pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Northwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0100277**
Facility Type	**Municipal**	APS ID	**1017790**
Major / Minor	**Major**	Authorization ID	**1316945**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**North & South Shenango Township Joint Municipal Authority**	Facility Name	**North & South Shenango Joint STP**
Applicant Address	3104 Water Trail Drive Jamestown, PA 16134-4410	Facility Address	3104 Water Trail Drive Jamestown, PA 16134
Applicant Contact	Michael J. Klink	Facility Contact	Michael Seman
Applicant Phone	(724) 932-3138	Facility Phone	(724) 932-3138
Client ID	44974	Site ID	240657
Ch 94 Load Status	Not Overloaded	Municipality	South Shenango Township
Connection Status	No Limitations	County	Crawford
Date Application Received	May 29, 2020	EPA Waived?	No
Date Application Accepted	June 25, 2020	If No, Reason	Major Facility

Purpose of Application: Renewal of an NPDES Permit for an existing discharge of treated sewage from a POTW.

Summary of Review

This is a municipally owned sewage treatment plant serving North and South Shenango Townships, Crawford County. The facility also accepts hauled in municipal waste (septic and holding tanks). There are no listed industrial users listed on the application.

The plant discharges to a segment of the Shenango River, which is known to contain threatened and endangered mussel species. A summary of threatened and endangered mussel species concerns and considerations is included on Pages 13 and 14 of this Fact Sheet. Additionally, the draft permit will be forwarded to the US Fish & Wildlife Service and PA Fish and Boat Commission.

There are currently no open violations listed in EFACTS for this permittee (2/08/2022).

Sludge use and disposal description and location(s): Dewatered sludge is hauled offsite to Seneca Landfill (Butler County) for disposal.

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.

Approve	Deny	Signatures	Date
X		Adam J. Pesek Adam J. Pesek, E.I.T. / Environmental Engineer	February 8, 2022
X		Justin C. Dickey Justin C. Dickey, P.E. / Environmental Engineer Manager	February 10, 2022

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	1.7
Latitude	41º 29' 51"	Longitude	-80º 27' 27"
Quad Name	Greenville West	Quad Code	0702
Wastewater Description:	Treated domestic sewage		

Receiving Waters	Shenango River	Stream Code	35482
NHD Com ID	130027721	RMI	68.2
Drainage Area	167	Yield (cfs/mi^2)	.023 (accrued downstream)
Q_{7-10} Flow (cfs)	11.21 (Summer), 8.145 (Winter)	Q_{7-10} Basis	USGS #03101500 (50 year with seasonal split), USGS #03100000 (accrued)
Elevation (ft)	978	Slope (ft/ft)	0.00102
Watershed No.	20-A	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	

Background/Ambient Data		Data Source
pH (SU)	7.71	WQN 911 field samples (2005-2020)(June-September)
Temperature (°F)	20.24 (Sum), 4.71 (Win)	WQN 911 (2005-2020)
Hardness (mg/L)	70	WQN 911 (2005-2020)(90th %)
NH_3-N	0.11	WQN 911 field samples (2002-2011)
$CBOD_5$	2.2	2005 sampling for NIDR – Shenango River Watershed

Nearest Downstream Public Water Supply Intake		Greenville Municipal Authority	
PWS Waters	Shenango River	Flow at Intake (cfs)	45.7
PWS RMI	57	Distance from Outfall (mi)	11.2

Changes Since Last Permit Issuance:

Other Comments:

Discharge, Receiving Waters and Water Supply Information

Outfall No.	002	Design Flow (MGD)	0
Latitude	41º 29' 59"	Longitude	-80º 27' 9"
Quad Name	Greenville West	Quad Code	0702
Wastewater Description:	Stormwater		
Receiving Waters	Unnamed Tributary to the Shenango River	Stream Code	35482
NHD Com ID	130027721	RMI	---
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	0	Q_{7-10} Basis	Dry Swale
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-A	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	

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

Nearest Downstream Public Water Supply Intake		Greenville Municipal Authority	
PWS Waters	Shenango River	Flow at Intake (cfs)	45.7
PWS RMI	57	Distance from Outfall (mi)	

Changes Since Last Permit Issuance:

Other Comments:

Treatment Facility Summary

Treatment Facility Name: North & South Shenango Joint STP

WQM Permit No.	Issuance Date
2092403 A-3	4/2/2019

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Secondary	Extended Aeration/ Sequencing Batch Reactor	Liquid Chlorine	1.7

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
1.7	1758	Not Overloaded	Aerobic Digestion	Landfill

Changes Since Last Permit Issuance: Sodium bisulfite dechlorination feed equipment was added.

Other Comments:

Compliance History	
Summary of DMRs:	There were 18 effluent violations reported since January 2016. The vast majority of those were due to fecal coliform IMAX excursions (11), and TRC average monthly excursions (4). There was also a D.O. violation and two total phosphorus effluent violations.
Summary of Inspections:	An unscheduled inspection occurred on 9/23/2021 to review recent I&I work and measures the Authority has done recently to reduce I&I and SSOs. Facility is already reporting a downward trend in I&I entering the plant. Brief inspection of the plant was done and was reported to be in good condition and records readily available. An inspection of sewer lines on Seminole Trail occurred on 7/08/2021 in response to an alleged complaint. No issues or violations were observed. Facility inspection was conducted on 12/09/2020. Inspection report noted a violation for SSOs and non-compliance for numerous things ranging from failure to properly calibrate testing equipment, failure to submit or properly complete monitoring reports, failure to document monitoring activities, results, and time of sample calibrations.

Other Comments:

Compliance History

DMR Data for Outfall 001 (from August 1, 2020 to July 31, 2021)

Parameter	JUL-21	JUN-21	MAY-21	APR-21	MAR-21	FEB-21	JAN-21	DEC-20	NOV-20	OCT-20	SEP-20	AUG-20
Flow (MGD) Average Monthly	0.724	0.48	0.711	0.569	0.601	0.601	0.727	0.842	0.502	0.371	0.329	0.369
Flow (MGD) Daily Maximum	1.859	1.1	1.894	1.592	1.37	1.771	1.807	1.604	1.62	1.62	0.748	1.62
pH (S.U.) Minimum	7.07	7.24	7.24	7.12	7.08	6.52	7.03	6.54	6.87	6.93	6.79	7.07
pH (S.U.) Maximum	7.75	7.59	7.82	8.0	7.78	7.64	7.89	7.49	7.56	7.44	7.46	7.4
DO (mg/L) Minimum	5.2	5.8	6.1	7.0	7.1	7.1	5.7	6.9	5.2	5.6	4.1	4.6
TRC (mg/L) Average Monthly	0.06	0.05	0.046	0.04	0.06	0.033	0.033	0.061	0.05	0.02	0.038	0.03
TRC (mg/L) Instantaneous Maximum	0.21	0.10	0.18	0.08	0.26	0.06	0.08	0.14	0.19	0.04	0.11	0.06
CBOD5 (lbs/day) Average Monthly	17.1	11	17	12	13.7	14	16	20	10	8	7	12
CBOD5 (lbs/day) Weekly Average	35.1	13	23	16	18.4	24	20	29	13	13	10	24
CBOD5 (mg/L) Average Monthly	3.1	3	3	3	3	3	3	3	3	3	3	3
CBOD5 (mg/L) Weekly Average	3.5	3	3	3	3	3	4	4	3	3	3	3
BOD5 (lbs/day) Raw Sewage Influent Average Monthly	198	239	196	164	96	231	150	183	114	249	180	292
BOD5 (lbs/day) Raw Sewage Influent Daily Maximum	408	529	326	254	145	679	350	362	222	455	301	558
BOD5 (mg/L) Raw Sewage Influent Average Monthly	50	68.3	37	43	22	49	30.2	27	39	116.8	76.1	91.8
TSS (lbs/day) Average Monthly	23.9	30	49	47	35	48	63	134	18	26	20	17

TSS (lbs/day) Raw Sewage Influent Average Monthly	202	302	229	333	47	267	219	271	168	319	349	470
TSS (lbs/day) Raw Sewage Influent Daily Maximum	352	716	353	1489	95	785	295	635	334	426	848	1108
TSS (lbs/day) Weekly Average	43.4	59	80	102	52.6	98	120	286	22	50	41	31
TSS (mg/L) Average Monthly	5.0	8	9	10	7.2	10	12	20	6	9	7	5
TSS (mg/L) Raw Sewage Influent Average Monthly	51	86	42	65	11	57	44	41	58	145	136	139
TSS (mg/L) Weekly Average	6.0	14	13	16	12	14	22	42	7	11	12	7
Fecal Coliform (CFU/100 ml) Geometric Mean	2	1.17	2	3	3	4	3	15	2	27	1	1
Fecal Coliform (CFU/100 ml) Instantaneous Maximum	11	5	5	44	12	73	9	613	5	687	1	1
Total Nitrogen (lbs/day) Average Monthly	52.5	64	67	39	41	44	50	41	44	64	71	87
Total Nitrogen (mg/L) Average Monthly	12.38	18.7	12.54	10.57	8.49	9.58	8.99	6.36	12.91	23.9	24.2	20.17
Ammonia (lbs/day) Average Monthly	2.16	0.6	0.6	0.7	0.6	1	2	1	0.3	0.3	0.6	0.5
Ammonia (mg/L) Average Monthly	0.29	0.16	0.11	0.17	0.12	0.17	0.36	0.19	0.1	0.11	0.26	0.12
Total Phosphorus (lbs/day) Average Monthly	4.71	1.64	2	1	0.7	1	2	3	1	2	2	4
Total Phosphorus (mg/L) Average Monthly	0.65	0.38	0.32	0.27	0.16	0.29	0.45	0.44	0.34	0.74	0.94	0.92

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** 1.7
Latitude 41º 29' 51.00" **Longitude** -80º 27' 27.00"
Wastewater Description: Treated domestic sewage

Technology-Based Limitations

The following technology-based limitations apply, subject to water quality analysis and BPJ where applicable:

Pollutant	Limit (mg/l)	SBC	Federal Regulation	State Regulation
$CBOD_5$	25	Average Monthly	133.102(a)(4)(i)	92a.47(a)(1)
	40	Average Weekly	133.102(a)(4)(ii)	92a.47(a)(2)
Total Suspended Solids	30	Average Monthly	133.102(b)(1)	92a.47(a)(1)
	45	Average Weekly	133.102(b)(2)	92a.47(a)(2)
pH	6.0 – 9.0 S.U.	Min – Max	133.102(c)	95.2(1)
Fecal Coliform (5/1 – 9/30)	200 / 100 ml	Geo Mean	-	92a.47(a)(4)
Fecal Coliform (5/1 – 9/30)	1,000 / 100 ml	IMAX	-	92a.47(a)(4)
Fecal Coliform (10/1 – 4/30)	2,000 / 100 ml	Geo Mean	-	92a.47(a)(5)
Fecal Coliform (10/1 – 4/30)	10,000 / 100 ml	IMAX	-	92a.47(a)(5)
Total Residual Chlorine	0.5	Average Monthly	-	92a.48(b)(2)
E. Coli	Report (No./100 ml)	IMAX	-	92a.61

Comments: Monitoring for E. coli is placed in the permit in accordance with the Department's SOP entitled "Establishing Effluent Limitations for Individual Sewage Permits."

Water Quality-Based Limitations

The following limitations were determined through water quality modeling (output files attached):

Parameter	Limit (mg/l)	SBC	Model
$CBOD_5$ (5/1 – 10/31)	15	Average Monthly	WQM 7.0 Version 1.1
NH_3-N (5/1 – 10/31)	6	Average Monthly	WQM 7.0 Version 1.1
NH_3-N (11/1 – 4/30)	10	Average Monthly	WQM 7.0 Version 1.1
Total Residual Chorine	0.16	Average Monthly	TRC_CALC Spreadsheet
Total Residual Chlorine	0.53	IMAX	TRC_CALC Spreadsheet
Total Copper	0.022	Average Monthly	Toxics Management Spreadsheet Ver. 1.3
Total Copper	0.034	Daily Maximum	Toxics Management Spreadsheet Ver. 1.3
Benzo(a)Anthracene (ug/l)	0.019	Average Monthly	Toxics Management Spreadsheet Ver. 1.3
Benzo(a)Anthracene (ug/l)	0.029	Daily Maximum	Toxics Management Spreadsheet Ver. 1.3
Benzo(a)Pyrene (ug/l)	0.002	Average Monthly	Toxics Management Spreadsheet Ver. 1.3
Benzo(a)Pyrene (ug/l)	0.003	Daily Maximum	Toxics Management Spreadsheet Ver. 1.3
Benzo(k)Fluoranthene (ug/l)	0.19	Average Monthly	Toxics Management Spreadsheet Ver. 1.3
Benzo(k)Fluoranthene (ug/l)	0.29	Daily Maximum	Toxics Management Spreadsheet Ver. 1.3

Comments: Wintertime modeling was conducted for this discharge, although not current standard modeling procedure, due to the unique seasonal streamflow characteristics for this discharge and Jamestown Municipal STP's discharge due to release rates of the Pymatuning Dam, operated by USACOE. The calculated wintertime ammonia nitrogen limit is slightly more stringent than the current limit due primarily to new Chapter 93 water quality criteria for ammonia nitrogen which took effect early in 2021.

The permittee indicated in their completed “Pre-Draft Permit Survey” that they were uncertain if they could meet the new WQBELs for total copper, benzo(a)anthracene, benzo(a)pyrene, and benzo(k)fluoranthene now or estimated date by which they would be able to meet the proposed WQBELs. Therefore, a compliance schedule of three years will be placed in the permit to meet the proposed WQBELs, with monitoring being conducted in the interim period along with special condition being placed in Part C of the permit requiring the permittee to conduct a Toxic Reduction Evaluation and site specific studies.

A phosphorus average monthly limit of 1.0 mg/l will be retained in the permit, based on the Shenango River Trophic State Index (TSI) Study.

The Toxic Management Spreadsheet also recommended monitoring for total aluminum, total zinc, and bis(2-ethylhexyl)phthalate. Monitoring will be placed in the permit for these parameters a reduced monitoring frequency of 2/month.

Best Professional Judgment (BPJ) Limitations

Comments: A dissolved oxygen limit of 4.0 mg/l as a daily minimum is placed in the permit in accordance with the Department’s SOP entitled “Establishing Effluent Limitations for Individual Sewage Permits.”

Other Considerations

Comments: Monitoring for influent BOD_5 and influent TSS is placed in the permit in accordance with the Department’s SOP entitled “New and Reissuance Individual Sewage NPDES Permit Applications.”

Monitoring for total nitrogen is placed in the permit in accordance with the Department’s SOP entitled “Establishing Effluent Limitations for Individual Sewage Permits.”

Anti-Backsliding

N/A

Development of Effluent Limitations

Outfall No.	002	**Design Flow (MGD)**	0
Latitude	41º 29' 59.00"	**Longitude**	-80º 27' 9.00"

Wastewater Description: Stormwater from STP Facility

Technology-Based Limitations

Comments: None

Water Quality-Based Limitations

Comments: No WQ modeling was conducted.

Best Professional Judgment (BPJ) Limitations

Comments: None

Anti-Backsliding

N/A

Whole Effluent Toxicity (WET)

For Outfall 001, ☐ **Acute** ☒ **Chronic** WET Testing was completed:

☐ For the permit renewal application (4 tests).
☐ Quarterly throughout the permit term.
☐ Quarterly throughout the permit term and a TIE/TRE was conducted.
☒ Other: **Annually**

The dilution series used for the tests was: 100%, 62%, 24%, 12%, and 6%. The Target Instream Waste Concentration (TIWC) to be used for analysis of the results is: 24%.

Summary of Four Most Recent Test Results

TST Data Analysis

(NOTE – In lieu of recording information below, the application manager may attach the DEP WET Analysis Spreadsheet).

Test Date	*Ceriodaphnia* Results (Pass/Fail)		*Pimephales* Results (Pass/Fail)	
	Survival	Reproduction	Survival	Growth
4/18/2017	Pass	Pass	Pass	Pass
5/29/2018	Pass	Pass	Fail	Pass
7/17/2018	Pass	Pass	Pass	Pass
5/28/2019	Pass	Pass	Pass	Pass
3/03/2020	Pass	Pass	Pass	Pass

** A "passing" result is that in which the replicate data for the TIWC is not statistically significant from the control condition. This is exhibited when the calculated t value ("T-Test Result") is greater than the critical t value. A "failing" result is exhibited when the calculated t value ("T-Test Result") is less than the critical t value.*

Is there reasonable potential for an excursion above water quality standards based on the results of these tests? (*NOTE – In general, reasonable potential is determined anytime there is at least one test failure in the previous four tests).*

☒ **YES** ☐ **NO**

Comments: One failure was found for Pimephales Promelas survival. A retest resulted in a passing test. In conversations with the permittee, the cause of the failure is believed to be due to a load delivered from a septage hauler on the day the samples were collected. The permittee has indicated that the facility is no longer accepting waste from that hauler (Bell Sanitation).

Evaluation of Test Type, IWC and Dilution Series for Renewed Permit

Acute Partial Mix Factor (PMFa): **0.340** Chronic Partial Mix Factor (PMFc): **1.0**

1. Determine IWC – Acute (IWCa):

$(Q_d \times 1.547) / ((Q_{7\text{-}10} \times PMFa) + (Q_d \times 1.547))$

[(1.7 MGD x 1.547) / ((8.145 cfs x 0.34) + (1.7 MGD x 1.547))] x 100 = **49%**

Is IWCa < 1%? ☐ **YES** ☒ **NO**

If the discharge is to the tidal portion of the Delaware River, indicate how the type of test was determined:

N/A

Type of Test for Permit Renewal: **Chronic**

2b. Determine Target IWCc (If Chronic Tests Required)

$(Q_d \times 1.547) / (Q_{7\text{-}10} \times PMFc) + (Q_d \times 1.547)$

[(1.7 MGD x 1.547) / ((8.145 cfs x 1) + (1.7 MGD x 1.547))] x 100 = **24%**

3. Determine Dilution Series

Dilution Series = 100%, 62%, 24%, 12%, and 6%.

WET Limits

Has reasonable potential been determined? ☒ YES ☐ NO

Will WET limits be established in the permit? ☐ YES ☒ NO

If WET limits will be established, identify the species and the limit values for the permit (TU).

N/A

If WET limits will not be established, but reasonable potential was determined, indicate the rationale for not establishing WET limits:

The reported WETT endpoint failure was the only failed test in the previous nine WET tests. Since the facility does not have any industrial users, there have been no changes to the dilution series in that period or in the proposed renewed permit, and a logical explanation and action was taken for the one failed test, it was decided not to impose WET limits in the proposed renewed permit.

Threatened and Endangered Mussel Species Concerns and Considerations

The main segment of the Shenango River from the Pymatuning Dam in Jamestown, Pennsylvania, downstream to the point of inundation by Shenango River Lake near Big Bend, Mercer County, Pennsylvania, is documented to contain federally and state listed threatened and endangered mussel species. Due to the discharge being directly to the Allegheny River, potential impacts to endangered mussel species were evaluated.

The USFWS has indicated in comment letters on other NPDES permits that in order to protect threatened and endangered mussel species, wastewater discharges containing ammonia-nitrogen (NH_3-N), chloride (Cl^-), dissolved nickel, and dissolved zinc where mussels or their habitat exist, 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. The calculated site-specific criteria based on WQN Station 911 stream background pH and temperature data (pH of 7.71 and temperature of 20.24) results in NH3-N criteria of 1.113 mg/l.

Ammonia-Nitrogen (NH_3-N) Evaluation:

The following is a summary of the Ammonia-Nitrogen eDMR average monthly reporting data:

Ammonia-Nitrogen (NH_3-N) Sampling Data (eDMR Reporting)

Ammonia-Nitrogen (NH_3-N) 24-hour composite samples (mg/L)(Averge Monthly)	Year	January	February	March	April	May	June	July	August	September	October	November	December
	2018	0.11	0.22	0.17	0.1	0.1	0.12	0.33	0.15	0.21	0.1	0.11	0.1
	2019	0.11	0.12	0.16	0.13	0.12	0.1	0.14	0.14	0.11	0.16	0.35	0.45
	2020	0.94	.65	.67	.46	.12	.26	.12	.12	.26	.11	.1	.19
	2021	0.36	.17	.12	.17	.11	.16	.29	.18	.17	.37	.11	0.15

Note: NSSJMA's current NPDES permit has 2/week NH3-N monitoring with a summertime average monthly limit of 6.0.0 mg/L (12 mg/L IMAX) and a wintertime average monthly limit of 11.0 mg/L (22 mg/L IMAX).

The proposed permit limits for Ammonia-Nitrogen in the new permit cycle were as follows:

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		
Ammonia-Nitrogen May 1 - Oct 31	85	XXX	XXX	6.0	XXX	12	2/week	24-Hr Composite
Ammonia-Nitrogen Nov 1 - Apr 30	141	XXX	XXX	10.0	XXX	20	2/week	24-Hr Composite

The limits in the existing permit were calculated utilizing the Department DO model (WQM 7.0) which assumes a complete mix of the effluent with the receiving stream. The WQM 7.0 model was reevaluated as part of the subject permit renewal using the newly adopted ammonia-nitrogen water quality criteria (same as 2013 EPA CMG).

As can be seen from the eDMR data for the past four years, the highest average monthly ammonia nitrogen concentration in the effluent was 0.94 mg/l, with average – average monthly value being 0.213 mg/l. This indicates that the facility consistently denitrifying the municipal sewage to a high degree and easily meeting the calculated WQBELs in the permit. There is no perceived impact due to ammonia nitrogen with the max average monthly concentration because it is less than the most stringent WQ criteria.

A summary of the sampling data for chloride, total nickel, and total zinc based on three effluent samples and one influent sample at Outfall 001 for the 2020 renewal application is as follows:

PARAMETER	UNITS	3/03/2020	3/05/2020	2/10/2020	Influent 1/15/2020
Chloride	mg/l	29.7	26	35.2	18.7
Total Nickel	µg/l	1	0.6	0.7	0.9
Total Zinc	µg/l	30	11	22	10

The Endangered Mussel Species Impact Area Calculations Spreadsheet (attached) was completed using the maximum discharge concentrations for ammonia nitrogen, chloride, total nickel, and zinc. As was expected, there were no calculated mussel impacts due to ammonia nitrogen, chloride and total nickel because all reported application data for these parameters were less than USFWS stated criteria. There was however a significant area of impact calculated due to total zinc (approximately 246-262 square meters.)

With the exception of discharging potentially elevated levels of total zinc, the North & South Shenango Joint STP facility is not believed to be having any measurable adverse effects on threatened or endangered mussel species in the Shenango River. However, the Department will establish quarterly effluent sampling for chloride and total nickel to develop a dataset as a means of further evaluating potential impacts to threatened and endangered mussels in the upcoming permit term. Twice a month monitoring for zinc will also be placed in the permit for reasoning discussed on Page 9 of this Fact Sheet, which will also aid in further evaluating potential impacts to threatened and endangered mussels A Part C condition will also be added requiring the permittee conduct a total zinc reduction evaluation.

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" (362-0400-001), SOPs and/or BPJ.

Outfall 001, Effective Period: Permit Effective Date through April 30, 2025.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Copper, Total	Report	Report	XXX	Report	Report	XXX	1/week	24-Hr Composite
Benzo(a)Anthracene (ug/L)	Report	Report	XXX	Report	Report	XXX	1/week	24-Hr Composite
Benzo(a)Pyrene (ug/L)	Report	Report	XXX	Report	Report	XXX	1/week	24-Hr Composite
Benzo(k)Fluoranthene (ug/L)	Report	Report	XXX	Report	Report	XXX	1/week	24-Hr Composite

Compliance Sampling Location: Outfall 001 (after disinfection)

Other Comments:

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" (362-0400-001), SOPs and/or BPJ.

Outfall 001, Effective Period: May 1, 2025 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	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Copper, Total	0.32	0.49	XXX	0.22	0.34	0.55	1/week	24-Hr Composite
Benzo(a)Anthracene (ug/L)	0.035	0.035	XXX	2.5	2.5	2.5	1/week	24-Hr Composite
Benzo(a)Pyrene (ug/L)	0.035	0.035	XXX	2.5	2.5	2.5	1/week	24-Hr Composite
Benzo(k)Fluoranthene (ug/L)	0.035	0.035	XXX	2.5	2.5	2.5	1/week	24-Hr Composite

Compliance Sampling Location: Outfall 001 (after disinfection)

Other Comments:

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" (362-0400-001), 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	Daily Maximum	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Daily Min	XXX	9.0 Daily Max	XXX	1/day	Grab
Dissolved Oxygen	XXX	XXX	4.0 Daily Min	XXX	XXX	XXX	1/day	Grab
Total Residual Chlorine (TRC)	XXX	XXX	XXX	0.16	0.53 Daily Max	XXX	1/day	Grab
Carbonaceous Biochemical Oxygen Demand (CBOD5) Nov 1 - Apr 30	354	567 Wkly Avg	XXX	25	40	50	2/week	24-Hr Composite
Carbonaceous Biochemical Oxygen Demand (CBOD5) May 1 - Oct 31	212	311 Wkly Avg	XXX	15	22	30	2/week	24-Hr Composite
Biochemical Oxygen Demand (BOD5) Raw Sewage Influent	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Total Suspended Solids Raw Sewage Influent	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Total Suspended Solids	425	638 Wkly Avg	XXX	30	45	60	2/week	24-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	2/week	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1000	2/week	Grab

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	Daily Maximum	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
E. Coli (No./100 ml)	XXX	XXX	XXX	XXX	XXX	Report	1/month	Grab
Total Nitrogen	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Ammonia-Nitrogen Nov 1 - Apr 30	141	XXX	XXX	10.0	XXX	20	2/week	24-Hr Composite
Ammonia-Nitrogen May 1 - Oct 31	85	XXX	XXX	6	XXX	12	2/week	24-Hr Composite
Total Phosphorus	14	XXX	XXX	1.0	XXX	2	2/week	24-Hr Composite
Aluminum, Total	Report	Report	XXX	Report	Report Daily Max	XXX	2/month	24-Hr Composite
Nickel, Total	XXX	Report	XXX	XXX	Report Daily Max	XXX	1/quarter	24-Hr Composite
Zinc, Total	Report	Report	XXX	Report	Report Daily Max	XXX	2/month	24-Hr Composite
Chloride	XXX	Report	XXX	XXX	Report Daily Max	XXX	1/quarter	24-Hr Composite
Bis(2-Ethylhexyl)Phthalate (ug/L)	Report	Report	XXX	Report	Report Daily Max	XXX	2/month	24-Hr Composite

Compliance Sampling Location: Outfall 001 (after disinfection)

Other Comments:

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
20A	35482	SHENANGO RIVER	**68.200**	978.00	167.00	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	0.023	11.21	0.00	0.000	0.000	0.0	0.00	0.00	20.24	7.71	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
NSSJMA STP	PA0100277	1.7000	0.0000	0.0000	0.000	20.00	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	2.20	0.00	1.50
Dissolved Oxygen	4.00	8.24	0.00	0.00
NH3-N	25.00	0.11	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
20A	35482	SHENANGO RIVER	**66.340**	968.00	170.80	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	0.023	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.24	7.71	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
Jamestown STP	PA0029726	0.2600	0.0000	0.0000	0.000	20.00	7.10

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.20	0.00	1.50
Dissolved Oxygen	4.00	8.24	0.00	0.00
NH3-N	25.00	0.11	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
20A	35482	SHENANGO RIVER	**62.000**	949.00	183.60	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	0.023	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.24	7.71	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
20A	35482	SHENANGO 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												
68.200	11.21	0.00	11.21	2.6299	0.00102	.845	62.99	74.56	0.26	0.437	20.19	7.46
66.340	11.30	0.00	11.30	3.0321	0.00083	.855	64.64	75.64	0.26	1.022	20.19	7.44
Q1-10 Flow												
68.200	7.17	0.00	7.17	2.6299	0.00102	NA	NA	NA	0.21	0.530	20.18	7.39
66.340	7.23	0.00	7.23	3.0321	0.00083	NA	NA	NA	0.22	1.233	20.17	7.37
Q30-10 Flow												
68.200	15.25	0.00	15.25	2.6299	0.00102	NA	NA	NA	0.30	0.379	20.20	7.50
66.340	15.36	0.00	15.36	3.0321	0.00083	NA	NA	NA	0.30	0.889	20.20	7.49

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		

WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
20A	35482	SHENANGO 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
68.200	NSSJMA STP	10.71	39.64	10.71	39.64	0	0
66.340	Jamestown STP	7.22	50	10.93	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
68.200	NSSJMA STP	1.37	8.68	1.37	7.52	2	13
66.340	Jamestown STP	1.15	25	1.39	21.67	2	13

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)		
68.20	NSSJMA STP	22.6	18.34	7.52	6.15	4	4	2	19
66.34	Jamestown STP	25	25	21.67	16.12	4	4	2	19

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
20A	35482	SHENANGO RIVER

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
68.200	1.700	20.194	7.458
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
62.992	0.845	74.563	0.260
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
5.27	0.666	1.26	0.711
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
7.437	1.815	Tsivoglou	5
Reach Travel Time (days)			
0.437			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.044	5.11	1.22	7.18
0.087	4.97	1.18	6.95
0.131	4.82	1.15	6.75
0.175	4.68	1.11	6.58
0.219	4.55	1.08	6.43
0.262	4.42	1.04	6.30
0.306	4.29	1.01	6.19
0.350	4.16	0.98	6.10
0.393	4.04	0.95	6.02
0.437	3.93	0.92	5.96

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
66.340	1.960	20.189	7.444
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
64.641	0.855	75.644	0.259
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
4.51	0.552	1.34	0.710
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
5.922	1.474	Tsivoglou	5
Reach Travel Time (days)			
1.022			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.102	4.26	1.25	5.62
0.204	4.02	1.16	5.42
0.307	3.80	1.08	5.28
0.409	3.59	1.00	5.20
0.511	3.39	0.93	5.18
0.613	3.20	0.87	5.19
0.716	3.03	0.81	5.24
0.818	2.86	0.75	5.31
0.920	2.70	0.70	5.40
1.022	2.55	0.65	5.51

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
20A	35482	SHENANGO 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)
68.200	NSSJMA STP	PA0100277	1.700	CBOD5	18.34		
				NH3-N	6.15	12.3	
				Dissolved Oxygen			4

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)
66.340	Jamestown STP	PA0029726	0.260	CBOD5	25		
				NH3-N	16.12	32.24	
				Dissolved Oxygen			4

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
20A	35482	SHENANGO RIVER	**68.200**	978.00	167.00	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	0.023	8.15	0.00	0.000	0.000	0.0	0.00	0.00	4.71	7.71	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
NSSJMA STP	PA0100277	1.7000	0.0000	0.0000	0.000	15.00	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	2.20	0.00	1.50
Dissolved Oxygen	4.00	8.24	0.00	0.00
NH3-N	25.00	0.11	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
20A	35482	SHENANGO RIVER	**66.340**	968.00	170.80	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	0.023	0.00	0.00	0.000	0.000	0.0	0.00	0.00	4.71	7.71	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
Jamestown STP	PA0029726	0.2600	0.0000	0.0000	0.000	15.00	7.10

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.20	0.00	1.50
Dissolved Oxygen	4.00	8.24	0.00	0.00
NH3-N	25.00	0.11	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
20A	35482	SHENANGO RIVER	**62.000**	949.00	183.60	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	0.023	0.00	0.00	0.000	0.000	0.0	0.00	0.00	4.71	7.71	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
20A	35482	SHENANGO 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												
68.200	8.15	0.00	8.15	2.6299	0.00102	.826	57.75	69.95	0.23	0.503	7.22	7.41
66.340	8.24	0.00	8.24	3.0321	0.00083	.836	59.44	71.1	0.23	1.170	7.48	7.39
Q1-10 Flow												
68.200	5.22	0.00	5.22	2.6299	0.00102	NA	NA	NA	0.19	0.601	8.16	7.33
66.340	5.27	0.00	5.27	3.0321	0.00083	NA	NA	NA	0.19	1.388	8.47	7.32
Q30-10 Flow												
68.200	11.08	0.00	11.08	2.6299	0.00102	NA	NA	NA	0.26	0.439	6.68	7.46
66.340	11.20	0.00	11.20	3.0321	0.00083	NA	NA	NA	0.26	1.026	6.90	7.44

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		

WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
20A	35482	SHENANGO 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
68.200	NSSJMA STP	16.79	49.87	16.79	49.87	0	0
66.340	Jamestown STP	10.94	50	17.07	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
68.200	NSSJMA STP	3.34	16.96	3.34	15.9	2	6
66.340	Jamestown STP	2.74	25	3.38	23.44	2	6

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)		
68.20	NSSJMA STP	25	25	14.7	10.45	4	4	2	19
66.34	Jamestown STP	25	25	23.44	17.57	4	4	2	19

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
20A	35482	SHENANGO RIVER

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
68.200	1.700	7.220	7.407
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
57.748	0.826	69.949	0.226
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
7.76	1.121	2.63	0.262
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
7.208	1.160	Tsivoglou	5
Reach Travel Time (days)			
0.503			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.050	7.52	2.60	6.98
0.101	7.29	2.56	6.78
0.151	7.07	2.53	6.60
0.201	6.85	2.50	6.44
0.251	6.64	2.46	6.31
0.302	6.43	2.43	6.19
0.352	6.23	2.40	6.09
0.402	6.04	2.37	6.01
0.452	5.85	2.34	5.94
0.503	5.67	2.31	5.89

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
66.340	1.960	7.479	7.393
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
59.445	0.836	71.104	0.227
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
6.34	0.959	2.84	0.267
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
5.837	0.953	Tsivoglou	5
Reach Travel Time (days)			
1.170			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.117	5.95	2.75	5.56
0.234	5.58	2.66	5.35
0.351	5.24	2.58	5.21
0.468	4.92	2.50	5.12
0.585	4.62	2.43	5.08
0.702	4.34	2.35	5.09
0.819	4.07	2.28	5.12
0.936	3.82	2.21	5.19
1.053	3.59	2.14	5.28
1.170	3.37	2.07	5.38

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
20A	35482	SHENANGO 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)
68.200	NSSJMA STP	PA0100277	1.700	CBOD5	25		
				NH3-N	10.45	20.9	
				Dissolved Oxygen			4

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)
66.340	Jamestown STP	PA0029726	0.260	CBOD5	25		
				NH3-N	17.57	35.14	
				Dissolved Oxygen			4

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.3, March 2021

Discharge Information

Instructions | Discharge | Stream

Facility: **North & South Shenango Joint STP** NPDES Permit No.: **PA0100277** Outfall No.: **001**

Evaluation Type: **Major Sewage / Industrial Waste** Wastewater Description: **Domestic 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
1.7	177.3	7						

					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		294		104							
	Chloride (PWS)	mg/L		35.2		9.47							
	Bromide	mg/L	<	0.1									
	Sulfate (PWS)	mg/L		26.2		8.78							
	Fluoride (PWS)	mg/L											
Group 2	Total Aluminum	µg/L		290									
	Total Antimony	µg/L		0.1									
	Total Arsenic	µg/L		0.9									
	Total Barium	µg/L		27									
	Total Beryllium	µg/L	<	0.05									
	Total Boron	µg/L	<	100									
	Total Cadmium	µg/L	<	0.08									
	Total Chromium (III)	µg/L		1									
	Hexavalent Chromium	µg/L	<	0.1									
	Total Cobalt	µg/L		0.2									
	Total Copper	µg/L		14									
	Free Cyanide	µg/L		1									
	Total Cyanide	µg/L		3									
	Dissolved Iron	µg/L	<	20									
	Total Iron	µg/L		570									
	Total Lead	µg/L		0.8									
	Total Manganese	µg/L		110									
	Total Mercury	µg/L	<	0.1									
	Total Nickel	µg/L		1									
	Total Phenols (Phenolics) (PWS)	µg/L	<	5									
	Total Selenium	µg/L	<	5									
	Total Silver	µg/L	<	0.05									
	Total Thallium	µg/L	<	2									
	Total Zinc	µg/L		30									
	Total Molybdenum	µg/L		0.4									
	Acrolein	µg/L	<	0.9									
	Acrylamide	µg/L	<										
	Acrylonitrile	µg/L	<	0.5									
	Benzene	µg/L	<	0.5									
	Bromoform	µg/L	<	0.5									

Group 3	Carbon Tetrachloride	µg/L	<	0.5									
	Chlorobenzene	µg/L		0.5									
	Chlorodibromomethane	µg/L	<	0.5									
	Chloroethane	µg/L	<	0.5									
	2-Chloroethyl Vinyl Ether	µg/L	<	0.5									
	Chloroform	µg/L		2.6									
	Dichlorobromomethane	µg/L	<	0.5									
	1,1-Dichloroethane	µg/L	<	0.5									
	1,2-Dichloroethane	µg/L	<	0.5									
	1,1-Dichloroethylene	µg/L	<	0.5									
	1,2-Dichloropropane	µg/L	<	0.5									
	1,3-Dichloropropylene	µg/L	<	0.5									
	1,4-Dioxane	µg/L	<	0.1									
	Ethylbenzene	µg/L	<	0.5									
	Methyl Bromide	µg/L	<	0.5									
	Methyl Chloride	µg/L	<	0.5									
	Methylene Chloride	µg/L	<	0.5									
	1,1,2,2-Tetrachloroethane	µg/L	<	0.5									
	Tetrachloroethylene	µg/L	<	0.5									
	Toluene	µg/L	<	0.5									
	1,2-trans-Dichloroethylene	µg/L	<	0.5									
	1,1,1-Trichloroethane	µg/L	<	0.5									
	1,1,2-Trichloroethane	µg/L	<	0.5									
	Trichloroethylene	µg/L	<	0.5									
	Vinyl Chloride	µg/L	<	0.5									
Group 4	2-Chlorophenol	µg/L	<	0.0884									
	2,4-Dichlorophenol	µg/L	<	0.0796									
	2,4-Dimethylphenol	µg/L	<	0.424									
	4,6-Dinitro-o-Cresol	µg/L	<	0.115									
	2,4-Dinitrophenol	µg/L	<	2.91									
	2-Nitrophenol	µg/L	<	0.0495									
	4-Nitrophenol	µg/L	<	0.0398									
	p-Chloro-m-Cresol	µg/L	<	0.0961									
	Pentachlorophenol	µg/L	<	0.101									
	Phenol	µg/L	<	0.0437									
	2,4,6-Trichlorophenol	µg/L	<	0.0961									
Group 5	Acenaphthene	µg/L	<	0.105									
	Acenaphthylene	µg/L	<	0.0903									
	Anthracene	µg/L	<	0.0883									
	Benzidine	µg/L	<	4.85									
	Benzo(a)Anthracene	µg/L		0.068									
	Benzo(a)Pyrene	µg/L		0.282									
	3,4-Benzofluoranthene	µg/L	<	0.0437									
	Benzo(ghi)Perylene	µg/L	<	0.0796									
	Benzo(k)Fluoranthene	µg/L		0.117									
	Bis(2-Chloroethoxy)Methane	µg/L	<	0.0825									
	Bis(2-Chloroethyl)Ether	µg/L	<	0.0757									
	Bis(2-Chloroisopropyl)Ether	µg/L	<	0.0864									
	Bis(2-Ethylhexyl)Phthalate	µg/L		2.67									
	4-Bromophenyl Phenyl Ether	µg/L	<	0.11									
	Butyl Benzyl Phthalate	µg/L	<	0.0641									
	2-Chloronaphthalene	µg/L	<	0.0924									
	4-Chlorophenyl Phenyl Ether	µg/L	<	0.0922									
	Chrysene	µg/L	<	0.0709									
	Dibenzo(a,h)Anthrancene	µg/L	<	0.0515									
	1,2-Dichlorobenzene	µg/L	<	0.5									
	1,3-Dichlorobenzene	µg/L	<	0.5									
	1,4-Dichlorobenzene	µg/L	<	0.5									
	3,3-Dichlorobenzidine	µg/L	<	0.135									
	Diethyl Phthalate	µg/L	<	0.114									
	Dimethyl Phthalate	µg/L	<	0.0883									
	Di-n-Butyl Phthalate	µg/L		0.487									
	2,4-Dinitrotoluene	µg/L	<	0.0816									

	2,6-Dinitrotoluene	µg/L	<	0.112									
	Di-n-Octyl Phthalate	µg/L	<	0.0737									
	1,2-Diphenylhydrazine	µg/L	<	0.115									
	Fluoranthene	µg/L	<	0.0864									
	Fluorene	µg/L	<	0.11									
	Hexachlorobenzene	µg/L	<	0.0854									
	Hexachlorobutadiene	µg/L	<	0.0796									
	Hexachlorocyclopentadiene	µg/L	<	0.0437									
	Hexachloroethane	µg/L	<										
	Indeno(1,2,3-cd)Pyrene	µg/L	<	0.0563									
	Isophorone	µg/L	<	0.0951									
	Naphthalene	µg/L	<	0.0621									
	Nitrobenzene	µg/L	<	0.0602									
	n-Nitrosodimethylamine	µg/L	<	0.0641									
	n-Nitrosodi-n-Propylamine	µg/L	<	0.0893									
	n-Nitrosodiphenylamine	µg/L	<	0.204									
	Phenanthrene	µg/L	<	0.101									
	Pyrene	µg/L	<	0.0934									
	1,2,4-Trichlorobenzene	µg/L	<	0.0944									
Group 6	Aldrin	µg/L	<										
	alpha-BHC	µg/L	<										
	beta-BHC	µg/L	<										
	gamma-BHC	µg/L	<										
	delta BHC	µg/L	<										
	Chlordane	µg/L	<										
	4,4-DDT	µg/L	<										
	4,4-DDE	µg/L	<										
	4,4-DDD	µg/L	<										
	Dieldrin	µg/L	<										
	alpha-Endosulfan	µg/L	<										
	beta-Endosulfan	µg/L	<										
	Endosulfan Sulfate	µg/L	<										
	Endrin	µg/L	<										
	Endrin Aldehyde	µg/L	<										
	Heptachlor	µg/L	<										
	Heptachlor Epoxide	µg/L	<										
	PCB-1016	µg/L	<										
	PCB-1221	µg/L	<										
	PCB-1232	µg/L	<										
	PCB-1242	µg/L	<										
	PCB-1248	µg/L	<										
	PCB-1254	µg/L	<										
	PCB-1260	µg/L	<										
	PCBs, Total	µg/L	<										
	Toxaphene	µg/L	<										
	2,3,7,8-TCDD	ng/L	<										
Group 7	Gross Alpha	pCi/L											
	Total Beta	pCi/L	<										
	Radium 226/228	pCi/L	<										
	Total Strontium	µg/L	<										
	Total Uranium	µg/L	<										
	Osmotic Pressure	mOs/kg											

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.3, March 2021

Stream / Surface Water Information

North & South Shenango Joint STP, NPDES Permit No. PA0100277, Outfall 001

Instructions | Discharge | *Stream*

Receiving Surface Water Name: **Shenango River**

No. Reaches to Model: **1**

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

Location	Stream Code*	RMI*	Elevation (ft)*	DA (mi^2)*	Slope (ft/ft)	PWS Withdrawal (MGD)	Apply Fish Criteria*
Point of Discharge	035482	68.2	978	167			Yes
End of Reach 1	035482	57	934	302.6		2	Yes

Q_{7-10}

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	68.2	0.023	8.145									70	7.71		
End of Reach 1	57	0.151	45.7									70	7.71		

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	68.2														
End of Reach 1	57														

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.3, March 2021

Model Results

North & South Shenango Joint STP, NPDES Permit No. PA0100277, 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)
68.2	8.15		8.15	2.63	0.00074	0.834	58.639	70.283	0.22	3.108	129.554
57	45.70	3.094	42.606								

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)
68.2	46.46		46.46	2.63	0.00074	1.626	58.639	36.063	0.515	1.329	74.643
57	209.776	3.094	206.68								

☑ ***Wasteload Allocations***

☑ ***AFC*** CCT (min): 15 PMF: 0.340 Analysis Hardness (mg/l): 122.24 Analysis pH: 7.23

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)	104000	0		0	N/A	N/A	N/A	
Chloride (PWS)	9470	0		0	N/A	N/A	N/A	
Sulfate (PWS)	8780	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	750	750	1,540	
Total Antimony	0	0		0	1,100	1,100	2,259	
Total Arsenic	0	0		0	340	340	698	Chem Translator of 1 applied
Total Barium	0	0		0	21,000	21,000	43,131	
Total Boron	0	0		0	8,100	8,100	16,636	
Total Cadmium	0	0		0	2.448	2.62	5.37	Chem Translator of 0.936 applied
Total Chromium (III)	0	0		0	671.635	2,125	4,365	Chem Translator of 0.316 applied
Hexavalent Chromium	0	0		0	16	16.3	33.5	Chem Translator of 0.982 applied
Total Cobalt	0	0		0	95	95.0	195	
Total Copper	0	0		0	16.239	16.9	34.7	Chem Translator of 0.96 applied

Free Cyanide	0	0		0	22	22.0	45.2	
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	80.311	105	217	Chem Translator of 0.762 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	1.400	1.65	3.38	Chem Translator of 0.85 applied
Total Nickel	0	0		0	554.956	556	1,142	Chem Translator of 0.998 applied
Total Phenols (Phenolics) (PWS)	0	0		0	N/A	N/A	N/A	
Total Selenium	0	0		0	N/A	N/A	N/A	Chem Translator of 0.922 applied
Total Silver	0	0		0	4.544	5.35	11.0	Chem Translator of 0.85 applied
Total Thallium	0	0		0	65	65.0	133	
Total Zinc	0	0		0	138.919	142	292	Chem Translator of 0.978 applied
Acrolein	0	0		0	3	3.0	6.16	
Acrylonitrile	0	0		0	650	650	1,335	
Benzene	0	0		0	640	640	1,314	
Bromoform	0	0		0	1,800	1,800	3,697	
Carbon Tetrachloride	0	0		0	2,800	2,800	5,751	
Chlorobenzene	0	0		0	1,200	1,200	2,465	
Chlorodibromomethane	0	0		0	N/A	N/A	N/A	
2-Chloroethyl Vinyl Ether	0	0		0	18,000	18,000	36,969	
Chloroform	0	0		0	1,900	1,900	3,902	
Dichlorobromomethane	0	0		0	N/A	N/A	N/A	
1,2-Dichloroethane	0	0		0	15,000	15,000	30,808	
1,1-Dichloroethylene	0	0		0	7,500	7,500	15,404	
1,2-Dichloropropane	0	0		0	11,000	11,000	22,592	
1,3-Dichloropropylene	0	0		0	310	310	637	
Ethylbenzene	0	0		0	2,900	2,900	5,956	
Methyl Bromide	0	0		0	550	550	1,130	
Methyl Chloride	0	0		0	28,000	28,000	57,507	
Methylene Chloride	0	0		0	12,000	12,000	24,646	
1,1,2,2-Tetrachloroethane	0	0		0	1,000	1,000	2,054	
Tetrachloroethylene	0	0		0	700	700	1,438	
Toluene	0	0		0	1,700	1,700	3,492	
1,2-trans-Dichloroethylene	0	0		0	6,800	6,800	13,966	
1,1,1-Trichloroethane	0	0		0	3,000	3,000	6,162	
1,1,2-Trichloroethane	0	0		0	3,400	3,400	6,983	
Trichloroethylene	0	0		0	2,300	2,300	4,724	
Vinyl Chloride	0	0		0	N/A	N/A	N/A	
2-Chlorophenol	0	0		0	560	560	1,150	
2,4-Dichlorophenol	0	0		0	1,700	1,700	3,492	
2,4-Dimethylphenol	0	0		0	660	660	1,356	
4,6-Dinitro-o-Cresol	0	0		0	80	80.0	164	
2,4-Dinitrophenol	0	0		0	660	660	1,356	
2-Nitrophenol	0	0		0	8,000	8,000	16,431	
4-Nitrophenol	0	0		0	2,300	2,300	4,724	
p-Chloro-m-Cresol	0	0		0	160	160	329	
Pentachlorophenol	0	0		0	11.007	11.0	22.6	

Phenol	0	0		0	N/A	N/A	N/A	
2,4,6-Trichlorophenol	0	0		0	460	460	945	
Acenaphthene	0	0		0	83	83.0	170	
Anthracene	0	0		0	N/A	N/A	N/A	
Benzidine	0	0		0	300	300	616	
Benzo(a)Anthracene	0	0		0	0.5	0.5	1.03	
Benzo(a)Pyrene	0	0		0	N/A	N/A	N/A	
3,4-Benzofluoranthene	0	0		0	N/A	N/A	N/A	
Benzo(k)Fluoranthene	0	0		0	N/A	N/A	N/A	
Bis(2-Chloroethyl)Ether	0	0		0	30,000	30,000	61,615	
Bis(2-Chloroisopropyl)Ether	0	0		0	N/A	N/A	N/A	
Bis(2-Ethylhexyl)Phthalate	0	0		0	4,500	4,500	9,242	
4-Bromophenyl Phenyl Ether	0	0		0	270	270	555	
Butyl Benzyl Phthalate	0	0		0	140	140	288	
2-Chloronaphthalene	0	0		0	N/A	N/A	N/A	
Chrysene	0	0		0	N/A	N/A	N/A	
Dibenzo(a,h)Anthrancene	0	0		0	N/A	N/A	N/A	
1,2-Dichlorobenzene	0	0		0	820	820	1,684	
1,3-Dichlorobenzene	0	0		0	350	350	719	
1,4-Dichlorobenzene	0	0		0	730	730	1,499	
3,3-Dichlorobenzidine	0	0		0	N/A	N/A	N/A	
Diethyl Phthalate	0	0		0	4,000	4,000	8,215	
Dimethyl Phthalate	0	0		0	2,500	2,500	5,135	
Di-n-Butyl Phthalate	0	0		0	110	110	226	
2,4-Dinitrotoluene	0	0		0	1,600	1,600	3,286	
2,6-Dinitrotoluene	0	0		0	990	990	2,033	
1,2-Diphenylhydrazine	0	0		0	15	15.0	30.8	
Fluoranthene	0	0		0	200	200	411	
Fluorene	0	0		0	N/A	N/A	N/A	
Hexachlorobenzene	0	0		0	N/A	N/A	N/A	
Hexachlorobutadiene	0	0		0	10	10.0	20.5	
Hexachlorocyclopentadiene	0	0		0	5	5.0	10.3	
Indeno(1,2,3-cd)Pyrene	0	0		0	N/A	N/A	N/A	
Isophorone	0	0		0	10,000	10,000	20,538	
Naphthalene	0	0		0	140	140	288	
Nitrobenzene	0	0		0	4,000	4,000	8,215	
n-Nitrosodimethylamine	0	0		0	17,000	17,000	34,915	
n-Nitrosodi-n-Propylamine	0	0		0	N/A	N/A	N/A	
n-Nitrosodiphenylamine	0	0		0	300	300	616	
Phenanthrene	0	0		0	5	5.0	10.3	
Pyrene	0	0		0	N/A	N/A	N/A	
1,2,4-Trichlorobenzene	0	0		0	130	130	267	

☑ ***CFC*** CCT (min): ####### PMF: 1 Analysis Hardness (mg/l): 96.189 Analysis pH: 7.41

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)	104000	0		0	N/A	N/A	N/A	
Chloride (PWS)	9470	0		0	N/A	N/A	N/A	
Sulfate (PWS)	8780	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	901	
Total Arsenic	0	0		0	150	150	615	Chem Translator of 1 applied
Total Barium	0	0		0	4,100	4,100	16,798	
Total Boron	0	0		0	1,600	1,600	6,555	
Total Cadmium	0	0		0	0.239	0.26	1.08	Chem Translator of 0.911 applied
Total Chromium (III)	0	0		0	71.793	83.5	342	Chem Translator of 0.86 applied
Hexavalent Chromium	0	0		0	10	10.4	42.6	Chem Translator of 0.962 applied
Total Cobalt	0	0		0	19	19.0	77.8	
Total Copper	0	0		0	8.663	9.02	37.0	Chem Translator of 0.96 applied
Free Cyanide	0	0		0	5.2	5.2	21.3	
Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	1,500	1,500	6,146	WQC = 30 day average; PMF = 1
Total Lead	0	0		0	2.412	3.03	12.4	Chem Translator of 0.797 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	0.770	0.91	3.71	Chem Translator of 0.85 applied
Total Nickel	0	0		0	50.325	50.5	207	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	20.4	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	53.3	
Total Zinc	0	0		0	114.313	116	475	Chem Translator of 0.986 applied
Acrolein	0	0		0	3	3.0	12.3	
Acrylonitrile	0	0		0	130	130	533	
Benzene	0	0		0	130	130	533	
Bromoform	0	0		0	370	370	1,516	
Carbon Tetrachloride	0	0		0	560	560	2,294	
Chlorobenzene	0	0		0	240	240	983	
Chlorodibromomethane	0	0		0	N/A	N/A	N/A	
2-Chloroethyl Vinyl Ether	0	0		0	3,500	3,500	14,340	
Chloroform	0	0		0	390	390	1,598	
Dichlorobromomethane	0	0		0	N/A	N/A	N/A	
1,2-Dichloroethane	0	0		0	3,100	3,100	12,701	
1,1-Dichloroethylene	0	0		0	1,500	1,500	6,146	
1,2-Dichloropropane	0	0		0	2,200	2,200	9,014	
1,3-Dichloropropylene	0	0		0	61	61.0	250	
Ethylbenzene	0	0		0	580	580	2,376	
Methyl Bromide	0	0		0	110	110	451	
Methyl Chloride	0	0		0	5,500	5,500	22,534	
Methylene Chloride	0	0		0	2,400	2,400	9,833	
1,1,2,2-Tetrachloroethane	0	0		0	210	210	860	
Tetrachloroethylene	0	0		0	140	140	574	

Toluene	0	0		0	330	330	1,352	
1,2-trans-Dichloroethylene	0	0		0	1,400	1,400	5,736	
1,1,1-Trichloroethane	0	0		0	610	610	2,499	
1,1,2-Trichloroethane	0	0		0	680	680	2,786	
Trichloroethylene	0	0		0	450	450	1,844	
Vinyl Chloride	0	0		0	N/A	N/A	N/A	
2-Chlorophenol	0	0		0	110	110	451	
2,4-Dichlorophenol	0	0		0	340	340	1,393	
2,4-Dimethylphenol	0	0		0	130	130	533	
4,6-Dinitro-o-Cresol	0	0		0	16	16.0	65.6	
2,4-Dinitrophenol	0	0		0	130	130	533	
2-Nitrophenol	0	0		0	1,600	1,600	6,555	
4-Nitrophenol	0	0		0	470	470	1,926	
p-Chloro-m-Cresol	0	0		0	500	500	2,049	
Pentachlorophenol	0	0		0	8.445	8.44	34.6	
Phenol	0	0		0	N/A	N/A	N/A	
2,4,6-Trichlorophenol	0	0		0	91	91.0	373	
Acenaphthene	0	0		0	17	17.0	69.7	
Anthracene	0	0		0	N/A	N/A	N/A	
Benzidine	0	0		0	59	59.0	242	
Benzo(a)Anthracene	0	0		0	0.1	0.1	0.41	
Benzo(a)Pyrene	0	0		0	N/A	N/A	N/A	
3,4-Benzofluoranthene	0	0		0	N/A	N/A	N/A	
Benzo(k)Fluoranthene	0	0		0	N/A	N/A	N/A	
Bis(2-Chloroethyl)Ether	0	0		0	6,000	6,000	24,582	
Bis(2-Chloroisopropyl)Ether	0	0		0	N/A	N/A	N/A	
Bis(2-Ethylhexyl)Phthalate	0	0		0	910	910	3,728	
4-Bromophenyl Phenyl Ether	0	0		0	54	54.0	221	
Butyl Benzyl Phthalate	0	0		0	35	35.0	143	
2-Chloronaphthalene	0	0		0	N/A	N/A	N/A	
Chrysene	0	0		0	N/A	N/A	N/A	
Dibenzo(a,h)Anthrancene	0	0		0	N/A	N/A	N/A	
1,2-Dichlorobenzene	0	0		0	160	160	656	
1,3-Dichlorobenzene	0	0		0	69	69.0	283	
1,4-Dichlorobenzene	0	0		0	150	150	615	
3,3-Dichlorobenzidine	0	0		0	N/A	N/A	N/A	
Diethyl Phthalate	0	0		0	800	800	3,278	
Dimethyl Phthalate	0	0		0	500	500	2,049	
Di-n-Butyl Phthalate	0	0		0	21	21.0	86.0	
2,4-Dinitrotoluene	0	0		0	320	320	1,311	
2,6-Dinitrotoluene	0	0		0	200	200	819	
1,2-Diphenylhydrazine	0	0		0	3	3.0	12.3	
Fluoranthene	0	0		0	40	40.0	164	
Fluorene	0	0		0	N/A	N/A	N/A	
Hexachlorobenzene	0	0		0	N/A	N/A	N/A	

Hexachlorobutadiene	0	0		0	2	2.0	8.19	
Hexachlorocyclopentadiene	0	0		0	1	1.0	4.1	
Indeno(1,2,3-cd)Pyrene	0	0		0	N/A	N/A	N/A	
Isophorone	0	0		0	2,100	2,100	8,604	
Naphthalene	0	0		0	43	43.0	176	
Nitrobenzene	0	0		0	810	810	3,319	
n-Nitrosodimethylamine	0	0		0	3,400	3,400	13,930	
n-Nitrosodi-n-Propylamine	0	0		0	N/A	N/A	N/A	
n-Nitrosodiphenylamine	0	0		0	59	59.0	242	
Phenanthrene	0	0		0	1	1.0	4.1	
Pyrene	0	0		0	N/A	N/A	N/A	
1,2,4-Trichlorobenzene	0	0		0	26	26.0	107	

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

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	104000	0		0	500,000	500,000	7,381,326	WQC applied at RMI 57 with a design stream flow of 45.7 cfs
Chloride (PWS)	9470	0		0	250,000	250,000	4,429,711	WQC applied at RMI 57 with a design stream flow of 45.7 cfs
Sulfate (PWS)	8780	0		0	250,000	250,000	4,441,701	WQC applied at RMI 57 with a design stream flow of 45.7 cfs
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	5.6	5.6	22.9	
Total Arsenic	0	0		0	10	10.0	41.0	
Total Barium	0	0		0	2,400	2,400	9,833	
Total Boron	0	0		0	3,100	3,100	12,701	
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	
Free Cyanide	0	0		0	4	4.0	16.4	
Dissolved Iron	0	0		0	300	300	1,229	
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	4,097	
Total Mercury	0	0		0	0.050	0.05	0.2	
Total Nickel	0	0		0	610	610	2,499	
Total Phenols (Phenolics) (PWS)	0	0		0	5	5.0	91.9	WQC applied at RMI 57 with a design stream flow of 45.7 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	0.98	
Total Zinc	0	0		0	N/A	N/A	N/A	
Acrolein	0	0		0	3	3.0	12.3	
Acrylonitrile	0	0		0	N/A	N/A	N/A	
Benzene	0	0		0	N/A	N/A	N/A	

Bromoform	0	0		0	N/A	N/A	N/A	
Carbon Tetrachloride	0	0		0	N/A	N/A	N/A	
Chlorobenzene	0	0		0	100	100.0	410	
Chlorodibromomethane	0	0		0	N/A	N/A	N/A	
2-Chloroethyl Vinyl Ether	0	0		0	N/A	N/A	N/A	
Chloroform	0	0		0	N/A	N/A	N/A	
Dichlorobromomethane	0	0		0	N/A	N/A	N/A	
1,2-Dichloroethane	0	0		0	N/A	N/A	N/A	
1,1-Dichloroethylene	0	0		0	33	33.0	135	
1,2-Dichloropropane	0	0		0	N/A	N/A	N/A	
1,3-Dichloropropylene	0	0		0	N/A	N/A	N/A	
Ethylbenzene	0	0		0	68	68.0	279	
Methyl Bromide	0	0		0	100	100.0	410	
Methyl Chloride	0	0		0	N/A	N/A	N/A	
Methylene Chloride	0	0		0	N/A	N/A	N/A	
1,1,2,2-Tetrachloroethane	0	0		0	N/A	N/A	N/A	
Tetrachloroethylene	0	0		0	N/A	N/A	N/A	
Toluene	0	0		0	57	57.0	234	
1,2-trans-Dichloroethylene	0	0		0	100	100.0	410	
1,1,1-Trichloroethane	0	0		0	10,000	10,000	40,971	
1,1,2-Trichloroethane	0	0		0	N/A	N/A	N/A	
Trichloroethylene	0	0		0	N/A	N/A	N/A	
Vinyl Chloride	0	0		0	N/A	N/A	N/A	
2-Chlorophenol	0	0		0	30	30.0	123	
2,4-Dichlorophenol	0	0		0	10	10.0	41.0	
2,4-Dimethylphenol	0	0		0	100	100.0	410	
4,6-Dinitro-o-Cresol	0	0		0	2	2.0	8.19	
2,4-Dinitrophenol	0	0		0	10	10.0	41.0	
2-Nitrophenol	0	0		0	N/A	N/A	N/A	
4-Nitrophenol	0	0		0	N/A	N/A	N/A	
p-Chloro-m-Cresol	0	0		0	N/A	N/A	N/A	
Pentachlorophenol	0	0		0	N/A	N/A	N/A	
Phenol	0	0		0	4,000	4,000	16,388	
2,4,6-Trichlorophenol	0	0		0	N/A	N/A	N/A	
Acenaphthene	0	0		0	70	70.0	287	
Anthracene	0	0		0	300	300	1,229	
Benzidine	0	0		0	N/A	N/A	N/A	
Benzo(a)Anthracene	0	0		0	N/A	N/A	N/A	
Benzo(a)Pyrene	0	0		0	N/A	N/A	N/A	
3,4-Benzofluoranthene	0	0		0	N/A	N/A	N/A	
Benzo(k)Fluoranthene	0	0		0	N/A	N/A	N/A	
Bis(2-Chloroethyl)Ether	0	0		0	N/A	N/A	N/A	
Bis(2-Chloroisopropyl)Ether	0	0		0	200	200	819	
Bis(2-Ethylhexyl)Phthalate	0	0		0	N/A	N/A	N/A	
4-Bromophenyl Phenyl Ether	0	0		0	N/A	N/A	N/A	

Butyl Benzyl Phthalate	0	0		0	0.1	0.1	0.41	
2-Chloronaphthalene	0	0		0	800	800	3,278	
Chrysene	0	0		0	N/A	N/A	N/A	
Dibenzo(a,h)Anthrancene	0	0		0	N/A	N/A	N/A	
1,2-Dichlorobenzene	0	0		0	1,000	1,000	4,097	
1,3-Dichlorobenzene	0	0		0	7	7.0	28.7	
1,4-Dichlorobenzene	0	0		0	300	300	1,229	
3,3-Dichlorobenzidine	0	0		0	N/A	N/A	N/A	
Diethyl Phthalate	0	0		0	600	600	2,458	
Dimethyl Phthalate	0	0		0	2,000	2,000	8,194	
Di-n-Butyl Phthalate	0	0		0	20	20.0	81.9	
2,4-Dinitrotoluene	0	0		0	N/A	N/A	N/A	
2,6-Dinitrotoluene	0	0		0	N/A	N/A	N/A	
1,2-Diphenylhydrazine	0	0		0	N/A	N/A	N/A	
Fluoranthene	0	0		0	20	20.0	81.9	
Fluorene	0	0		0	50	50.0	205	
Hexachlorobenzene	0	0		0	N/A	N/A	N/A	
Hexachlorobutadiene	0	0		0	N/A	N/A	N/A	
Hexachlorocyclopentadiene	0	0		0	4	4.0	16.4	
Indeno(1,2,3-cd)Pyrene	0	0		0	N/A	N/A	N/A	
Isophorone	0	0		0	34	34.0	139	
Naphthalene	0	0		0	N/A	N/A	N/A	
Nitrobenzene	0	0		0	10	10.0	41.0	
n-Nitrosodimethylamine	0	0		0	N/A	N/A	N/A	
n-Nitrosodi-n-Propylamine	0	0		0	N/A	N/A	N/A	
n-Nitrosodiphenylamine	0	0		0	N/A	N/A	N/A	
Phenanthrene	0	0		0	N/A	N/A	N/A	
Pyrene	0	0		0	20	20.0	81.9	
1,2,4-Trichlorobenzene	0	0		0	0.07	0.07	0.29	

☑ ***CRL*** CCT (min): 74.643 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)	104000	0		0	N/A	N/A	N/A	
Chloride (PWS)	9470	0		0	N/A	N/A	N/A	
Sulfate (PWS)	8780	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	
Free Cyanide	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	
Acrolein	0	0		0	N/A	N/A	N/A	
Acrylonitrile	0	0		0	0.06	0.06	1.12	
Benzene	0	0		0	0.58	0.58	10.8	
Bromoform	0	0		0	7	7.0	131	
Carbon Tetrachloride	0	0		0	0.4	0.4	7.47	
Chlorobenzene	0	0		0	N/A	N/A	N/A	
Chlorodibromomethane	0	0		0	0.8	0.8	14.9	
2-Chloroethyl Vinyl Ether	0	0		0	N/A	N/A	N/A	
Chloroform	0	0		0	5.7	5.7	106	
Dichlorobromomethane	0	0		0	0.95	0.95	17.7	
1,2-Dichloroethane	0	0		0	9.9	9.9	185	
1,1-Dichloroethylene	0	0		0	N/A	N/A	N/A	
1,2-Dichloropropane	0	0		0	0.9	0.9	16.8	
1,3-Dichloropropylene	0	0		0	0.27	0.27	5.04	
Ethylbenzene	0	0		0	N/A	N/A	N/A	
Methyl Bromide	0	0		0	N/A	N/A	N/A	
Methyl Chloride	0	0		0	N/A	N/A	N/A	
Methylene Chloride	0	0		0	20	20.0	373	
1,1,2,2-Tetrachloroethane	0	0		0	0.2	0.2	3.73	
Tetrachloroethylene	0	0		0	10	10.0	187	
Toluene	0	0		0	N/A	N/A	N/A	
1,2-trans-Dichloroethylene	0	0		0	N/A	N/A	N/A	
1,1,1-Trichloroethane	0	0		0	N/A	N/A	N/A	
1,1,2-Trichloroethane	0	0		0	0.55	0.55	10.3	
Trichloroethylene	0	0		0	0.6	0.6	11.2	
Vinyl Chloride	0	0		0	0.02	0.02	0.37	
2-Chlorophenol	0	0		0	N/A	N/A	N/A	
2,4-Dichlorophenol	0	0		0	N/A	N/A	N/A	
2,4-Dimethylphenol	0	0		0	N/A	N/A	N/A	
4,6-Dinitro-o-Cresol	0	0		0	N/A	N/A	N/A	
2,4-Dinitrophenol	0	0		0	N/A	N/A	N/A	

2-Nitrophenol	0	0		0	N/A	N/A	N/A	
4-Nitrophenol	0	0		0	N/A	N/A	N/A	
p-Chloro-m-Cresol	0	0		0	N/A	N/A	N/A	
Pentachlorophenol	0	0		0	0.030	0.03	0.56	
Phenol	0	0		0	N/A	N/A	N/A	
2,4,6-Trichlorophenol	0	0		0	1.5	1.5	28.0	
Acenaphthene	0	0		0	N/A	N/A	N/A	
Anthracene	0	0		0	N/A	N/A	N/A	
Benzidine	0	0		0	0.0001	0.0001	0.002	
Benzo(a)Anthracene	0	0		0	0.001	0.001	0.019	
Benzo(a)Pyrene	0	0		0	0.0001	0.0001	0.002	
3,4-Benzofluoranthene	0	0		0	0.001	0.001	0.019	
Benzo(k)Fluoranthene	0	0		0	0.01	0.01	0.19	
Bis(2-Chloroethyl)Ether	0	0		0	0.03	0.03	0.56	
Bis(2-Chloroisopropyl)Ether	0	0		0	N/A	N/A	N/A	
Bis(2-Ethylhexyl)Phthalate	0	0		0	0.32	0.32	5.97	
4-Bromophenyl Phenyl Ether	0	0		0	N/A	N/A	N/A	
Butyl Benzyl Phthalate	0	0		0	N/A	N/A	N/A	
2-Chloronaphthalene	0	0		0	N/A	N/A	N/A	
Chrysene	0	0		0	0.12	0.12	2.24	
Dibenzo(a,h)Anthrancene	0	0		0	0.0001	0.0001	0.002	
1,2-Dichlorobenzene	0	0		0	N/A	N/A	N/A	
1,3-Dichlorobenzene	0	0		0	N/A	N/A	N/A	
1,4-Dichlorobenzene	0	0		0	N/A	N/A	N/A	
3,3-Dichlorobenzidine	0	0		0	0.05	0.05	0.93	
Diethyl Phthalate	0	0		0	N/A	N/A	N/A	
Dimethyl Phthalate	0	0		0	N/A	N/A	N/A	
Di-n-Butyl Phthalate	0	0		0	N/A	N/A	N/A	
2,4-Dinitrotoluene	0	0		0	0.05	0.05	0.93	
2,6-Dinitrotoluene	0	0		0	0.05	0.05	0.93	
1,2-Diphenylhydrazine	0	0		0	0.03	0.03	0.56	
Fluoranthene	0	0		0	N/A	N/A	N/A	
Fluorene	0	0		0	N/A	N/A	N/A	
Hexachlorobenzene	0	0		0	0.00008	0.00008	0.001	
Hexachlorobutadiene	0	0		0	0.01	0.01	0.19	
Hexachlorocyclopentadiene	0	0		0	N/A	N/A	N/A	
Indeno(1,2,3-cd)Pyrene	0	0		0	0.001	0.001	0.019	
Isophorone	0	0		0	N/A	N/A	N/A	
Naphthalene	0	0		0	N/A	N/A	N/A	
Nitrobenzene	0	0		0	N/A	N/A	N/A	
n-Nitrosodimethylamine	0	0		0	0.0007	0.0007	0.013	
n-Nitrosodi-n-Propylamine	0	0		0	0.005	0.005	0.093	
n-Nitrosodiphenylamine	0	0		0	3.3	3.3	61.6	
Phenanthrene	0	0		0	N/A	N/A	N/A	
Pyrene	0	0		0	N/A	N/A	N/A	

1,2,4-Trichlorobenzene	0	0		0	N/A	N/A	N/A	

☑ ***Recommended WQBELs & Monitoring Requirements***

No. Samples/Month: 4

Pollutants	*Mass Limits* AML (lbs/day)	*Mass Limits* MDL (lbs/day)	*Concentration Limits* AML	*Concentration Limits* MDL	*Concentration Limits* IMAX	*Concentration Limits* Units	Governing WQBEL	WQBEL Basis	Comments
Total Aluminum	Report	Report	Report	Report	Report	µg/L	987	AFC	Discharge Conc > 10% WQBEL (no RP)
Total Copper	0.32	0.49	22.3	34.7	55.7	µg/L	22.3	AFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Zinc	Report	Report	Report	Report	Report	µg/L	187	AFC	Discharge Conc > 10% WQBEL (no RP)
Benzo(a)Anthracene	0.0003	0.0004	0.019	0.029	0.047	µg/L	0.019	CRL	Discharge Conc ≥ 50% WQBEL (RP)
Benzo(a)Pyrene	0.00003	0.00004	0.002	0.003	0.005	µg/L	0.002	CRL	Discharge Conc ≥ 50% WQBEL (RP)
Benzo(k)Fluoranthene	0.003	0.004	0.19	0.29	0.47	µg/L	0.19	CRL	Discharge Conc ≥ 50% WQBEL (RP)
Bis(2-Ethylhexyl)Phthalate	Report	Report	Report	Report	Report	µg/L	5.97	CRL	Discharge Conc > 25% 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)	7,381	mg/L	Discharge Conc ≤ 10% WQBEL
Chloride (PWS)	4,430	mg/L	Discharge Conc ≤ 10% WQBEL
Bromide	N/A	N/A	No WQS
Sulfate (PWS)	4,442	mg/L	Discharge Conc ≤ 10% WQBEL
Total Antimony	22.9	µg/L	Discharge Conc ≤ 10% WQBEL
Total Arsenic	41.0	µg/L	Discharge Conc ≤ 10% WQBEL
Total Barium	9,833	µg/L	Discharge Conc ≤ 10% WQBEL
Total Beryllium	N/A	N/A	No WQS
Total Boron	6,555	µg/L	Discharge Conc < TQL
Total Cadmium	1.08	µg/L	Discharge Conc < TQL
Total Chromium (III)	342	µg/L	Discharge Conc ≤ 10% WQBEL
Hexavalent Chromium	21.4	µg/L	Discharge Conc < TQL
Total Cobalt	77.8	µg/L	Discharge Conc ≤ 10% WQBEL
Free Cyanide	16.4	µg/L	Discharge Conc ≤ 25% WQBEL
Total Cyanide	N/A	N/A	No WQS
Dissolved Iron	1,229	µg/L	Discharge Conc < TQL
Total Iron	6,146	µg/L	Discharge Conc ≤ 10% WQBEL
Total Lead	12.4	µg/L	Discharge Conc ≤ 10% WQBEL
Total Manganese	4,097	µg/L	Discharge Conc ≤ 10% WQBEL

Total Mercury	0.2	µg/L	Discharge Conc < TQL
Total Nickel	207	µg/L	Discharge Conc ≤ 10% WQBEL
Total Phenols (Phenolics) (PWS)	91.9	µg/L	Discharge Conc < TQL
Total Selenium	20.4	µg/L	Discharge Conc < TQL
Total Silver	7.04	µg/L	Discharge Conc < TQL
Total Thallium	0.98	µg/L	Discharge Conc < TQL
Total Molybdenum	N/A	N/A	No WQS
Acrolein	3.95	µg/L	Discharge Conc < TQL
Acrylonitrile	1.12	µg/L	Discharge Conc < TQL
Benzene	10.8	µg/L	Discharge Conc < TQL
Bromoform	131	µg/L	Discharge Conc < TQL
Carbon Tetrachloride	7.47	µg/L	Discharge Conc < TQL
Chlorobenzene	410	µg/L	Discharge Conc ≤ 25% WQBEL
Chlorodibromomethane	14.9	µg/L	Discharge Conc < TQL
Chloroethane	N/A	N/A	No WQS
2-Chloroethyl Vinyl Ether	14,340	µg/L	Discharge Conc < TQL
Chloroform	106	µg/L	Discharge Conc ≤ 25% WQBEL
Dichlorobromomethane	17.7	µg/L	Discharge Conc < TQL
1,1-Dichloroethane	N/A	N/A	No WQS
1,2-Dichloroethane	185	µg/L	Discharge Conc < TQL
1,1-Dichloroethylene	135	µg/L	Discharge Conc < TQL
1,2-Dichloropropane	16.8	µg/L	Discharge Conc < TQL
1,3-Dichloropropylene	5.04	µg/L	Discharge Conc < TQL
1,4-Dioxane	N/A	N/A	No WQS
Ethylbenzene	279	µg/L	Discharge Conc < TQL
Methyl Bromide	410	µg/L	Discharge Conc < TQL
Methyl Chloride	22,534	µg/L	Discharge Conc < TQL
Methylene Chloride	373	µg/L	Discharge Conc < TQL
1,1,2,2-Tetrachloroethane	3.73	µg/L	Discharge Conc < TQL
Tetrachloroethylene	187	µg/L	Discharge Conc < TQL
Toluene	234	µg/L	Discharge Conc < TQL
1,2-trans-Dichloroethylene	410	µg/L	Discharge Conc < TQL
1,1,1-Trichloroethane	2,499	µg/L	Discharge Conc < TQL
1,1,2-Trichloroethane	10.3	µg/L	Discharge Conc < TQL
Trichloroethylene	11.2	µg/L	Discharge Conc < TQL
Vinyl Chloride	0.37	µg/L	Discharge Conc < TQL
2-Chlorophenol	123	µg/L	Discharge Conc < TQL
2,4-Dichlorophenol	41.0	µg/L	Discharge Conc < TQL
2,4-Dimethylphenol	410	µg/L	Discharge Conc < TQL
4,6-Dinitro-o-Cresol	8.19	µg/L	Discharge Conc < TQL
2,4-Dinitrophenol	41.0	µg/L	Discharge Conc < TQL
2-Nitrophenol	6,555	µg/L	Discharge Conc < TQL
4-Nitrophenol	1,926	µg/L	Discharge Conc < TQL
p-Chloro-m-Cresol	211	µg/L	Discharge Conc < TQL
Pentachlorophenol	0.56	µg/L	Discharge Conc < TQL

Phenol	16,388	µg/L	Discharge Conc < TQL
2,4,6-Trichlorophenol	28.0	µg/L	Discharge Conc < TQL
Acenaphthene	69.7	µg/L	Discharge Conc < TQL
Acenaphthylene	N/A	N/A	No WQS
Anthracene	1,229	µg/L	Discharge Conc < TQL
Benzidine	0.002	µg/L	Discharge Conc < TQL
3,4-Benzofluoranthene	0.019	µg/L	Discharge Conc < TQL
Benzo(ghi)Perylene	N/A	N/A	No WQS
Bis(2-Chloroethoxy)Methane	N/A	N/A	No WQS
Bis(2-Chloroethyl)Ether	0.56	µg/L	Discharge Conc < TQL
Bis(2-Chloroisopropyl)Ether	819	µg/L	Discharge Conc < TQL
4-Bromophenyl Phenyl Ether	221	µg/L	Discharge Conc < TQL
Butyl Benzyl Phthalate	0.41	µg/L	Discharge Conc < TQL
2-Chloronaphthalene	3,278	µg/L	Discharge Conc < TQL
4-Chlorophenyl Phenyl Ether	N/A	N/A	No WQS
Chrysene	2.24	µg/L	Discharge Conc < TQL
Dibenzo(a,h)Anthrancene	0.002	µg/L	Discharge Conc < TQL
1,2-Dichlorobenzene	656	µg/L	Discharge Conc < TQL
1,3-Dichlorobenzene	28.7	µg/L	Discharge Conc < TQL
1,4-Dichlorobenzene	615	µg/L	Discharge Conc < TQL
3,3-Dichlorobenzidine	0.93	µg/L	Discharge Conc < TQL
Diethyl Phthalate	2,458	µg/L	Discharge Conc < TQL
Dimethyl Phthalate	2,049	µg/L	Discharge Conc < TQL
Di-n-Butyl Phthalate	81.9	µg/L	Discharge Conc ≤ 25% WQBEL
2,4-Dinitrotoluene	0.93	µg/L	Discharge Conc < TQL
2,6-Dinitrotoluene	0.93	µg/L	Discharge Conc < TQL
Di-n-Octyl Phthalate	N/A	N/A	No WQS
1,2-Diphenylhydrazine	0.56	µg/L	Discharge Conc < TQL
Fluoranthene	81.9	µg/L	Discharge Conc < TQL
Fluorene	205	µg/L	Discharge Conc < TQL
Hexachlorobenzene	0.001	µg/L	Discharge Conc < TQL
Hexachlorobutadiene	0.19	µg/L	Discharge Conc < TQL
Hexachlorocyclopentadiene	4.1	µg/L	Discharge Conc < TQL
Indeno(1,2,3-cd)Pyrene	0.019	µg/L	Discharge Conc < TQL
Isophorone	139	µg/L	Discharge Conc < TQL
Naphthalene	176	µg/L	Discharge Conc < TQL
Nitrobenzene	41.0	µg/L	Discharge Conc < TQL
n-Nitrosodimethylamine	0.013	µg/L	Discharge Conc < TQL
n-Nitrosodi-n-Propylamine	0.093	µg/L	Discharge Conc < TQL
n-Nitrosodiphenylamine	61.6	µg/L	Discharge Conc < TQL
Phenanthrene	4.1	µg/L	Discharge Conc < TQL
Pyrene	81.9	µg/L	Discharge Conc < TQL
1,2,4-Trichlorobenzene	0.29	µg/L	Discharge Conc < TQL

1A	B	C	D	E	F	G
2	**TRC EVALUATION**			North & South Shenango Joint STP		
3	Input appropriate values in B4:B8 and E4:E7					
4	8.145	= Q stream (cfs)		0.5	= CV Daily	
5	1.7	= Q discharge (MGD)		0.5	= CV Hourly	
6	30	= no. samples		0.34	= AFC_Partial Mix Factor	
7	0.3	= Chlorine Demand of Stream		1	= CFC_Partial Mix Factor	
8	0	= Chlorine Demand of Discharge		15	= AFC_Criteria Compliance Time (min)	
9	0.5	= BAT/BPJ Value		720	= CFC_Criteria Compliance Time (min)	
	0	= % Factor of Safety (FOS)		0	=Decay Coefficient (K)	
10	Source	Reference	AFC Calculations		Reference	CFC Calculations
11	TRC	1.3.2.iii	WLA afc =	0.355	1.3.2.iii	WLA cfc = 0.974
12	PENTOXSD TRG	5.1a	LTAMULT afc =	0.373	5.1c	LTAMULT cfc = 0.581
13	PENTOXSD TRG	5.1b	LTA_afc=	0.132	5.1d	LTA_cfc = 0.566
14						
15	Source		Effluent Limit Calculations			
16	PENTOXSD TRG	5.1f	AML MULT =	1.231		
17	PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) =	0.163	AFC	
18			INST MAX LIMIT (mg/l) =	0.532		

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)**

NPDES Permit Fact Sheet

NPDES Permit No. PA0100277
North & South Shenango Joint STP

2/8/2022

Outfall 001

Facility:	North & South Shenango Joint STP
Permit Number:	PA0100277 Effective: Pending Expiration:
Outfall No:	001
Location:	Jamestown, PA
Discharge to:	Shenango River
Site Specific Mussel Survey Completed:	None

Discharge and Stream Characteristics			Comments
Q_S	Stream Flow	7 MGD / 11.21 cfs	USGS # 03101500, accrued flow #03100000
Q_D	Discharge Flow	1.7 MGD / 2.63067 cfs	Design discharge flow of the plant
$C_{S(Cl^-)}$	Instream chloride Concentration	9.47 mg/L	WQN 911 field samples (2010-2020)(June-Sept)
$C_{E(Cl^-)}$	Discharge chloride (existing)	35.2 mg/L	Maximum concentration from renewal application
$C_{P(Cl^-)}$	Discharge chloride (proposed)	35.2 mg/L	Maximum concentration from renewal application
$C_{S(Ni)}$	Instream nickel Concentration	1 µg/L	Unknow - All data found was non-detect (< 50 ug/l)
$C_{E(Ni)}$	Discharge nickel (existing)	1 µg/L	Maximum concentration from renewal application
$C_{P(Ni)}$	Discharge nickel (proposed)	1 µg/L	Maximum concentration from renewal application
$C_{S(Zn)}$	Instream zinc Concentration	10 µg/L	Asssumed - Greenville STP Mussel Survey (2017) reported background as <10
$C_{E(Zn)}$	Discharge zinc (existing)	30 µg/L	Maximum concentration from renewal application
$Zn_{P(Zn)}$	Discharge zinc (proposed)	30 µg/L	Maximum concentration from renewal application
$C_{S(NH3-N)}$	Instream NH^3-N	0.11 mg/L	WQN 911 field samples (2002-2011l)
$C_{E(NH3-N)}$	Discharge NH^3-N (existing)	0.94 mg/L	Highest average monthly concentration reported on DMRs in last 5 years
$C_{P(NH3-N)}$	Discharge NH^3-N (proposed)	0.94 mg/L	Highest average monthly concentration reported on DMRs in last 5 years
pH_S	Instream pH	7.71 S.U.	WQN 911 field samples (2010-2020)(June-Sept)
T_S	Instream Temp.	20.24 °C	WQN 911 (2005-2020)(Summertime)
$C_{C(NH3-N)}$	Ammonia criteria	1.113 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	17.87 meters	TMS Spreadsheet estimation

Ammonia Criteria Calculations:

pH_S	7.71	S.U.	*(Default value is 7.0)*
T_S	20.24	°C	*(Default value is 20° for a CWF and 25° for a WWF)*

Acute Criteria

	METHOD and UNITS	CRITERIA	Comments	
	Old CMC (mg TAN/L) =	4.231		
	EPA 2013 CMC (mg TAN/L) =	6.463	Oncorhynchus present	* formula on pg. 41 (plateaus at 15.7 C)
		6.463	Oncorhynchus absent	* formula on pg. 42 (plateaus at 10.2 C)

Chronic Criteria

	METHOD and UNITS	CRITERIA	COMMENTS
	Old CMC (mg TAN/L) =	1.231	
$C_{C(NH3-N)}$	EPA 2013 CMC (mg TAN/L) =	1.113	* formula on pg. 46 (plateaus at 7 C)

Endangered Mussel Species Impact Area Calculations:

Existing Area of Impact

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

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

Method 1 - Utilizing Site Specific Mussel Survey Information

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

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

A.	Area of Impact Determined from Survey:	N/A	m^2
B.	Chlorides in Existing Discharge:	35	mg/L
C.	Chlorides in Proposed Discharge after Treatment Facility Upgrades:	35.2	mg/L
D.	Approximate Area of Impact after Treatment Facility Upgrades:	N/A	m^2

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

2/8/2022

Outfall 001

Facility:	North & South Shenango Joint STP		
Permit Number:	PA0100277	Effective: Pending	Expiration:
Outfall No:	001		
Location:	Jamestown, PA		
Discharge to:	Shenango River		
Site Specific Mussel Survey Completed:	None		

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 =	4,001 lbs/Day
	$L_{D\text{-}MAX(Cl^-)}$ = Current Maximum Discharge Chloride Loading exceeding criteria = $\{C_{E(Cl^-)} - C_{E(Cl^-)}\} \times Q_D$(MGD) X 8.34 =	-607 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 =	-606.8184 lbs/Day
	$\%_{P(Cl^-)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(Cl^-)} / L_{S(Cl^-)}$ =	-15.17% 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	3.67 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 =	368 lbs/Day
	$L_{D\text{-}MAX(Ni)}$ = Current Maximum Discharge Nickel Loading exceeding criteria = $\{C_{E(Ni)} - C_{E(Ni)}\} \times Q_D$(MGD) X 8.34 =	-89 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 =	-89.3214 lbs/Day
	$\%_{P(Ni)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(Ni)} / L_{S(Ni)}$ =	-24.27% 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	9.41 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 =	186 lbs/Day
	$L_{D\text{-}MAX(Zn)}$ = Current Maximum Discharge Zinc Loading exceeding criteria = $\{C_{E(Zn)} - C_{E(Zn)}\} \times Q_D$(MGD) X 8.34 =	238 lbs/Day
	$\%_{E(Zn)}$ = Percent of Stream Capacity for Current Loading = $L_{D\text{-}MAX(Zn)} / L_{S(Zn)}$ =	128% 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 =	238.47396 lbs/Day
	$\%_{P(Zn)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(Zn)} / L_{S(Zn)}$ =	128.21% 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	262.47 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 =	59 lbs/Day
	$L_{D\text{-}MAX(NH3\text{-}N)}$ = Current Maximum Discharge NH3-N Loading = $C_{E(NH3\text{-}N)} \times Q_D$(MGD) X 8.34 =	13 lbs/Day
	$\%_{E(NH3\text{-}N)}$ = Percent of Stream Capacity for Current Loading = $L_{D\text{-}MAX(NH3\text{-}N)} / L_{S(NH3\text{-}N)}$ =	22% 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 =	-2 lbs/Day
	$\%_{P(NH3\text{-}N)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(NH3\text{-}N)} / L_{S(NH3\text{-}N)}$ =	-3.39% 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	0.18 m^2

2/8/2022

Outfall 001

Facility:	North & South Shenango Joint STP		
Permit Number:	PA0100277	Effective: Pending	Expiration:
Outfall No:	001		
Location:	Jamestown, PA		
Discharge to:	Shenango River		
Site Specific Mussel Survey Completed:	None		

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 $Q_{A(Cl^-)} = [(Q_D C_{P(Cl^-)} / C_{C(Cl^-)}) - Q_D)] / (1 - C_{S(Cl^-)}/C_{C(Cl^-)})$ =	-1.64296915 cfs
	$\%_{P(Cl^-)}$ = Percent of Stream Width Required to Assimilate Chlorides to Criteria Concentration = $Q_{A(Cl^-)} / Q_S$ (cfs) =	-14.6563%
	$W_{I(Cl^-)}$ = Proposed Width of Stream required to Assimilate Chlorides to Criteria Concentration = W_S X $\%_{P(Cl^-)}$	-2.619077 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	3.43 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 $Q_{A(Ni)} = [(Q_D C_{P(Ni)} / C_{C(Ni)}) - Q_D)] / (1 - C_{S(Ni)}/C_{C(Ni)})$ =	-2.63067 cfs
	$\%_{P(Cl^-)}$ = Percent of Stream Width Required to Assimilate Nickel to Criteria Concentration = $Q_{A(Ni)} / Q_S$ (cfs) =	-23.4672%
	$W_{I(Ni)}$ = Proposed Width of Stream required to Assimilate Nickel to Criteria Concentration = W_S X $\%_{P(Ni)}$	-4.193584 meters
	Proposed Area of Impact due to Nickel * = $(W_{I(Ni)})^2$ X 0.5 = * assuming equal flow across transect and 90° spread at discharge	8.79 m^2
Zinc (Zn)	$Q_{A(Zn)}C_{S(Zn)} + Q_D C_{P(Zn)} = Q_T C_{C(Zn)}$	
	$Q_{A(Zn)}$ = Assimilative Stream Flow Required to Achieve Criteria (cfs)	
	$Q_T = Q_S + Q_D$ (cfs)	
	$Q_{A(Zn)}C_{S(Zn)} + Q_D C_{P(Zn)} = (Q_D+Q_S)C_{C(Zn)}$	
	SOLVING FOR $Q_{A(Zn)} = [(Q_D C_{PZn)} / C_{C(Zn)}) - Q_D)] / (1 - C_{S(Zn)}/C_{C(Zn)})$ =	13.9144243 cfs
	$\%_{P(Cl^-)}$ = Percent of Stream Width Required to Assimilate Zinc to Criteria Concentration = $Q_{A(Zn)} / Q_S$ (cfs) =	124.1251%
	$W_{I(Zn)}$ = Proposed Width of Stream required to Assimilate Zinc to Criteria Concentration = W_S X $\%_{PZn)}$	22.181156 meters
	Proposed Area of Impact due to Zinc * = $(W_{IZn)})^2$ X 0.5 = * assuming equal flow across transect and 90° spread at discharge	246.00 m^2
Ammonia-Nitrogen (NH3-N)	$Q_{A(NH3\text{-}N)}C_{S(NH3\text{-}N)} + Q_D C_{P(NH3\text{-}N)} = Q_T C_{C(NH3\text{-}N)}$	
	$Q_{A(NH3\text{-}N)}$ = Assimilative Stream Flow Required to Achieve Criteria (cfs)	
	$Q_T = Q_S + Q_D$ (cfs)	
	$Q_{A(NH3\text{-}N)}C_{S(NH3\text{-}N)} + Q_D C_{P(NH3\text{-}N)} = (Q_D+Q_S)C_{C(NH3\text{-}N)}$	
	SOLVING FOR $Q_{A(NH3\text{-}N)} = [(Q_D C_{P(NH3\text{-}N)} / C_{C(NH3\text{-}N)}) - Q_D)] / (1 - C_{S(NH3\text{-}N)}/C_{C(NH3\text{-}N)})$ =	-0.453745 cfs
	$\%_{P(NH3\text{-}N)}$ = Percent of Stream Width Required to Assimilate NH3-N to Criteria Concentration = $Q_{A(NH3\text{-}N)} / Q_S$ (cfs) =	-4.0477%
	$W_{I(NH3\text{-}N)}$ = Proposed Width of Stream required to Assimilate NH3-N to Criteria Concentration = W_S X $\%_{P(NH3\text{-}N)}$	-0.723320 meters
	Proposed Area of Impact due to NH3-N * = $(W_{I(NH3\text{-}N)})^2$ X 0.5 = * assuming equal flow across transect and 90° spread at discharge	0.26 m^2