pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Northwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0047201**
Facility Type	**Municipal**	APS ID	**1066334**
Major / Minor	**Minor**	Authorization ID	**1401206**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Tionesta Municipal Authority**	Facility Name	**Tionesta Borough WWTP**
Applicant Address	PO Box 408	Facility Address	104 River Street
	Tionesta, PA 16353-0408		Tionesta, PA 16353-0408
Applicant Contact	Cynthia Crytzer, Borough Manager (cindycrytzer@tionestaboro.org)	Facility Contact	Cynthia Crytzer, Borough Manager (cindycrytzer@tionestaboro.org)
Applicant Phone	(814) 755-3502	Facility Phone	(814) 755-3502
Client ID	66643	Site ID	263865
Ch 94 Load Status	Not Overloaded	Municipality	Tionesta Borough
Connection Status	No Limitations	County	Forest
Date Application Received	June 23, 2022	EPA Waived?	Yes
Date Application Accepted	June 29, 2022	If No, Reason	-
Purpose of Application	Renewal of an NPDES Permit for an existing discharge of treated sanitary wastewater from a municipal sewer system.		

Summary of Review

Act 14 - Proof of Notification was submitted and received.

A Part II Water Quality Management permit is not required at this time.

The Permittee should be able to meet the limits of this permit, which will protect the uses of the receiving stream.

I. OTHER REQUIREMENTS:

A. Stormwater into sewers
B. Right of way
C. Solids handling
D. Effluent Chlorine Optimization and Minimization

SPECIAL CONDITIONS:

II. Solids Management

There are no open violations in efacts for Client ID (66643) as of 2/1/2024.

Approve	Deny	Signatures	Date
X		Stephen A. McCauley Stephen A. McCauley, E.I.T. / Environmental Engineering Specialist	2/1/2024
X		 Vacant / Environmental Engineer Manager	Okay to Draft JCD 2/5/2024

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	0.250
Latitude	41º 29' 30.00"	Longitude	-79º 27' 34.00"
Quad Name	-	Quad Code	-
Wastewater Description:	Sewage Effluent		
Receiving Waters	Allegheny River (WWF)	Stream Code	42122
NHD Com ID	100475283	RMI	153
Drainage Area	3,720	Yield (cfs/mi^2)	0.1 (default value)
Q_{7-10} Flow (cfs)	372.0	Q_{7-10} Basis	calculated
Elevation (ft)	1033	Slope (ft/ft)	0.000189
Watershed No.	16-F	Chapter 93 Class.	WWF
Existing Use	-	Existing Use Qualifier	-
Exceptions to Use	-	Exceptions to Criteria	-
Assessment Status	Impaired*		
Cause(s) of Impairment	Mercury		
Source(s) of Impairment	Source Unknown		
TMDL Status	-	Name	-

Background/Ambient Data		Data Source
pH (SU)	-	-
Temperature (°F)	-	-
Hardness (mg/L)	-	-
Other:	-	-

Nearest Downstream Public Water Supply Intake	Aqua Pennsylvania, Inc. - Emlenton		
PWS Waters	Allegheny River	Flow at Intake (cfs)	1,376
PWS RMI	90.0	Distance from Outfall (mi)	63.0

* - The receiving stream is impaired by Mercury. Since this discharge is a POTW with no commercial or industrial users, it is not expected to discharge Mercury. No monitoring or limits will be added with this renewal.

Sludge use and disposal description and location(s): Solid sludge is hauled in a WM Warren roll off to the Greentree Landfill, and liquid sludge is hauled by CWM Environmental to the Ridgway Borough STP.

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.

Narrative: This Fact Sheet details the determination of draft NPDES permit limits for an existing discharge of 0.250 MGD of treated sewage from an existing Publicly Owned Treatment Works (POTW) in Tionesta Borough, Forest County.

Treatment permitted under WQM Permit 2780401 consists of the following: A 580 gallon wet well, one 1" bar screen followed by a 2" bar screen, an aerated, mechanically-cleaned grit chamber, a gravity screen, two Rotating Biological Reactors (RBCs) in parallel with 75,000 square feet of media on each, two 16,441 gallon settling tanks in parallel, and chlorine disinfection with a 6,581 gallon contact tank. A 1,000 gallon aerobic sludge digester and a 2,400 square foot drying bed are used for sludge handling.

1. Streamflow:

Allegheny River at Outfall 001:

Drainage Area:	3,720	sq. mi.	(USGS StreamStats)
Yieldrate:	0.1	cfsm	(Default used in absence of data)
% of stream allocated:	100%	Basis:	No nearby discharges
Q_{7-10}:	372	cfs	(Calculated)

2. Wasteflow:

Maximum discharge: 0.25 MGD = 0.38 cfs

Runoff flow period: 24 hours Basis: Runoff flow for municipal STPs

The calculated stream flow (Q7-10) is greater than 3 times the permitted discharge flow. In accordance with the SOP, the treatment requirements in document number 391-2000-014, titled, "Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers", dated April 12, 2008, will not be evaluated with this renewal.

Flow will be required to be monitored as authorized under Chapter 92a.61, and as recommended in the SOP.

3. Parameters:

The following parameters were evaluated: pH, Total Suspended Solids, Fecal Coliform, E. Coli, Total Phosphorus, Total Nitrogen, NH_3-N, $CBOD_5$, Dissolved Oxygen, and Disinfection.

a. pH

Between 6.0 and 9.0 at all times

Basis: Application of Chapter 93.7 technology-based limits.

The measurement frequency was previously set to 1/day as recommended in the SOP, based on Table 6-3 in the "Technical Guidance for the Development and Specification of Effluent Limitations" (362-0400-001), which will be retained.

b. Total Suspended Solids

Limits are 30.0 mg/l as a monthly average and 60.0 as an instantaneous maximum.

Basis: Application of Chapter 92a47 technology-based limits

c. Fecal Coliform

05/01 - 09/30:	200/100ml	(monthly average geometric mean)
	1,000/100ml	(instantaneous maximum)
10/01 - 04/30:	2,000/100ml	(monthly average geometric mean)
	10,000/100ml	(instantaneous maximum)

Basis: Application of Chapter 92a47 technology-based limits

d. E. Coli

Monitoring was added for E. Coli at a frequency of 1/quarter.

Basis: Application of Chapter 92a.61 as recommended by the SOP for flows greater than 0.05 MGD and less than 1.0 MGD.

e. Total Phosphorus

Chapter 96.5 does not apply. Therefore, the previous monitoring for Total Phosphorus will be retained in accordance with the SOP, based on Chapter 92a.61.

f. Total Nitrogen

The previous monitoring for Total Nitrogen will be retained in accordance with the SOP, based on Chapter 92a.61.

g. Ammonia-Nitrogen (NH_3-N)

Median discharge pH to be used:	6.5	Standard Units (S.U.)
	Basis:	eDMR data from previous 12 months
Discharge temperature:	25°C	(default value used in the absence of data)
Median stream pH to be used:	7.0	Standard Units (S.U.)
	Basis:	default value used in the absence of data
Stream Temperature:	25˚C	(default value used for WWF modeling)
Background NH_3-N concentration:	0.0	mg/l
	Basis:	Default value
Calculated NH_3-N Summer limits:	25.0	mg/l (monthly average)
	50.0	mg/l (instantaneous maximum)
Calculated NH_3-N Winter limits:	25.0	mg/l (monthly average)
	50.0	mg/l (instantaneous maximum)

Result: WQ modeling resulted in the summer NH3-N limits above (see Attachment 1). The winter limits are calculated as three times the summer limits, but since the technology-based limits would govern, they will be used. These limits are the same as the previous permit and will be retained. Per the SOP, and similar to the previous permit, monitoring for NH3-N will be set year round.

h. $CBOD_5$

Median discharge pH to be used: 6.5 Standard Units (S.U.)

Basis: eDMR data from previous 12 months

Discharge temperature: 25°C (default value used in the absence of data)

Median stream pH to be used: 7.0 Standard Units (S.U.)

Basis: default value used in the absence of data

Stream Temperature: 25˚C (default value used for WWF modeling)

Background $CBOD_5$ concentration: 2.0 mg/l

Basis: Default value

Calculated $CBOD_5$ limits: 25.0 mg/l (monthly average)
50.0 mg/l (instantaneous maximum)

Result: WQ modeling resulted in the calculated CBOD5 limits above (see Attachment 1). These limits are the same as the previous permit and will be retained.

i. Influent Total Suspended Solids and BOD_5

Monitoring for these two parameters will be retained as recommended in the SOP for POTWs, as authorized under Chapter 92a.61.

j. Dissolved Oxygen (DO)

The technology-based minimum of 4.0 mg/l is recommended by the WQ Model (see Attachment 1) and the SOP based on Chapter 93.7, under the authority of Chapter 92a.61. This limit is the same as the previous permit and will be retained.

The measurement frequency was previously set to 1/day as recommended in the SOP, based on Table 6-3 in the "Technical Guidance for the Development and Specification of Effluent Limitations" (362-0400-001), which will be retained.

k. Disinfection

☐ Ultraviolet (UV) light monitoring

☒ Total Residual Chlorine (TRC) limits: 0.5 mg/l (monthly average)
1.6 mg/l (instantaneous maximum)

Basis: The technology-based TRC limits above were calculated using the Department's TRC Calculation Spreadsheet (see Attachment 2). The limits are the same as the previous NPDES Permit and will be retained.

The measurement frequency was previously set to 1/day as recommended in the SOP, based on Table 6-3 in the "Technical Guidance for the Development and Specification of Effluent Limitations" (362-0400-001), which will be retained.

4. Reasonable Potential Analysis for Receiving Stream:

A Reasonable Potential Analysis was performed in accordance with State practices for Outfall 001 using the Department's Toxics Management Spreadsheet (see Attachment 3).

Result: None of the discharge concentrations for the parameters sampled were found to be greater than 10% of the calculated WQBELs. No monitoring or limits are required as a result of the Reasonable Potential Analysis.

5. Reasonable Potential for Downstream Public Water Supply (PWS):

The Department's Toxics Management Spreadsheet does not calculate limits for parameters that are based on PWS criteria (TDS, Chloride, Bromide, and Sulfate).

Nearest Downstream potable water supply (PWS): Aqua Pennsylvania, Inc. - Emlenton

Distance downstream from the point of discharge: 63.0 miles (approximate)

Parameter	PWS Criteria (mg/l)	Discharge Maximum (mg/l)
TDS	500	280
Chloride	250	140
Bromide	1.0	<0.1
Sulfate	250	21.8

Result: Since none of the parameters are discharged at a concentration greater than the criteria at the PWS, no limits or monitoring are necessary as significant dilution is available.

6. Flow Information:

The Tionesta Borough receives 95% of its flow from the borough. The remaining 5% of its flow comes from the Tionesta Township. The Tionesta Borough and the Tionesta Township are both separate sewer systems.

7. Anti-Backsliding:

Since all the permit limits in this renewal are the same or more restrictive than the previous NPDES Permit, anti-backsliding is not applicable.

8. Attachment List:

Attachment 1 - WQ Modeling Printouts

Attachment 2 - TRC_Calc Spreadsheet

Attachment 3 - Toxics Management Spreadsheet

Attachment 4 - Mussel Impact Evaluation Spreadsheet

(The Attachments above can be found at the end of this document)

Threatened and Endangered Mussel Species Concerns and Considerations

The Allegheny River is known to contain state and federally listed threatened and endangered mussel species. Due to this being a direct discharge to the Allegheny River, potential impacts were evaluated.

The USFWS has indicated that to protect threatened and endangered mussel species, wastewater discharges containing Ammonia-Nitrogen (NH_3-N), Chloride (Cl^-), Dissolved Nickel, and Dissolved Zinc, where mussels or their habitat exist, can be no more than 1.9 mg/l, 78 mg/l, 7.3 µg/l, and 13.18 µg/l, respectively.

Since this facility was previously identified, the sampling below was collected for Ammonia-Nitrogen, Chloride, and Nickel.

Sampling Data for USFWS Parameters of Concern	
Parameter	NPDES Renewal Application (June 13, 2022)
Ammonia-Nitrogen (NH_3-N) (mg/L)	1.93 avg. / 11.8 max. (11 samples)
Chloride (mg/L)	69.0 avg. / 140 max. (24 samples)
Total Nickel (µg/L)	3.1 avg. / 6.0 max. (7 samples)
Total Zinc (µg/L)	30.0 max. (1 samples)

The Department required monitoring during the previous NPDES Permit period for Ammonia-Nitrogen, Chloride, and Total Nickel to determine the discharge concentrations for each parameter. Based on the reported sampling data, the Department has determined that the discharge concentrations of Ammonia-Nitrogen, Chloride, and Total Nickel do not show a reasonable potential to cause harm to mussels in the receiving stream. In addition, the Department's Mussel Impact Evaluation Spreadsheet (see Attachment 4) shows the maximum stream impact area (NH3-N) to only be 0.8 square meters *when assuming a worst-case scenario of maximum discharge flow at the maximum reported concentration of ammonia-nitrogen and at low flow (Q_{7-10}) stream flow.* (JCD) Therefore, additional monitoring for Ammonia-Nitrogen, Chloride, and Total Nickel will not be included with this renewal.

The only data available for Total Zinc was from the 1 sample required with the NPDES Permit renewal. Since Zinc was not required to be monitored in the previous NPDES Permit, the Department has decided to require quarterly monitoring with this renewal. In addition, the monitoring will be for Dissolved Zinc since that is the parameter of concern for mussels as indicated by the USFWS.

Compliance History

DMR Data for Outfall 001 (from December 1, 2022 to November 30, 2023)

Parameter	NOV-23	OCT-23	SEP-23	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23	FEB-23	JAN-23	DEC-22
Flow (MGD) Average Monthly	0.028	0.026	0.022	0.033	0.035	0.025	0.035	0.044	0.075	0.050	0.086	0.056
Flow (MGD) Daily Maximum	0.145	0.091	0.036	0.159	0.106	0.055	0.088	0.232	0.230	0.186	0.280	0.239
pH (S.U.) Instantaneous Minimum	6.25	6.40	6.20	6.22	6.27	6.33	6.31	6.21	6.45	6.31	6.58	6.37
pH (S.U.) Instantaneous Maximum	6.84	6.90	6.65	6.69	6.75	6.77	6.82	6.95	7.0	6.92	6.92	7.11
DO (mg/L) Instantaneous Minimum	4.50	4.08	4.07	4.09	4.2	4.40	5.13	5.60	7.11	6.60	6.55	6.28
TRC (mg/L) Average Monthly	0.43	0.42	0.45	0.44	0.44	0.44	0.42	0.43	0.43	0.43	0.42	0.42
TRC (mg/L) Instantaneous Maximum	0.57	0.56	0.59	0.65	0.61	0.58	0.57	0.59	0.56	0.55	0.56	0.56
CBOD5 (lbs/day) Average Monthly	0.7	1.0	1.0	0.9	1.0	1.0	2.0	1.0	2.0	2.0	2.0	0.9
CBOD5 (lbs/day) Weekly Average	1.0	3	2.0	1.0	2.0	2.0	2.0	2.0	2.0	5.0	2.0	1.0
CBOD5 (mg/L) Average Monthly	4.5	4.2	5.3	4.5	6.2	5.5	6.3	4.2	4.0	3.7	3.3	3.1
CBOD5 (mg/L) Weekly Average	5.8	5.6	9.8	5.7	7.9	5.8	12.0	4.6	5.0	4.4	4.0	3.3
BOD5 (lbs/day) Influent Average Monthly	31.0	33	39.0	39.0	35.0	46.0	58	42.0	49.0	87.0	63.0	41
BOD5 (mg/L) Influent Average Monthly	189.0	166	196.0	206.0	212.0	206.0	208	158.0	109.0	151.0	120.0	145
BOD5 (mg/L) Influent Weekly Average	228.0	212	267.0	244.0	279.0	280.0	371	197.0	207.0	186.0	151.0	195
TSS (lbs/day) Average Monthly	0.5	0.8	0.8	0.7	0.5	1.0	2.0	1.0	2.0	2.0	2.0	1.2
TSS (lbs/day) Influent Average Monthly	24.0	37	24.0	33.0	26.0	31.0	37	31.0	37.0	138.0	53.0	26
TSS (lbs/day) Weekly Average	0.7	2	0.9	0.8	0.6	2.0	3.0	1.0	2.0	6.0	3.0	1.0
TSS (mg/L) Average Monthly	3.0	4.0	4.0	3.0	3.0	6.0	6.0	5.0	4.0	4.0	3.0	4.0
TSS (mg/L) Influent Average Monthly	146.0	169	121.0	170.0	157.0	133.0	137	117.0	81.0	191.0	98.0	91

TSS (mg/L) Influent Weekly Average	164.0	207	174.0	210.0	244.0	190.0	202	146.0	124.0	282.0	150.0	142
TSS (mg/L) Weekly Average	4.0	6.0	6.0	4.0	3.0	7.0	10.0	6.0	6.0	4.0	5.0	5.0
Fecal Coliform (No./100 ml) Geometric Mean	1	1	1	2	1	1	13	1.0	2.0	4	4.0	6
Fecal Coliform (No./100 ml) Instantaneous Maximum	2	4	1	7	4	2	455	2.0	4.0	15	22.0	13
Total Nitrogen (lbs/day) Average Monthly	4.0	3	8.0	6.0	5.0	3.0	19.0	7.0	8.0	6.0	9.0	6.0
Total Nitrogen (mg/L) Average Monthly	26.6	21.4	33.6	37.6	28.0	21.6	39.8	14.6	12.2	15.2	15.7	16.8
Total Nitrogen (mg/L) Instantaneous Maximum	26.6	21.4	33.6	37.6	28.0	21.6	39.8	14.6	12.2	15.2	15.7	16.8
Ammonia (lbs/day) Average Monthly	0.08	0.1	2.0	0.5	0.4	0.3	0.2	0.08	0.2	0.1	0.3	0.1
Ammonia (mg/L) Average Monthly	0.51	0.8	8.14	3.07	2.39	2.11	0.43	0.17	0.31	0.4	0.55	0.4
Ammonia (mg/L) Instantaneous Maximum	0.51	0.8	8.14	3.07	2.39	2.11	0.43	0.17	0.31	0.4	0.55	0.4
Total Phosphorus (lbs/day) Average Monthly	0.6	0.7	1.0	1.0	0.9	0.9	1.0	0.7	1.0	0.7	1.0	0.8
Total Phosphorus (mg/L) Average Monthly	4.05	5.35	5.85	5.94	5.66	5.96	2.4	1.58	1.57	1.99	2.31	2.22
Total Phosphorus (mg/L) Instantaneous Maximum	4.05	5.35	5.85	5.94	5.66	5.96	2.4	1.58	1.57	1.99	2.31	2.22
Total Nickel (mg/L) Average Quarterly			0.00518			< 0.02			0.02			0.002
Chloride (mg/L) Average Monthly	57.5	57.1	66.3	70.1	62.3	66.5	43.9	54.2	54.2	133.0	85.1	4.31

Proposed Effluent Limitations and Monitoring Requirements

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

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

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Flow (MGD)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Inst Min	XXX	XXX	9.0	1/day	Grab
DO	XXX	XXX	4.0 Inst Min	XXX	XXX	XXX	1/day	Grab
TRC	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
CBOD5	52.0	78.0	XXX	25.0	37.5	50	1/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	XXX	XXX	Report	Report	XXX	1/week	24-Hr Composite
TSS	62.0	93.0	XXX	30.0	45.0	60	1/week	24-Hr Composite
TSS Raw Sewage Influent	Report	XXX	XXX	Report	Report	XXX	1/week	24-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	1/week	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1000	1/week	Grab
E. Coli (No./100 ml)	XXX	XXX	XXX	XXX	XXX	Report	1/quarter	Grab
Total Nitrogen	Report	XXX	XXX	Report	XXX	Report	1/month	24-Hr Composite
Ammonia	Report	XXX	XXX	Report	XXX	Report	1/month	24-Hr Composite

Outfall 001, Continued (from Permit Effective Date through Permit Expiration Date)

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Total Phosphorus	Report	XXX	XXX	Report	XXX	Report	1/month	24-Hr Composite
Dissolved Zinc	Report Avg Qrtly	XXX	XXX	Report Avg Qrtly	XXX	XXX	1/quarter	24-Hr Composite

Compliance Sampling Location: at Outfall 001, after disinfection

Flow is monitor only based on Chapter 92a.61. The limits for pH and Dissolved Oxygen are technology-based on Chapter 93.7. The Total Residual Chlorine (TRC) limits are technology-based on Chapter 92a.48. The limits for $CBOD_5$, Total Suspended Solids, and Fecal Coliforms are technology-based on Chapter 92a.47. Monitoring for influent BOD5 and influent TSS is based on Chapter 92a.61. Monitoring for E. Coli, Ammonia-Nitrogen, Total Nitrogen, Total Phosphorus, and Dissolved Zinc is based on Chapter 92a.61.

Attachment 1

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
18A	42122	ALLEGHENY RIVER

RMI	Name	Permit Number	Disc Flow (mgd)	Parameter	Effl. Limit 30-day Ave. (mg/L)	Effl. Limit Maximum (mg/L)	Effl. Limit Minimum (mg/L)
153.000	Tionesta WWTP	PA0047201	0.250	CBOD5	25		
				NH3-N	25	50	
				Dissolved Oxygen			4

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
18A	42122	ALLEGHENY RIVER

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
153.000	0.250	25.000	6.999
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
379.350	1.221	310.618	0.804
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
2.02	0.016	0.03	1.029
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
7.536	0.799	Tsivoglou	5
Reach Travel Time (days)			
0.228			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.023	2.02	0.03	7.54
0.046	2.02	0.02	7.54
0.068	2.02	0.02	7.54
0.091	2.02	0.02	7.54
0.114	2.02	0.02	7.54
0.137	2.02	0.02	7.54
0.160	2.02	0.02	7.54
0.182	2.02	0.02	7.54
0.205	2.02	0.02	7.54
0.228	2.01	0.02	7.54

WQM 7.0 Modeling Specifications

Parameters	Both	Use Inputted Q1-10 and Q30-10 Flows	☑
WLA Method	EMPR	Use Inputted W/D Ratio	☐
Q1-10/Q7-10 Ratio	0.64	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.36	Temperature Adjust Kr	☑
D.O. Saturation	90.00%	Use Balanced Technology	☑
D.O. Goal	5		

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
18A	42122	ALLEGHENY RIVER	**153.000**	1033.00	3720.00	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.100	0.00	0.00	0.000	0.000	0.0	0.00	0.00	25.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
Tionesta WWTP	PA0047201	0.2500	0.0000	0.0000	0.000	25.00	6.50

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	4.00	7.54	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
18A	42122	ALLEGHENY RIVER	**150.000**	1030.00	4210.00	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.100	0.00	0.00	0.000	0.000	0.0	0.00	0.00	25.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
		0.0000	0.0000	0.0000	0.000	25.00	7.00

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	3.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

WQM 7.0 Hydrodynamic Outputs

SWP Basin	Stream Code	Stream Name
18A	42122	ALLEGHENY RIVER

RMI	Stream Flow (cfs)	PWS With (cfs)	Net Stream Flow (cfs)	Disc Analysis Flow (cfs)	Reach Slope (ft/ft)	Depth (ft)	Width (ft)	W/D Ratio	Velocity (fps)	Reach Trav Time (days)	Analysis Temp (°C)	Analysis pH
Q7-10 Flow												
153.000	372.00	0.00	372.00	.3868	0.00019	1.221	379.35	310.62	0.80	0.228	25.00	7.00
Q1-10 Flow												
153.000	238.08	0.00	238.08	.3868	0.00019	NA	NA	NA	0.63	0.293	25.00	7.00
Q30-10 Flow												
153.000	505.92	0.00	505.92	.3868	0.00019	NA	NA	NA	0.95	0.192	25.00	7.00

WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
18A	42122	ALLEGHENY RIVER

NH3-N Acute Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
153.000	Tionesta WWTP	11.09	50	11.09	50	0	0

NH3-N Chronic Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
153.000	Tionesta WWTP	1.37	25	1.37	25	0	0

Dissolved Oxygen Allocations

RMI	Discharge Name	CBOD5		NH3-N		Dissolved Oxygen		Critical Reach	Percent Reduction
		Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)		
153.00	Tionesta WWTP	25	25	25	25	4	4	0	0

Attachment 2

TRC EVALUATION

Input appropriate values in A3:A9 and D3:D9

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

Source	Reference	AFC Calculations		Reference	CFC Calculations	
TRC	1.3.2.iii	WLA afc =	306.853	1.3.2.iii	WLA cfc =	299.150
PENTOXSD TRG	5.1a	LTAMULT afc =	0.373	5.1c	LTAMULT cfc =	0.581
PENTOXSD TRG	5.1b	LTA_afc=	114.341	5.1d	LTA_cfc =	173.912

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

WLA afc	**(.019/e(-k*AFC_tc)) + [(AFC_Yc*Qs*.019/Qd*e(-k*AFC_tc))...** **...+ Xd + (AFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**
LTAMULT afc	EXP((0.5*LN(cvh^2+1))-2.326*LN(cvh^2+1)^0.5)
LTA_afc	wla_afc*LTAMULT_afc
WLA_cfc	**(.011/e(-k*CFC_tc) + [(CFC_Yc*Qs*.011/Qd*e(-k*CFC_tc))...** **...+ Xd + (CFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**
LTAMULT_cfc	EXP((0.5*LN(cvd^2/no_samples+1))-2.326*LN(cvd^2/no_samples+1)^0.5)
LTA_cfc	wla_cfc*LTAMULT_cfc
AML MULT	EXP(2.326*LN((cvd^2/no_samples+1)^0.5)-0.5*LN(cvd^2/no_samples+1))
AVG MON LIMIT	MIN(BAT_BPJ,MIN(LTA_afc,LTA_cfc)*AML_MULT)
INST MAX LIMIT	**1.5*((av_mon_limit/AML_MULT)/LTAMULT_afc)**

Attachment 3

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.4, May 2023

Discharge Information

Instructions | Discharge | Stream

Facility: **Tionesta Boroough WWTP** NPDES Permit No.: **PA0047201** Outfall No.: **001**

Evaluation Type: **Major Sewage / Industrial Waste** Wastewater Description: **POTW Sewage**

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
0.25	100	6.5						

					0 if left blank		*0.5 if left blank*		*0 if left blank*			*1 if left blank*	
	Discharge Pollutant	Units	Max Discharge Conc		Trib Conc	Stream Conc	Daily CV	Hourly CV	Stream CV	Fate Coeff	FOS	Criteria Mod	Chem Transl
Group 1	Total Dissolved Solids (PWS)	mg/L		280									
	Chloride (PWS)	mg/L		140									
	Bromide	mg/L	<	0.1									
	Sulfate (PWS)	mg/L		21.8									
	Fluoride (PWS)	mg/L											
Group 2	Total Aluminum	µg/L											
	Total Antimony	µg/L											
	Total Arsenic	µg/L											
	Total Barium	µg/L											
	Total Beryllium	µg/L											
	Total Boron	µg/L											
	Total Cadmium	µg/L											
	Total Chromium (III)	µg/L											
	Hexavalent Chromium	µg/L											
	Total Cobalt	µg/L											
	Total Copper	mg/L		0.01									
	Free Cyanide	µg/L	<	0.02									
	Total Cyanide	µg/L											
	Dissolved Iron	µg/L											
	Total Iron	µg/L											
	Total Lead	µg/L											
	Total Manganese	µg/L											
	Total Mercury	µg/L											
	Total Nickel	µg/L		0.006									
	Total Phenols (Phenolics) (PWS)	µg/L											
	Total Selenium	µg/L											
	Total Silver	µg/L											
	Total Thallium	µg/L											
	Total Zinc	mg/L		0.03									
	Total Molybdenum	µg/L											
	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 1.4, May 2023

Stream / Surface Water Information

Tionesta Boroough WWTP, NPDES Permit No. PA0047201, Outfall 001

Instructions | Discharge | *Stream*

Receiving Surface Water Name: _____ 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	042122	153	1033	3720			Yes
End of Reach 1	042122	150	1030	4210			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	153	0.1										100	7		
End of Reach 1	150	0.1										100	7		

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	153														
End of Reach 1	150														

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Toxics Management Spreadsheet
Version 1.4, May 2023

Model Results

Tionesta Boroough WWTP, NPDES Permit No. PA0047201, 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)
153	372		372	0.387	0.00019	1.221	379.35	310.618	0.804	0.228	10597.49
150	421		421								

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)
153	1311.12		1311.12	0.387	0.00019	2.125	379.35	178.503	1.627	0.113	4623.559
150	1460.869		1460.87								

☑ ***Wasteload Allocations***

☑ ***AFC*** CCT (min): 15 PMF: 0.038 Analysis Hardness (mg/l): 100 Analysis pH: 6.98

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Total Copper	0	0		0	13.439	14.0	521	Chem Translator of 0.96 applied
Free Cyanide	0	0		0	22	22.0	818	
Total Nickel	0	0		0	468.236	469	17,447	Chem Translator of 0.998 applied
Total Zinc	0	0		0	117.180	120	4,456	Chem Translator of 0.978 applied

☑ ***CFC*** CCT (min): 720 PMF: 0.261 Analysis Hardness (mg/l): 100 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	
Total Copper	0	0		0	8.956	9.33	2,348	Chem Translator of 0.96 applied
Free Cyanide	0	0		0	5.2	5.2	1,309	
Total Nickel	0	0		0	52.007	52.2	13,130	Chem Translator of 0.997 applied
Total Zinc	0	0		0	118.139	120	30,159	Chem Translator of 0.986 applied

☑ ***THH*** CCT (min): 720 PMF: 0.261 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	500,000	500,000	N/A	
Chloride (PWS)	0	0		0	250,000	250,000	N/A	
Sulfate (PWS)	0	0		0	250,000	250,000	N/A	
Total Copper	0	0		0	N/A	N/A	N/A	
Free Cyanide	0	0		0	4	4.0	1,007	
Total Nickel	0	0		0	610	610	153,545	
Total Zinc	0	0		0	N/A	N/A	N/A	

☑ ***CRL*** CCT (min): 720 PMF: 0.395 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	
Total Copper	0	0		0	N/A	N/A	N/A	
Free Cyanide	0	0		0	N/A	N/A	N/A	
Total Nickel	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

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

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

Pollutants	Governing WQBEL	Units	Comments
Total Dissolved Solids (PWS)	N/A	N/A	PWS Not Applicable
Chloride (PWS)	N/A	N/A	PWS Not Applicable
Bromide	N/A	N/A	No WQS
Sulfate (PWS)	N/A	N/A	PWS Not Applicable
Total Copper	0.33	mg/L	Discharge Conc ≤ 10% WQBEL
Free Cyanide	N/A	N/A	Discharge Conc < TQL
Total Nickel	11,183	µg/L	Discharge Conc ≤ 10% WQBEL
Total Zinc	2.86	mg/L	Discharge Conc ≤ 10% WQBEL

Attachment 4

Facility:	Tionesta WWTP		
Permit Number:	PA0047201	Effective: N/A	Expiration: N/A
Outfall No:	001		
Location:	Tionesta Borough, Forest County		
Discharge to:	Allegheny River		
Site Specific Mussel Survey Completed:	No		

Discharge and Stream Characteristics			Comments
Q_S	Stream Flow	240 MGD / 372 cfs	Fact Sheet
Q_D	Discharge Flow	0.25 MGD / 0.38686 cfs	Fact Sheet
$C_{S(Cl^-)}$	Instream chloride Concentration	16.82 mg/L	WQN 805
$C_{E(Cl^-)}$	Discharge chloride (existing)	140 mg/L	Max of 24 grab samples
$C_{P(Cl^-)}$	Discharge chloride (proposed)	140 mg/L	Max of 24 grab samples
$C_{S(Cl^-)}$	Instream nickel Concentration	0.02 µg/L	WQN 805
$C_{E(Ni)}$	Discharge nickel (existing)	6 µg/L	From renewal application - Max of 3 grab samples
$C_{P(Ni)}$	Discharge nickel (proposed)	6 µg/L	From renewal application - Max of 3 grab samples
$C_{S(Zn)}$	Instream zinc Concentration	16.26 µg/L	Average WQN data (2010 to 2021 - USGS-03036500)
$C_{E(Zn)}$	Discharge zinc (existing)	30 µg/L	From renewal application - Max of 1 grab sample
$Zn_{P(Cl^-)}$	Discharge zinc (proposed)	30 µg/L	From renewal application - Max of 1 grab sample
$C_{S(NH3-N)}$	Instream NH^3-N	0.02 mg/L	WQN 805
$C_{E(NH3-N)}$	Discharge NH^3-N (existing)	11.8 mg/L	From renewal application - Max of 11 samples
$C_{P(NH3-N)}$	Discharge NH^3-N (proposed)	11.8 mg/L	From renewal application - Max of 11 samples
pH_S	Instream pH	7.69 S.U.	WQN 805 geo mean during critical period
T_S	Instream Temp.	21.3 °C	WQN 805 median during critical period
$C_{C(NH3-N)}$	Ammonia criteria	1.062 mg/L	From ammonia criteria comparison spreadsheet -using instream pH and Temp
$C_{C(Cl^-)}$	Chloride criteria	78 mg/L	USFWS criteria
$C_{C(Ni)}$	Nickel criteria	7.3 µg/L	USFWS criteria
$C_{C(Zn)}$	Zinc criteria	13.18 µg/L	USFWS criteria
W_S	Stream width	120 meters	Google Earth

Ammonia Criteria Calculations:

pH_S	7.69	S.U.	*(Default value is 7.0)*	
T_S	21.3	°C	*(Default value is 20 °)*	

Acute Criteria

	METHOD and UNITS	CRITERIA	Comments	
	Old CMC (mg TAN/L) =	4.049		
	EPA 2013 CMC (mg TAN/L) =	6.124	Oncorhynchus present	* formula on pg. 41 (plateaus at 15.7 C)
		6.124	Oncorhynchus absent	* formula on pg. 42 (plateaus at 10.2 C)

Chronic Criteria

	METHOD and UNITS	CRITERIA	COMMENTS
	Old CMC (mg TAN/L) =	1.174	
$C_{C(NH3-N)}$	EPA 2013 CMC (mg TAN/L) =	1.062	* formula on pg. 46 (plateaus at 7 C)

Endangered Mussel Species Impact Area Calculations:

Existing Area of Impact

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

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

Method 1 - Utilizing Site Specific Mussel Survey Information

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

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

A.	Area of Impact Determined from Survey:	N/A	m^2
B.	Chlorides in Existing Discharge:		140 mg/L
C.	Chlorides in Proposed Discharge after Treatment Facility Upgrades:		140 mg/L

D.	Approximate Area of Impact after Treatment Facility Upgrades:	N/A m^2

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

Endangered Mussel Species Impact Area Calculations: (continued…)

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

Chloride (Cl^-)	$L_{S(Cl^-)}$ = Available Chloride Loading in Stream = $C_{C(Cl^-)} - C_{S(Cl^-)} \times Q_S$(MGD) X 8.34 =	122,458 lbs/Day
	$L_{D\text{-}MAX(Cl^-)}$ = Current Maximium Discharge Chloride Loading exceeding criteria = $(C_{E(CL^-)} - C_{E(CL^-)}) \times Q_D$(MGD) X 8.34 =	129 lbs/Day
	$\%_{E(Cl^-)}$ = Percent of Stream Capacity for Current Loading = $L_{D\text{-}MAX(Cl^-)} / L_{S(Cl^-)}$ =	0% of Stream Capacity
	$L_{D(Cl^-)}$ = Proposed Discharge Cl^- Loading exceeding criteria after Treatment Facility Upgrades = $(C_{P(Cl^-)} - C_{P(Cl^-)}) \times Q_D$(MGD) X 8.34 =	129.27 lbs/Day
	$\%_{P(Cl^-)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(Cl^-)} / L_{S(Cl^-)}$ =	0.11% of Stream Capacity
	Proposed Area of Impact due to Chloride * = $(\%_{P(Cl^-)} \times W_S)^2 \times 0.5$ = * assuming equal flow across transect and 90° spread at discharge	0.0080 m^2
Nickel (Ni)	$L_{S(Ni)}$ = Available Nickel Loading in Stream = $C_{C(Ni)} - C_{S(Ni)} \times Q_S$(MGD) X 8.34 =	14,572 lbs/Day
	$L_{D\text{-}MAX(Ni)}$ = Current Maximium Discharge Nickel Loading exceeding criteria = $(C_{E(Ni)} - C_{E(Ni)}) \times Q_D$(MGD) X 8.34 =	-3 lbs/Day
	$\%_{E(Ni)}$ = Percent of Stream Capacity for Current Loading = $L_{D\text{-}MAX(Ni)} / L_{S(Ni)}$ =	0% of Stream Capacity
	$L_{D(Ni)}$ = Proposed Discharge Ni Loading exceeding criteria after Treatment Facility Upgrades = $(C_{P(Ni)} - C_{P(Ni)}) \times Q_D$(MGD) X 8.34 =	-2.7105 lbs/Day
	$\%_{P(Ni)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(Ni)} / L_{S(Ni)}$ =	-0.02% of Stream Capacity
	Proposed Area of Impact due to Nickel * = $(\%_{P(Ni)} \times W_S)^2 \times 0.5$ = * assuming equal flow across transect and 90° spread at discharge	0.0002 m^2
Zinc (Zn)	$L_{S(Zn)}$ = Available Zinc Loading in Stream = $C_{C(Zn)} - C_{S(Zn)} \times Q_S$(MGD) X 8.34 =	-6,165 lbs/Day
	$L_{D\text{-}MAX(Zn)}$ = Current Maximium Discharge Zinc Loading exceeding criteria = $(C_{E(Zn)} - C_{E(Zn)}) \times Q_D$(MGD) X 8.34 =	35 lbs/Day
	$\%_{E(Zn)}$ = Percent of Stream Capacity for Current Loading = $L_{D\text{-}MAX(Zn)} / L_{S(Zn)}$ =	-1% of Stream Capacity
	$L_{D(Zn)}$ = Proposed Discharge Zn Loading exceeding criteria after Treatment Facility Upgrades = $(C_{P(Zn)} - C_{P(Zn)}) \times Q_D$(MGD) X 8.34 =	35.0697 lbs/Day
	$\%_{P(Zn)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(Zn)} / L_{S(Zn)}$ =	-0.57% of Stream Capacity
	Proposed Area of Impact due to Zinc * = $(\%_{P(Zn)} \times W_S)^2 \times 0.5$ = * assuming equal flow across transect and 90° spread at discharge	0.2330 m^2
Ammonia-Nitrogen (NH3-N)	$L_{S(NH3\text{-}N)}$ = Available NH3-N Loading in Stream = $C_{C(NH3\text{-}N)} - C_{S(NH3\text{-}N)} \times Q_S$(MGD) X 8.34 =	2,086 lbs/Day
	$L_{D\text{-}MAX(NH3\text{-}N)}$ = Current Maximium Discharge NH3-N Loading = $C_{E(NH3\text{-}N)} \times Q_D$(MGD) X 8.34 =	25 lbs/Day
	$\%_{E(NH3\text{-}N)}$ = Percent of Stream Capacity for Current Loading = $L_{D\text{-}MAX(NH3\text{-}N)} / L_{S(NH3\text{-}N)}$ =	1% of Stream Capacity
	$L_{D(NH3\text{-}N)}$ = Proposed Discharge NH3-N Loading after Treatment Facility Upgrades = $C_{P(NH3\text{-}N)} - C_{C(NH3\text{-}N)} \times Q_D$(MGD) X 8.34 =	22 lbs/Day
	$\%_{P(NH3\text{-}N)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(NH3\text{-}N)} / L_{S(NH3\text{-}N)}$ =	1.05% of Stream Capacity
	Proposed Area of Impact due to NH3-N * = $(\%_{P(NH3\text{-}N)} \times W_S)^2 \times 0.5$ = * assuming equal flow across transect and 90° spread at discharge	0.8008 m^2

Endangered Mussel Species Impact Area Calculations: (continued…)

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

Chloride (Cl^-)	$Q_{A(Cl^-)}C_{S(Cl^-)} + Q_D C_{P(Cl^-)} = Q_T C_{C(Cl^-)}$	
	$Q_{A(Cl^-)}$ = Assimilative Stream Flow Required to Achieve Criteria (cfs)	
	$Q_T = Q_S + Q_D$ (cfs)	
	$Q_{A(Cl^-)}C_{S(Cl^-)} + Q_D C_{P(Cl^-)} = (Q_D+Q_S)C_{C(Cl^-)}$	
	SOLVING FOR $Q_{A(Cl^-)} = [(Q_D C_{P(Cl^-)} / C_{C(Cl^-)}) - Q_D)] / (1 - C_{S(Cl^-)}/C_{C(Cl^-)})$ =	0.39204511 cfs
	$\%_{P(Cl^-)}$ = Percent of Stream Width Required to Assimilate Chlorides to Criteria Concentration = $Q_{A(Cl^-)} / Q_S$ (cfs) =	0.1054%
	$W_{I(Cl^-)}$ = Proposed Width of Stream required to Assimilate Chlorides to Criteria Concentration = $W_S \times \%_{P(Cl^-)}$	0.126466 meters
	Proposed Area of Impact due to Chloride * = $(W_{I(Cl^-)})^2 \times 0.5$ = * assuming equal flow across transect and 90° spread at discharge	0.0080 m^2
Nickel (Ni)	$Q_{A(Ni)}C_{S(Ni)} + Q_D C_{P(Ni)} = Q_T C_{C(Ni)}$	
	$Q_{A(Ni)}$ = Assimilative Stream Flow Required to Achieve Criteria (cfs)	
	$Q_T = Q_S + Q_D$ (cfs)	
	$Q_{A(Ni)}C_{S(Ni)} + Q_D C_{P(Ni)} = (Q_D+Q_S)C_{C(Ni)}$	
	SOLVING FOR $Q_{A(Ni)} = [(Q_D C_{P(Ni)} / C_{C(Ni)}) - Q_D)] / (1 - C_{S(Ni)}/C_{C(Ni)})$ =	-0.0690821 cfs
	$\%_{P(Cl^-)}$ = Percent of Stream Width Required to Assimilate Nickel to Criteria Concentration = $Q_{A(Ni)} / Q_S$ (cfs) =	-0.0186%
	$W_{I(Ni)}$ = Proposed Width of Stream required to Assimilate Nickel to Criteria Concentration = $W_S \times \%_{P(Ni)}$	-0.022285 meters
	Proposed Area of Impact due to Nickel * = $(W_{I(Ni)})^2 \times 0.5$ = * assuming equal flow across transect and 90° spread at discharge	0.0002 m^2
	$Q_{A(Zn)}C_{S(Zn)} + Q_D C_{P(Zn)} = Q_T C_{C(Zn)}$	

Zinc (Zn)	$Q_{A(Zn)}$ = Assimilative Stream Flow Required to Achieve Criteria (cfs)	
	$Q_T = Q_S + Q_D$ (cfs)	
	$Q_{A(Zn)}C_{S(Zn)} + Q_DC_{P(Zn)} = (Q_D+Q_S)C_{C(Zn)}$	
	SOLVING FOR $\mathbf{Q_{A(Zn)}} = [(Q_DC_{P(Zn)} / C_{C(Zn)}) - Q_D)] / (1 - C_{S(Zn)}/C_{C(Zn)}) =$	-2.1126575 cfs
	$\%_{P(Cl^-)}$ = Percent of Stream Width Required to Assimilate Zinc to Criteria Concentration = $Q_{A(Zn)} / Q_S$ (cfs) =	-0.5679%
	$W_{I(Zn)}$ = Proposed Width of Stream required to Assimilate Zinc to Criteria Concentration = W_S X $\%_{P(Zn)}$	-0.681502 meters
	Proposed Area of Impact due to Chloride * = $(W_{I(Cl^-)})^2$ X 0.5 = * assuming equal flow across transect and 90° spread at discharge	0.2322 m^2
Ammonia-Nitrogen (NH3-N)	$Q_{A(NH3-N)}C_{S(NH3-N)} + Q_DC_{P(NH3-N)} = Q_TC_{C(NH3-N)}$	
	$Q_{A(NH3-N)}$ = Assimilative Stream Flow Required to Achieve Criteria (cfs)	
	$Q_T = Q_S + Q_D$ (cfs)	
	$Q_{A(NH3-N)}C_{S(NH3-N)} + Q_DC_{P(NH3-N)} = (Q_D+Q_S)C_{C(NH3-N)}$	
	SOLVING FOR $\mathbf{Q_{A(NH3-N)}} = [(Q_DC_{P(NH3-N)} / C_{C(NH3-N)}) - Q_D)] / (1 - C_{S(NH3-N)}/C_{C(NH3-N)}) =$	3.986663 cfs
	$\%_{P(NH3-N)}$ = Percent of Stream Width Required to Assimilate NH3-N to Criteria Concentration = $Q_{A(NH3-N)} / Q_S$ (cfs) =	1.0717%
	$W_{I(NH3-N)}$ = Proposed Width of Stream required to Assimilate NH3-N to Criteria Concentration = W_S X $\%_{P(NH3-N)}$	1.286020 meters
	Proposed Area of Impact due to NH3-N * = $(W_{I(NH3-N)})^2$ X 0.5 = * assuming equal flow across transect and 90° spread at discharge	0.8269 m^2