pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Southwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0216291**
Facility Type	**Industrial**	APS ID	**782238**
Major / Minor	**Minor**	Authorization ID	**1318340**

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

Applicant and Facility Information

Applicant Name	**Municipal Authority of the Borough of Carmichaels**	Facility Name	**Carmichaels Water Treatment Plant**
Applicant Address	104 North Pine Street	Facility Address	Browns Ferry Road
	Carmichaels, PA 15320-1240		Carmichaels, PA 15320
Applicant Contact	Lloyd Richard	Facility Contact	Lloyd Richard
Applicant Phone	(724) 966-2250	Facility Phone	(724) 966-2250
Client ID	37856	Site ID	249302
SIC Code	4941	Municipality	Cumberland Township
SIC Description	Trans. & Utilities - Water Supply	County	Greene
Date Application Received	June 17, 2020	EPA Waived?	Yes
Date Application Accepted	July 1, 2020	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 the Borough of Carmichaels for the Carmichaels Water Treatment Plant (WTP) located in Cumberland Township of Greene County on July 17, 2020. The facility is a potable public WTP with SIC Code of 4941. The water treatment plant was constructed in 1949 and underwent major reconstruction in 1993-1994.

Raw water from the Monongahela River is collected, treated, and distributed for community potable water use. Potable water treatment terrain consists of the following:

- Raw water intake from the Monongahela River
- Chemical addition- Chlorine, Caustic Soda, Alum, and Active Carbon
- Flocculation
- Clarification
- Dual media Filtration
- Clearwell Storage
- Pumping to the distribution system
- Backwash of filters and clarifier sludge draw off to wastewater treatment lagoons (Average wastewater flow is 0.0242 MGD).

The wastewater treatment system is going under major re-construction as authorized by Water Quality Management (Part II) Permit No. 3076205-A2. The amendment changed the settling lagoons configuration. The lagoons were excavated, and a

Approve	Deny	Signatures	Date
X		Curtis Holes, P.E. / Environmental Engineering Specialist	August 28, 2020
X		Michael E. Fifth, P.E. / Environmental Engineer Manager	September 9, 2020

Summary of Review

36-mil synthetic liner was installed along with increasing the settling volumes of both lagoons (71,150 gallons for the primary lagoon and 63,660 gallons for the secondary lagoon). The lagoon base grades are now sloped to allow the sludge to accumulate at the designed sump for sludge removal.

The backwash water, filter-to-waste water and sludge from two existing primary clarifiers (sedimentation basins) are collected in the existing concrete wastewater holding tank (23' 3" Long X 18' 3" Wide X 20' Deep). The wastewater from the holding tank is then pumped by one of the two proposed 200 gpm submersible pumps through the valve pit to the modified wastewater settling basin via a six (6) inch force main where its energy will be dissipated prior to entering the main bay. The wastewater from the initial bay will flow over a weir and enter the main settling chamber. After settling, the supernatant will flow over a weir into the effluent bay and it will be discharged to the Monongahela River via a 12 -inch PVC pipe via Outfall 001.
Residual waste disposal must meet solid waste regulations.

Part C language in the draft permit provides controls on floating solids, chemical additives, residual solids, Total Residual Chlorine and Sedimentation Basin Cleaning.

The Carmichaels Municipal Water Authority has no open violations pertaining to NPDES.

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

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

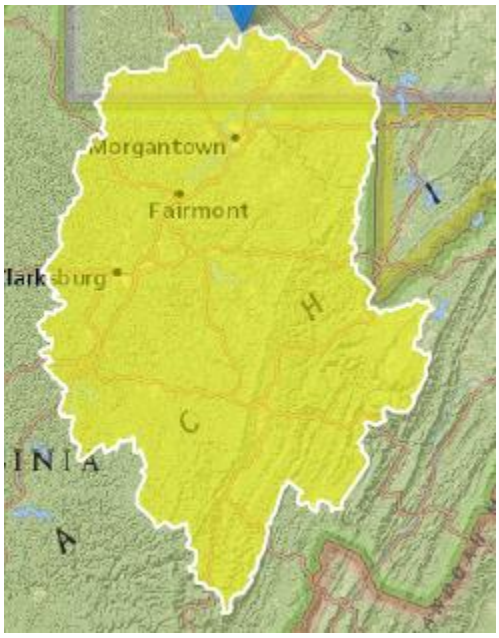
Outfall No.	001	Design Flow (MGD)	0.03
Latitude	39º 54' 08"	Longitude	-79º 55' 48"
Quad Name	Carmichaels	Quad Code	1906
Wastewater Description:	Lagoon supernatant from filter backwash water and sludge from settling tanks.		

Receiving Waters	Monongahela River	Stream Code	37185
NHD Com ID	99415066	RMI	75.5
Drainage Area	4,560 mi^2	Yield (cfs/mi^2)	0.1162 cfs/mi^2
Q_{7-10} Flow (cfs)	530 cfs	Q_{7-10} Basis	US Army Corp of Engineers
Elevation (ft.)	769 ft.	Slope (ft./ft.)	
Watershed No.	19-B	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use	None	Exceptions to Criteria	None
Assessment Status	Impaired		
Cause(s) of Impairment	Chlordane, PCBs, and Organics		
Source(s) of Impairment	Source Unknown		
TMDL Status	Final, 04/09/2001	Name	Monongahela River TMDL

Nearest Downstream Public Water Supply Intakes	Southwestern PA Water Authority		
PWS Waters	Monongahela River	Flow at Intake (cfs)	9.3 MGD
PWS RMI	71.7	Distance from Outfall (mi)	3.8 mi

Changes Since Last Permit Issuance: None

Outfall 001 Drainage Basin



Compliance History	
Summary of DMRs:	No exceedances with permit effluent limits.
Summary of Inspections:	The last inspection conducted by the Department was on July 2, 2015 by Pamela Russell and no violations were noted.

Other Comments:

Compliance History

DMR Data for Outfall 001 (from July 1, 2019 to June 30, 2020)

Parameter	Limit	MAY-20	APR-20	MAR-20	FEB-20	JAN-20	DEC-19	NOV-19	OCT-19	SEP-19	AUG-19	JUL-19
Flow (MGD) Average Monthly	Report				0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Flow (MGD) Daily Maximum	Report				0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
pH (S.U.) Minimum	6.0				7.13	7.10	7.15	7.14	7.15	7.11	7.12	7.06
pH (S.U.) Maximum	9.0				7.22	7.16	7.19	7.15	7.15	7.19	7.16	7.10
TRC (mg/L) Average Monthly	0.5				0.13	0.23	0.04	0.14	0.05	0.02	0.09	0.04
TRC (mg/L) Instantaneous Maximum	1.0				0.15	0.28	0.05	0.18	0.06	0.13	0.11	0.06
TSS (mg/L) Average Monthly	30.0				< 5.0	< 5.0	< 5.0	6.0	< 5.0	5.5	7	< 5.0
TSS (mg/L) Instantaneous Maximum	60.0				< 5.0	< 5.0	< 5.0	7.0	< 5.0	6.0	7	< 5.0
Total Aluminum (mg/L) Average Monthly	4.0				0.2	0.2	0.3	0.85	0.3	0.75	0.9	0.3
Total Aluminum (mg/L) Instantaneous Maximum	8.0				0.3	0.3	0.4	1.3	0.4	1.2	1.0	0.3
Total Iron (mg/L) Average Monthly	2.0				0.04	0.06	0.06	0.15	< 0.03	0.11	0.15	0.07
Total Iron (mg/L) Instantaneous Maximum	4.0				0.04	0.1	0.1	0.2	< 0.03	0.2	0.2	0.1
Total Manganese (mg/L) Average Monthly	1.0				0.07	0.02	0.07	0.07	0.07	0.06	0.15	0.1
Total Manganese (mg/L) Instantaneous Maximum	2.0				0.1	0.04	0.1	0.1	0.1	0.1	0.2	0.1

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** 0.03
Latitude 39º 54' 08" **Longitude** -79º 55' 48"
Wastewater Description: Lagoon supernatant from filter backwash water and sludge from settling tanks.

Technology-Based Limitations

The Carmichaels 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 of 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.)	6-9 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 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)	2.0	4.0
Aluminum (total)	4.0	8.0
Manganese (total)	1.0	2.0
Flow	Monitor	----
pH (S.U.)	6-9 at all times	
TRC	0.5	1.0

Water Quality-Based Limitations

Total Maximum Daily Load (TMDL)

Wastewater discharges from Carmichaels WTP facility is located within the Monongahela River Watershed for which the Department has developed a TMDL. The TMDL was finalized on April 9, 2001 to address PCB, Organics and Chlordane within the Monongahela River Watershed. The Industrial Waste discharge for the Carmichaels WTP facility consist of filter backwash water and sludge from settling tanks. The facility does not use PCBs or Chlordane, therefore, the Ohio River TMDL does not pertain to the Carmichaels WTP.

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	Carmichaels WTP
Evaluation Type	Industrial
NPDES Permit No.	PA0216291
Wastewater Description	Industrial Wastewater and Stormwater
Outfall ID	001
Design Flow (MGD)	0.03
Hardness ($^{mg}/_{L}$)	76
pH (S.U.)	7.5
Partial Mix Factors	Unknown – Calculated by TMS
Complete Mix Times	
Q_{7-10} (min)	
Q_h (min)	
Stream Inputs	
Receiving Surface Water	Monongahela River
Number of Reaches to Model	1
Stream Code	37185
RMI	75.5
Elevation (ft)	769
Drainage Area (mi^2)	4,560
Slope (ft/ft)	
PWS Withdrawal (MGD)	9.3
Apply Fish Criteria	Yes
Low Flow Yield (cfs/mi^2)	
Flows	
Stream (cfs)	530/530*****
Tributary (cfs)	N/A
Width (ft)	660/685*****
Stream Hardness ($^{mg}/_{L}$)	100
Stream pH (S.U.)	7

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

Based on the recommendations of the TMS, weekly monitor and report for two (2) parameters: Chloride and Sulfate for weekly monitoring are reporting at Outfall 001. 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 concentration of <4 mg/L, 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)	—	—	2.0	4.0	—	40 CFR § 125.3
Aluminum (total)	—	—	4.0	8.0	—	40 CFR § 125.3
Manganese (total)	—	—	1.0	2.0	—	40 CFR § 125.3
Chloride	—	—	Report	Report	—	25 Pa. Code § 96.3
Sulfate	—	—	Report	Report	—	25 Pa. Code § 96.3
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 Carmichaels WTP are displayed in Table 5 below. The Toxics Management Spreadsheet recommended weekly monitoring of Chloride and Sulfate. To align with other monitoring requirements, twice per month monitoring frequency will be imposed for Chloride and Sulfate.

Table 5. Monitoring Requirements for Outfall 001

Parameter	Sample Type	Minimum Sample Frequency
Flow (MGD)	Meter	2/Month
TRC	Grab	2/Month
TSS	Grab	2/Month
Iron (total)	Grab	2/Month
Aluminum (total)	Grab	2/Month
Manganese (total)	Grab	2/Month
Chloride	Grab	2/Month
Sulfate	Grab	2/Month
pH (S.U.)	Grab	2/Month

Tools and References Used to Develop Permit	
☐	WQM for Windows Model (see Attachment)
☐	PENTOXSD for Windows Model (see Attachment)
☐	TRC Model Spreadsheet (see Attachment **C**)
☐	Temperature Model Spreadsheet (see Attachment)
☐	Toxics Management Spreadsheet (see Attachment **B**)
☐	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:

Attachment A – StreamStats Outfall 001

Attachment B – Toxic Management Spreadsheet Outfall 001

Attachment C – TRC Calculation Spreadsheet

Attachment A – StreamStats Outfall 001

StreamStats Report - Carmichaels WTP Outfall 001

Region ID:	PA
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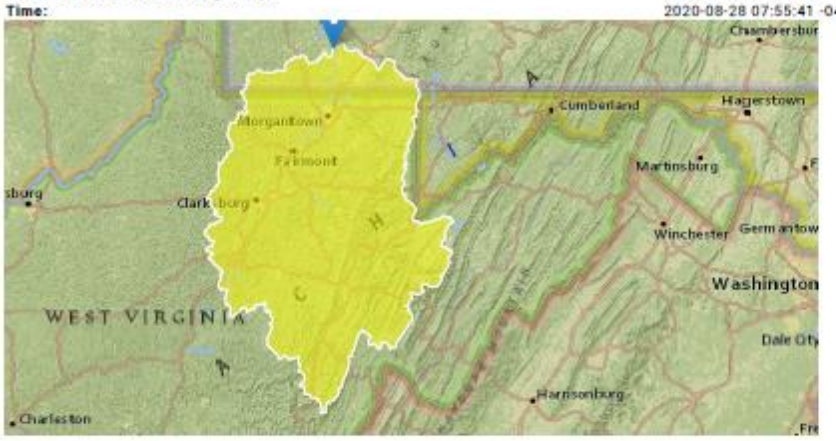
Clicked Point (Latitude, Longitude):	39.90258, -79.92903
Time:	2020-08-28 07:55:41 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	4560	square miles
ELEV	Mean Basin Elevation	1941.1	feet
PRECIP	Mean Annual Precipitation	48.5	inches
FOREST	Percentage of area covered by forest	79.6	percent
URBAN	Percentage of basin with urban development	1.9	percent
CARBON	Percentage of area of carbonate rock	1.9	percent

Peak Flow Statistics Parameters[100 Percent (4560 square miles) Peak Flow Region 4]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4560	square miles	0.92	1720

Peak Flow Statistics Disclaimers[100 Percent (4560 square miles) Peak Flow Region 4]

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

Peak Flow Statistics Flow Report[100 Percent (4560 square miles) Peak Flow Region 4]

Statistic	Value	Unit
2 Year Peak Flood	82000	ft^3/s
5 Year Peak Flood	117000	ft^3/s
10 Year Peak Flood	143000	ft^3/s
50 Year Peak Flood	209000	ft^3/s
100 Year Peak Flood	243000	ft^3/s
500 Year Peak Flood	335000	ft^3/s

Peak Flow Statistics Citations

Roland, M.A., and Stuckey, M.H.,2008, Regression equations for estimating flood flows at selected recurrence intervals for ungaged streams in Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2008-5102, 57p. (http://pubs.usgs.gov/sir/2008/5102/)

Low-Flow Statistics Parameters[100 Percent (4560 square miles) Low Flow Region 4]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4560	square miles	2.26	1400
ELEV	Mean Basin Elevation	1941.1	feet	1050	2580

Low-Flow Statistics Disclaimers[100 Percent (4560 square miles) 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[100 Percent (4560 square miles) Low Flow Region 4]

Statistic	Value	Unit
7 Day 2 Year Low Flow	618	ft^3/s
30 Day 2 Year Low Flow	828	ft^3/s
7 Day 10 Year Low Flow	351	ft^3/s
30 Day 10 Year Low Flow	416	ft^3/s
90 Day 10 Year Low Flow	630	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/)

Annual Flow Statistics Parameters[100 Percent (4560 square miles) Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4560	square miles	2.26	1720
ELEV	Mean Basin Elevation	1941.1	feet	130	2700
PRECIP	Mean Annual Precipitation	48.5	inches	33.1	50.4
FOREST	Percent Forest	79.6	percent	5.1	100
URBAN	Percent Urban	1.9	percent	0	89
CARBON	Percent Carbonate	1.9	percent	0	99

Annual Flow Statistics Disclaimers[100 Percent (4560 square miles) Statewide Mean and Base Flow]

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

Annual Flow Statistics Flow Report[100 Percent (4560 square miles) Statewide Mean and Base Flow]

Statistic	Value	Unit
Mean Annual Flow	10200	ft^3/s
Harmonic Mean Streamflow	4220	ft^3/s

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/)

Base Flow Statistics Parameters[100 Percent (4560 square miles) Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4560	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	48.5	inches	33.1	50.4
CARBON	Percent Carbonate	1.9	percent	0	99

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
FOREST	Percent Forest	79.6	percent	5.1	100
URBAN	Percent Urban	1.9	percent	0	89

Base Flow Statistics Disclaimers[100 Percent (4550 square miles) Statewide Mean and Base Flow]

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

Base Flow Statistics Flow Report[100 Percent (4550 square miles) Statewide Mean and Base Flow]

Statistic	Value	Unit
Base Flow 10 Year Recurrence Interval	4080	ft^3/s
Base Flow 25 Year Recurrence Interval	3690	ft^3/s
Base Flow 50 Year Recurrence Interval	3450	ft^3/s

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 Parameters[100 Percent (4550 square miles) Statewide Bankfull Noncarbonate 2018 5066]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4560	square miles	2.62	207
CARBON	Percent Carbonate	1.9	percent		

Bankfull Statistics Disclaimers[100 Percent (4550 square miles) Statewide Bankfull Noncarbonate 2018 5066]

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

Bankfull Statistics Flow Report[100 Percent (4550 square miles) Statewide Bankfull Noncarbonate 2018 5066]

Statistic	Value	Unit
Bankfull Area	9940	ft^2
Bankfull Streamflow	62700	ft^3/s
Bankfull Width	683	ft
Bankfull Depth	13.6	ft

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 of Pennsylvania and southern New York: U.S. Geological Survey Scientific Investigations Report 2018 –5066, 20 p. (https://doi.org/10.3133/sir20185066)

Application Version: 4.4.0

Attachment B – Toxics Management Spreadsheet Outfall 001

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Toxics Management Spreadsheet
Version 1.0, July 2020

Discharge Information

Instructions | Discharge | Stream

Facility: **Carmichaels Water Treatment Plant** NPDES Permit No.: **PA0216291** Outfall No.: **001**

Evaluation Type: **Major Sewage / Industrial Waste** Wastewater Description: **Industrial Wastewater & Stormwater**

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
0.03	76	7.5						

	Discharge Pollutant	Units	Max Discharge Conc		0 if left blank: Trib Conc		0.5 if left blank: Daily CV	Hourly CV	0 if left blank: Strea m CV	Fate Coeff	FOS	1 if left blank: Criteri a Mod	Chem Transl
Group 1	Total Dissolved Solids (PWS)	mg/L		158									
	Chloride (PWS)	mg/L		14.5									
	Bromide	mg/L	<	0.032									
	Sulfate (PWS)	mg/L		63.8									
	Fluoride (PWS)	mg/L		0.1									
Group 2	Total Aluminum	µg/L		1300									
	Total Antimony	µg/L	<	0.33									
	Total Arsenic	µg/L	<	0.5									
	Total Barium	µg/L		25									
	Total Beryllium	µg/L	<	0.1									
	Total Boron	µg/L		23									
	Total Cadmium	µg/L	<	0.16									
	Total Chromium (III)	µg/L	<	0.33									
	Hexavalent Chromium	µg/L	<	0.047									
	Total Cobalt	µg/L	<	0.83									
	Total Copper	µg/L		6.3									
	Free Available Cyanide	µg/L											
	Total Cyanide	µg/L		1.6									
	Dissolved Iron	µg/L		64									
	Total Iron	µg/L		300									
	Total Lead	µg/L		0.39									
	Total Manganese	µg/L		200									
	Total Mercury	µg/L	<	0.00017									
	Total Nickel	µg/L		1.8									
	Total Phenols (Phenolics) (PWS)	µg/L		4									
	Total Selenium	µg/L	<	0.66									
	Total Silver	µg/L	<	0.33									
	Total Thallium	µg/L	<	0.16									
	Total Zinc	µg/L		13									
	Total Molybdenum	µg/L	<	0.33									
	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												

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Toxics Management Spreadsheet
Version 1.0, July 2020

Stream / Surface Water Information

Carmichaels Water Treatment Plant, NPDES Permit No. PA0216291, 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 (mi^2)*	Slope (ft/ft)	PWS Withdrawal (MGD)	Apply Fish Criteria*
Point of Discharge	037185	75.5	769	4560			Yes
End of Reach 1	037185	71.7	762	4600		9.3	Yes

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

Location	RMI	LFY (cfs/mi^2)*	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	75.5	0.1	530			660	9					100	7		
End of Reach 1	71.7	0.1	530			685	9								

Q_h

Location	RMI	LFY (cfs/mi^2)	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	75.5														
End of Reach 1	71.7														

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Toxics Management Spreadsheet
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Model Results

Carmichaels Water Treatment Plant, NPDES Permit No. PA0216291, Outfall 001

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

☑ ***Hydrodynamics***

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

RMI	Stream Flow (cfs)	PWS Withdrawal (cfs)	Net Stream Flow (cfs)	Discharge Analysis Flow (cfs)	Slope (ft/ft)	Depth (ft)	Width (ft)	W/D Ratio	Velocity (fps)	Travel Time (days)	Complete Mix Time (min)
75.5	530		530	0.046	0.00035	9.	660.	73.333	0.089	2.602	1183.683
71.7	530	14.387	515.6129								

Q_h

RMI	Stream Flow (cfs)	PWS Withdrawal (cfs)	Net Stream Flow (cfs)	Discharge Analysis Flow (cfs)	Slope (ft/ft)	Depth (ft)	Width (ft)	W/D Ratio	Velocity (fps)	Travel Time (days)	Complete Mix Time (min)
75.5	1786.51		1786.51	0.046	0.00035	15.361	660.	42.965	0.176	1.318	530.89
71.7	1786.512	14.387	1772.12								

☑ ***Wasteload Allocations***

☑ ***AFC*** CCT (min): 15 PMF: 0.113 Analysis Hardness (mg/l): 99.981 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	964,920	
Total Antimony	0	0		0	1,100	1,100	1,415,216	
Total Arsenic	0	0		0	340	340	437,430	Chem Translator of 1 applied
Total Barium	0	0		0	21,000	21,000	27,017,753	
Total Boron	0	0		0	8,100	8,100	10,421,133	
Total Cadmium	0	0		0	2.013	2.13	2,744	Chem Translator of 0.944 applied
Total Chromium (III)	0	0		0	569.676	1,803	2,319,376	Chem Translator of 0.316 applied
Hexavalent Chromium	0	0		0	16	16.3	20,962	Chem Translator of 0.982 applied
Total Cobalt	0	0		0	95	95.0	122,223	
Total Copper	0	0		0	13.437	14.0	18,007	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	64.568	81.6	105,016	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	2,119	Chem Translator of 0.85 applied
Total Nickel	0	0		0	468.162	469	603,525	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	3.216	3.78	4,867	Chem Translator of 0.85 applied
Total Thallium	0	0		0	65	65.0	83,626	
Total Zinc	0	0		0	117.162	120	154,127	Chem Translator of 0.978 applied

☑ *CFC* CCT (min): 720 PMF: 0.780 Analysis Hardness (mg/l): 99.997 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	1,959,676	
Total Arsenic	0	0		0	150	150	1,336,143	Chem Translator of 1 applied
Total Barium	0	0		0	4,100	4,100	36,521,236	
Total Boron	0	0		0	1,600	1,600	14,252,190	
Total Cadmium	0	0		0	0.246	0.27	2,411	Chem Translator of 0.909 applied
Total Chromium (III)	0	0		0	74.113	86.2	767,639	Chem Translator of 0.86 applied
Hexavalent Chromium	0	0		0	10	10.4	92,595	Chem Translator of 0.962 applied
Total Cobalt	0	0		0	19	19.0	169,245	
Total Copper	0	0		0	8.956	9.33	83,096	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	17,131,429	WQC = 30 day average; PMF = 1
Total Lead	0	0		0	2.517	3.18	28,339	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	8,069	Chem Translator of 0.85 applied
Total Nickel	0	0		0	52.005	52.2	464,638	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	44,441	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	115,799	
Total Zinc	0	0		0	118.136	120	1,067,255	Chem Translator of 0.986 applied

☑ *THH* CCT (min): 720 THH PMF: 0.780 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 71.7 with a design stream flow of 530 cfs
Chloride (PWS)	0	0		0	250,000	250,000	#########	WQC applied at RMI 71.7 with a design stream flow of 530 cfs
Sulfate (PWS)	0	0		0	250,000	250,000	#########	WQC applied at RMI 71.7 with a design stream flow of 530 cfs
Fluoride (PWS)	0	0		0	2,000	2,000	22,841,905	WQC applied at RMI 71.7 with a design stream flow of 530 cfs
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	5.6	5.6	49,883	
Total Arsenic	0	0		0	10	10.0	89,076	
Total Barium	0	0		0	2,400	2,400	21,378,285	
Total Boron	0	0		0	3,100	3,100	27,613,618	
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	2,672,286	
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	8,907,619	
Total Mercury	0	0		0	0.050	0.05	445	
Total Nickel	0	0		0	610	610	5,433,647	
Total Phenols (Phenolics) (PWS)	0	0		0	5	5.0	57,105	WQC applied at RMI 71.7 with a design stream flow of 530 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	2,138	
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 (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
Chloride (PWS)	Report	Report	Report	Report	Report	mg/L	2,855,238	THH-PWS	Discharge Conc > 10% WQBEL (no RP)
Sulfate (PWS)	Report	Report	Report	Report	Report	mg/L	2,855,238	THH-PWS	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)	5,710,476	mg/L	Discharge Conc ≤ 10% WQBEL
Bromide	N/A	N/A	No WQS
Fluoride (PWS)	22,842	mg/L	Discharge Conc ≤ 10% WQBEL
Total Aluminum	618,475	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 Boron	6,679,526	µg/L	Discharge Conc ≤ 10% WQBEL
Total Beryllium	N/A	N/A	No WQS
Total Cadmium	1,759	µg/L	Discharge Conc < TQL
Total Chromium (III)	767,639	µg/L	Discharge Conc < TQL
Hexavalent Chromium	13,436	µg/L	Discharge Conc < TQL
Total Cobalt	78,340	µg/L	Discharge Conc < TQL
Total Iron	17,131,429	µg/L	Discharge Conc ≤ 10% WQBEL
Total Lead	28,339	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cyanide	N/A	N/A	No WQS
Total Nickel	386,835	µg/L	Discharge Conc ≤ 10% WQBEL
Total Phenols (Phenolics) (PWS)	57,105	µg/L	Discharge Conc ≤ 10% WQBEL
Total Mercury	445	µg/L	Discharge Conc < TQL

Total Zinc	98,789	µg/L	Discharge Conc ≤ 10% WQBEL
Total Selenium	44,441	µg/L	Discharge Conc < TQL
Total Silver	3,120	µg/L	Discharge Conc < TQL
Total Thallium	2,138	µg/L	Discharge Conc < TQL
Total Molybdenum	N/A	N/A	No WQS

Attachment C – TRC Calculation Spreadsheet

TRC EVALUATION Carmichaels WTP Outfall 001

530	= Q stream (cfs)	0.5	= CV Daily
0.03	= 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	= 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 = 2568.309	1.3.2.iii	WLA cfc = 3551.616
PENTOXSD TRG	5.1a	LTAMULT afc = 0.373	5.1c	LTAMULT cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc= 957.013	5.1d	LTA_cfc = 2064.743

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)**