LON -79°33'12"
GEORGE R SWEENEY
WATER FILTRATION
PLANT
OUTFALL 001
LAT 40°30'47"
LON -79°33'08"
Municipal Authority
Westmoreland County

Appendix B – TMS Model Summary

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.3, March 2021

Model Results

Beaver Run WTP, NPDES Permit No. PA 0000361, Outfall 001

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

☐ ***Hydrodynamics***

☑ ***Wasteload Allocations***

☑ ***AFC*** CCT (min): 5.135 PMF: 1 Analysis Hardness (mg/l): 119.12 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	4,590	
Total Antimony	0	0		0	1,100	1,100	6,732	
Total Arsenic	0	0		0	340	340	2,081	Chem Translator of 1 applied
Total Barium	0	0		0	21,000	21,000	128,511	
Total Boron	0	0		0	8,100	8,100	49,569	
Total Cadmium	0	0		0	2.387	2.55	15.6	Chem Translator of 0.937 applied
Total Chromium (III)	0	0		0	657.541	2,081	12,734	Chem Translator of 0.316 applied
Hexavalent Chromium	0	0		0	16	16.3	99.7	Chem Translator of 0.982 applied
Total Cobalt	0	0		0	95	95.0	581	
Total Copper	0	0		0	15.847	16.5	101	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	78.092	102	624	Chem Translator of 0.766 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	1.400	1.65	10.1	Chem Translator of 0.85 applied
Total Nickel	0	0		0	542.931	544	3,329	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	4.346	5.11	31.3	Chem Translator of 0.85 applied
Total Thallium	0	0		0	65	65.0	398	
Total Zinc	0	0		0	135.904	139	850	Chem Translator of 0.978 applied

Model Results 6/10/2022 Page 1

☑ *CFC* CCT (min): 5.135 PMF: 1 Analysis Hardness (mg/l): 119.12 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	1,346	
Total Arsenic	0	0		0	150	150	918	Chem Translator of 1 applied
Total Barium	0	0		0	4,100	4,100	25,090	
Total Boron	0	0		0	1,600	1,600	9,791	
Total Cadmium	0	0		0	0.278	0.31	1.89	Chem Translator of 0.902 applied
Total Chromium (III)	0	0		0	85.533	99.5	609	Chem Translator of 0.86 applied
Hexavalent Chromium	0	0		0	10	10.4	63.6	Chem Translator of 0.962 applied
Total Cobalt	0	0		0	19	19.0	116	
Total Copper	0	0		0	10.400	10.8	66.3	Chem Translator of 0.96 applied
Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	1,500	1,500	9,179	WQC = 30 day average; PMF = 1
Total Lead	0	0		0	3.043	3.98	24.3	Chem Translator of 0.766 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	0.770	0.91	5.54	Chem Translator of 0.85 applied
Total Nickel	0	0		0	60.303	60.5	370	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	30.5	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	79.6	
Total Zinc	0	0		0	137.016	139	850	Chem Translator of 0.986 applied

☑ *THH* CCT (min): 5.135 THH PMF: 1 Analysis Hardness (mg/l): N/A Analysis pH: N/A PWS PMF: 1

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	#########	WQC applied at RMI 6.5 with a design stream flow of 2070 cfs
Chloride (PWS)	0	0		0	250,000	250,000	#########	WQC applied at RMI 6.5 with a design stream flow of 2070 cfs
Sulfate (PWS)	0	0		0	250,000	250,000	#########	WQC applied at RMI 6.5 with a design stream flow of 2070 cfs
Fluoride (PWS)	0	0		0	2,000	2,000	2,142,918	WQC applied at RMI 6.5 with a design stream flow of 2070 cfs
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	5.6	5.6	34.3	
Total Arsenic	0	0		0	10	10.0	61.2	
Total Barium	0	0		0	2,400	2,400	14,687	
Total Boron	0	0		0	3,100	3,100	18,971	
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	1,836	
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	6,120	
Total Mercury	0	0		0	0.050	0.05	0.31	
Total Nickel	0	0		0	610	610	3,733	
Total Phenols (Phenolics) (PWS)	0	0		0	5	5.0	5,357	WQC applied at RMI 6.5 with a design stream flow of 2070 cfs
Total Selenium	0	0		0	N/A	N/A	N/A	
Total Silver	0	0		0	N/A	N/A	N/A	
Total Thallium	0	0		0	0.24	0.24	1.47	
Total Zinc	0	0		0	N/A	N/A	N/A	

☑ *CRL* CCT (min): 2.425 PMF: 1 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	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

	Mass Limits		*Concentration Limits*						
Pollutants	AML (lbs/day)	MDL (lbs/day)	AML	MDL	IMAX	Units	Governing WQBEL	WQBEL Basis	Comments
Total Aluminum	Report	Report	Report	Report	Report	µg/L	2,942	AFC	Discharge Conc > 10% WQBEL (no RP)

☑ ***Other Pollutants without Limits or Monitoring***

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

Pollutants	Governing WQBEL	Units	Comments
Total Dissolved Solids (PWS)	535,729	mg/L	Discharge Conc ≤ 10% WQBEL
Chloride (PWS)	267,865	mg/L	Discharge Conc ≤ 10% WQBEL
Bromide	N/A	N/A	No WQS
Sulfate (PWS)	267,865	mg/L	Discharge Conc ≤ 10% WQBEL
Fluoride (PWS)	2,143	mg/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	14,687	µg/L	Discharge Conc ≤ 10% WQBEL
Total Beryllium	N/A	N/A	No WQS
Total Boron	9,791	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cadmium	1.89	µg/L	Discharge Conc < TQL
Total Chromium (III)	609	µg/L	Discharge Conc < TQL
Hexavalent Chromium	63.6	µg/L	Discharge Conc < TQL
Total Cobalt	116	µg/L	Discharge Conc ≤ 10% WQBEL
Total Copper	64.8	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cyanide	N/A	N/A	No WQS
Dissolved Iron	1,836	µg/L	Discharge Conc < TQL
Total Iron	9,179	µg/L	Discharge Conc ≤ 10% WQBEL
Total Lead	24.3	µg/L	Discharge Conc < TQL
Total Manganese	6,120	µg/L	Discharge Conc ≤ 10% WQBEL
Total Mercury	0.31	µg/L	Discharge Conc < TQL
Total Nickel	370	µg/L	Discharge Conc ≤ 10% WQBEL
Total Phenols (Phenolics) (PWS)	5,357	µg/L	Discharge Conc ≤ 10% WQBEL
Total Selenium	30.5	µg/L	Discharge Conc < TQL
Total Silver	20.1	µg/L	Discharge Conc < TQL
Total Thallium	1.47	µg/L	Discharge Conc < TQL
Total Zinc	545	µg/L	Discharge Conc < TQL

Appendix C – TRC Model Summary

TRC_CALC_Beaver Run

TRC EVALUATION

9.9	= Q stream (cfs)	0.5	= CV Daily
1.25	= Q discharge (MGD)	0.5	= CV Hourly
4	= no. samples	0.705	= AFC_Partial Mix Factor
0.3	= Chlorine Demand of Stream	1	= CFC_Partial Mix Factor
0.06	= 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 = 1.230	1.3.2.iii	WLA cfc = 1.663
PENTOXSD TRG	5.1a	LTAMULT afc = 0.373	5.1c	LTAMULT cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc= 0.458	5.1d	LTA_cfc = 0.967

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	

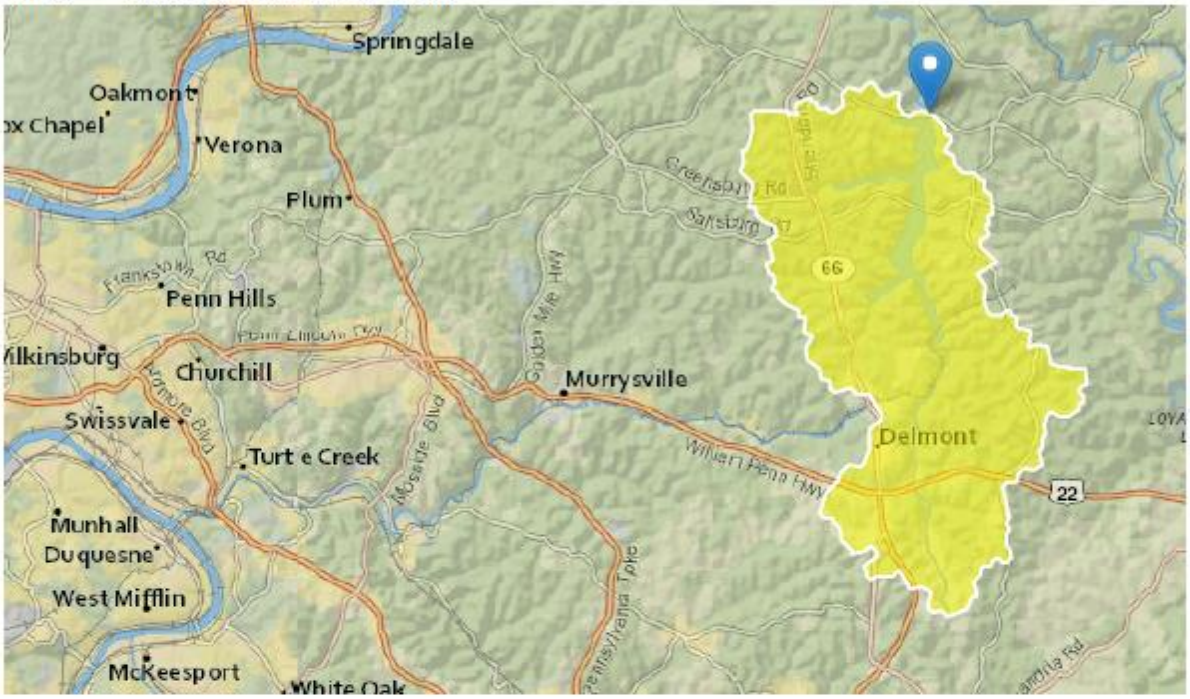
WLA afc	**(.019/e(-k*AFC_tc)) + [(AFC_Yc*Qs*.019/Qd*e(-k*AFC_tc))...** **...+ Xd + (AFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**
LTAMULT afc	EXP((0.5*LN(cvh^2+1))-2.326*LN(cvh^2+1)^0.5)
LTA_afc	wla_afc*LTAMULT_afc
WLA_cfc	**(.011/e(-k*CFC_tc) + [(CFC_Yc*Qs*.011/Qd*e(-k*CFC_tc))...** **...+ Xd + (CFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**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

Appendix D – USGS StreamStats

StreamStats Report - Beaver Run WTP Outfall 001

Region ID: PA
Workspace ID: PA20220603113554735000
Clicked Point (Latitude, Longitude): 40.51352, -79.55140
Time: 2022-06-03 07:36:17 -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	42.8	square miles
ELEV	Mean Basin Elevation	1218	feet
FOREST	Percentage of area covered by forest	61.2339	percent
PRECIP	Mean Annual Precipitation	40	inches

Parameter Code	Parameter Description	Value	Unit
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	4.02	percent
URBAN	Percentage of basin with urban development	3.1283	percent

Low-Flow Statistics

Low-Flow Statistics Parameters [100.0 Percent (42.7 square miles) Low Flow Region 3]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	42.8	square miles	2.33	1720
ELEV	Mean Basin Elevation	1218	feet	898	2700
PRECIP	Mean Annual Precipitation	40	inches	38.7	47.9

Low-Flow Statistics Flow Report [100.0 Percent (42.7 square miles) Low Flow Region 3]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	ASEp
7 Day 2 Year Low Flow	3.25	ft^3/s	43	43
30 Day 2 Year Low Flow	4.53	ft^3/s	38	38
7 Day 10 Year Low Flow	1.38	ft^3/s	54	54
30 Day 10 Year Low Flow	1.99	ft^3/s	49	49
90 Day 10 Year Low Flow	2.94	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/)

Annual Flow Statistics

Annual Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	42.8	square miles	2.26	1720
ELEV	Mean Basin Elevation	1218	feet	130	2700
PRECIP	Mean Annual Precipitation	40	inches	33.1	50.4
FOREST	Percent Forest	61.2339	percent	5.1	100
URBAN	Percent Urban	3.1283	percent	0	89

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

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	ASEp
Mean Annual Flow	59	ft^3/s	12	12

Annual 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/)

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Peak Flow Region 2 SIR 2019 5094]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	42.8	square miles	0.92	1160
STORAGE	Percent Storage	4.02	percent	0	8.9

Peak-Flow Statistics Flow Report [Peak Flow Region 2 SIR 2019 5094]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp
50-percent AEP flood	1360	ft^3/s	26.1
20-percent AEP flood	2020	ft^3/s	27
10-percent AEP flood	2510	ft^3/s	28.9
4-percent AEP flood	3170	ft^3/s	31.6
2-percent AEP flood	3720	ft^3/s	34.8
1-percent AEP flood	4290	ft^3/s	37.8
0.5-percent AEP flood	4910	ft^3/s	41.6
0.2-percent AEP flood	5800	ft^3/s	46.1

Peak-Flow Statistics Citations

Roland, M.A., and Stuckey, M.H.,2019, Development of regression equations for the estimation of flood flows at ungaged streams in Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2019–5094, 36 p. (https://doi.org/10.3133/sir20195094)

General Flow Statistics

General Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	42.8	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	40	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	61.2339	percent	5.1	100
URBAN	Percent Urban	3.1283	percent	0	89

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

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	ASEp
Harmonic Mean Streamflow	11.9	ft^3/s	38	38

General 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
DRNAREA	Drainage Area	42.8	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	40	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	61.2339	percent	5.1	100
URBAN	Percent Urban	3.1283	percent	0	89

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

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	ASEp
Base Flow 10 Year Recurrence Interval	20.3	ft^3/s	21	21
Base Flow 25 Year Recurrence Interval	17.8	ft^3/s	21	21
Base Flow 50 Year Recurrence Interval	16.4	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/)

Bankfull Statistics

Bankfull Statistics Parameters [Statewide Bankfull Noncarbonate 2018 5066]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	42.8	square miles	2.62	207
CARBON	Percent Carbonate	0	percent		

Bankfull Statistics Parameters [Appalachian Highlands D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	42.8	square miles	0.07722	940.1535

Bankfull Statistics Parameters [Appalachian Plateaus P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	42.8	square miles	0.081081	536.995602

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	42.8	square miles	0.07722	59927.7393

Bankfull Statistics Flow Report [Statewide Bankfull Noncarbonate 2018 5066]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE
Bankfull Area	244	ft^2	64
Bankfull Streamflow	1160	ft^3/s	74
Bankfull Width	80.1	ft	59
Bankfull Depth	3.04	ft	56

Bankfull Statistics Flow Report [Appalachian Highlands D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	72.2	ft
Bieger_D_channel_depth	3.29	ft
Bieger_D_channel_cross_sectional_area	243	ft^2

Bankfull Statistics Flow Report [Appalachian Plateaus P Bieger 2015]

of Pennsylvania and southern New York: U.S. Geological Survey Scientific Investigations Report 2018–5066, 20 p. (https://doi.org/10.3133/sir20185066)
Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. (https://digitalcommons.unl.edu/usdaarsfacpub/1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515&utm_medium=PDF&utm_

Application Version: 4.9.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.0

Statistic	Value	Unit
Bieger_P_channel_width	79	ft
Bieger_P_channel_depth	3.34	ft
Bieger_P_channel_cross_sectional_area	262	ft^2

Bankfull Statistics Flow Report [USA Bieger 2015]

Statistic	Value	Unit
Bieger_USA_channel_width	46.5	ft
Bieger_USA_channel_depth	2.68	ft
Bieger_USA_channel_cross_sectional_area	130	ft^2

Bankfull Statistics Flow Report [Area-Averaged]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE
Bankfull Area	244	ft^2	64
Bankfull Streamflow	1160	ft^3/s	74
Bankfull Width	80.1	ft	59
Bankfull Depth	3.04	ft	56
Bieger_D_channel_width	72.2	ft	
Bieger_D_channel_depth	3.29	ft	
Bieger_D_channel_cross_sectional_area	243	ft^2	
Bieger_P_channel_width	79	ft	
Bieger_P_channel_depth	3.34	ft	
Bieger_P_channel_cross_sectional_area	262	ft^2	
Bieger_USA_channel_width	46.5	ft	
Bieger_USA_channel_depth	2.68	ft	
Bieger_USA_channel_cross_sectional_area	130	ft^2	

Bankfull Statistics Citations

Clune, J.W., Chaplin, J.J., and White, K.E.,2018, Comparison of regression relations of bankfull discharge and channel geometry for the glaciated and nonglaciated settings