pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Northwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0252760**
Facility Type	**Municipal**	APS ID	**1028256**
Major / Minor	**Minor**	Authorization ID	**1335830**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Pine Township**	Facility Name	**Pine Township STP**
Applicant Address	PO Box 111	Facility Address	115 5th Street
	Templeton, PA 16259-0111		Templeton, PA 16259-0111
Applicant Contact	Marsha Hetrick	Facility Contact	Spurgeon Schilling
Applicant Phone	(724) 868-2922	Facility Phone	(814) 229-3955
Client ID	87724	Site ID	253313
Ch 94 Load Status	Not Overloaded	Municipality	Pine Township
Connection Status	No Limitations	County	Armstrong
Date Application Received	November 19, 2020	EPA Waived?	Yes
Date Application Accepted	December 22, 2020	If No, Reason	

Purpose of Application: Individual NPDES permit renewal.

Summary of Review

Act 14 – Proof of Notification was submitted and received.

Pine Township STP is currently registered to use the Departments eDMR system for reporting

There are no open violations for subject client no. 87724 as of 2/11/2022.

Sludge use and disposal description and location(s): Septage must be pumped and hauled off-site by a septage hauler for land application under a general permit authorized by DEP or disposal at an 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.

Approve	Deny	Signatures	Date
X		Jon F. Bucha Jonathan F. Bucha / Civil Engineer General	March 16, 2022
X		Justin C. Dickey Justin C. Dickey, P.E. / Environmental Engineer Manager	March 16, 2022

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	.06
Latitude	40º 54' 50.43"	Longitude	-79º 27' 44.94"
Quad Name	Templeton	Quad Code	1110
Wastewater Description:	Sewage Effluent		

Receiving Waters	Allegheny River (WWF)	Stream Code	42122
NHD Com ID	123864270	RMI	54.26
Drainage Area	8840 (Streamstats)	Yield (cfs/mi^2)	0.11
Q_{7-10} Flow (cfs)	972.4	Q_{7-10} Basis	US Army Corps of Engineers Franklin, PA
Elevation (ft)	801	Slope (ft/ft)	-
Watershed No.	17-D	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)	7.0	Default
Temperature (°C)	25	Default (WWF)
Hardness (mg/L)	-	-
Other: NH_3-N	0.1	Default

Nearest Downstream Public Water Supply Intake		Kittanning Suburban Joint Water Authority	
PWS Waters	Allegheny River	Flow at Intake (cfs)	987
PWS RMI	45.6	Distance from Outfall (mi)	8.66

Changes Since Last Permit Issuance: None

Other Comments: This treatment facility is capable of meeting effluent requirements.

Treatment Facility Summary				
Treatment Facility Name: Pine Township STP				
WQM Permit No.	**Issuance Date**			
0305401	4/23/2013			
Waste Type	**Degree of Treatment**	**Process Type**	**Disinfection**	**Avg Annual Flow (MGD)**
Sewage	Tertiary	Extended Aeration With Solids Removal	Chlorination	0.06
Hydraulic Capacity (MGD)	**Organic Capacity (lbs/day)**	**Load Status**	**Biosolids Treatment**	**Biosolids Use/Disposal**
0.06	110	Not Overloaded	None	Combination of methods

Changes Since Last Permit Issuance: None

Other Comments: Treatment consists of sewer systems, pump stations, force mains, comminutor, bar screen, 21,000-gallon equalization tank, two 30,000-gallon aeration tanks, two 9,023-gallon final settling tanks, chlorination, dichlorination, two 11,000-gallon aerobic digestion tanks, sludge dewatering unit, two sludge drying beds, and a flow meter located in the dichlorination basin. Soda ash is used to ensure proper ammonia nitrification.

Compliance History

DMR Data for Outfall 001 (from January 1, 2019 to December 31, 2021)

Parameter	DEC-21	NOV-21	OCT-21	SEP-21	AUG-21	JUL-21	JUN-21	MAY-21	APR-21	MAR-21	FEB-21	JAN-21
Flow (MGD) Average Monthly	0.006	0.007	0.008	0.0094	0.0143	0.0151	0.013	0.013	0.0113	0.0114	0.0112	0.0125
Flow (MGD) Weekly Average	0.008	0.008	0.008	0.0103	0.0186	0.0164	0.016	0.016	0.0134	0.0136	0.0113	0.0173
pH (S.U.) Minimum	7.4	7.32	7.4	7.93	7.87	7.81	7.7	7.69	7.56	7.4	7.46	7.38
pH (S.U.) Maximum	7.65	7.62	7.95	8.02	8.05	8.0	7.85	7.75	7.72	7.63	7.59	7.64
DO (mg/L) Minimum	5.0	4.76	4.86	4.21	4.19	4.03	4.08	4.66	5.03	5.38	5.43	5.12
TRC (mg/L) Average Monthly	0.11	0.1	0.09	0.16	0.12	0.02	0.23	0.3	0.13	0.16	0.15	0.19
TRC (mg/L) Instantaneous Maximum	0.23	0.28	0.23	0.55	0.23	0.32	1.16	0.56	0.36	0.29	0.33	0.46
CBOD5 (lbs/day) Average Monthly	0.1	0.1	0.2	0.1	0.4	0.3	0.2	0.2	0.3	0.2	0.3	0.4
CBOD5 (mg/L) Average Monthly	3.1	2.0	2.6	2.1	2.9	2.8	2.1	2.0	3.3	2.8	3.4	5.6
CBOD5 (mg/L) Instantaneous Maximum	4.2	2.0	3.1	2.2	3.8	3.5	2.1	2.0	4.0	3.0	3.7	8.2
BOD5 (mg/L) Raw Sewage Influent Average Monthly	148	369	167	117	88	92	141	106	113	128	99	103
TSS (lbs/day) Average Monthly	0.2	0.4	1.0	0.4	1.0	0.5	1.0	0.6	1.0	0.7	0.4	0.9
TSS (mg/L) Average Monthly	5.0	7.0	21	8.0	8.0	5.0	11	8.0	10	10.0	6.0	14
TSS (mg/L) Raw Sewage Influent Average Monthly	216	653	212	108	124	106	200	164	112	180	95	122
TSS (mg/L) Instantaneous Maximum	5.0	8.0	30	10	11.0	5.0	16	10	13	11.0	6.0	19
Fecal Coliform (CFU/100 ml) Geometric Mean	37	< 10	369	35	**371**	**429**	96	120	617	136	60	131
Fecal Coliform (CFU/100 ml) Instantaneous Maximum	135	< 10	1527	122	**1600**	**18400**	161	287	1188	186	130	200

Compliance History

Effluent Violations for Outfall 001, from: February 1, 2021 To: December 31, 2021

Parameter	Date	SBC	DMR Value	Units	Limit Value	Units
Fecal Coliform	07/31/21	Geo Mean	429	CFU/100 ml	200	CFU/100 ml
Fecal Coliform	08/31/21	Geo Mean	371	CFU/100 ml	200	CFU/100 ml
Fecal Coliform	08/31/21	IMAX	1600	CFU/100 ml	1000	CFU/100 ml
Fecal Coliform	07/31/21	IMAX	18400	CFU/100 ml	1000	CFU/100 ml
Fecal Coliform	07/31/20	Geo Mean	431	CFU/100 ml	200	CFU/100 ml
Fecal Coliform	01/31/20	IMAX	23,200	CFU/100 ml	10000	CFU/100 ml
Fecal Coliform	12/31/19	Geo Mean	2634	CFU/100 ml	2000	CFU/100 ml

Summary of Inspections: An inspection occurred on 5/16/2019, where no violations were noted. As of the date of this inspection, the plant was running at half capacity due to flows being approximately 0.02 mgd of the permitted 0.06 mgd. There appeared to be some sludge build-up below the outfall. One blower had been replaced and the other was not operable at the time of inspection. Butterfly valves on the sludge return and wasting lines caused problems with them becoming clogged with grit and garbage. It was recommended to replace these valves to eliminate future problems.

Other Comments: Multiple violations for fecal coliform have occurred over the past 3 years. This system uses a tablet system, which can be difficult to control the rate of erosion of the tablets. It is essential that the operator checks the tablet system daily to ensure the treatment system operates properly.

The chapter 94 report for 2020 showed the treatment system was not overloaded, nor is it expected to be in the next 5 years.

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** .06
Latitude 40º 54' 50.43" **Longitude** -79º 27' 44.94"
Wastewater Description: Sewage Effluent

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)

Water Quality-Based Limitations

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

Parameter	Limit (mg/l)	SBC	Model
CBOD5	25	Avg mo.	WQM 7.0
NH_3-N	25	Avg mo.	WQM 7.0
Dissolved Oxygen	4	Avg mo.	WQM 7.0
TRC	1.6	imax	TRC Calc Spreadsheet

Comments: Water quality modeling was completed using WQM 7.0. Modeling determined that the minimum technology and BPJ standards for $CBOD_5$, NH_3-N, DO, and TRC are adequate to protect the stream quality of the Allegheny River.

Best Professional Judgment (BPJ) Limitations

Comments: Total Nitrogen, Total Phosphorus, and E. Coli monitoring is based on Ch. 92a.61 and the Departments SOP for Establishing Effluent Limitations for Individual Sewage Permits (SOP No. BPNPSM-PMT-033). Total Nitrogen and Total Phosphorus monitoring frequency will remain at 1/year, based on past eDMR data and the receiving stream not being nutrient impaired. E. Coli monitoring is a new addition to this permit renewal and will have a monitoring frequency of 1/quarter.

Ammonia Nitrogen (NH_3-N) limitations were not applied to the previous NPDES permits. An ammonia nitrogen limit of 25 mg/L average monthly and 50 mg/L imax are being incorporated into this permit renewal as a minimum technology-based BPJ limit required by the SOP titled “Establishing Effluent Limitations for Individual Sewage Permits (SOP No. BPNPSM-PMT-033)”.

POTWs with a discharge greater than 2,000 gpd require raw sewage influent monitoring, and therefore will remain in the permit renewal as recommended by the SOP (No. BPNPSM-PMT-033) for parameters BOD_5 and Total Suspended Solids (TSS), at the same frequency and sample type as the effluent.

Monitoring for pH, TRC, and Dissolved Oxygen is being increased from 5/week to 1/day based on Table 6-3 of the Permit Writers Manual. This change should help with ensuring the tablet erosion system is monitored daily and operating properly.

Mass Loading Limitations

For POTWs, mass loading limits (lbs/day) are to be established for $CBOD_5$, TSS, and NH_3-N, which are determined by the formula (design flow)*(conc. limit (mg/L))*(conversion factor 8.34). Mass loading limits for $CBOD_5$, and TSS are remaining at 12.5 lbs/day, and 15.0 lbs/day respectively, while a mass loading limit of 12.5 lbs/day for NH_3-N will be newly added to this permit renewal.

Also, reporting of average monthly mass loadings for raw sewage influent parameters BOD_5, and TSS has been included on this permit renewal.

Anti-Backsliding

Anti-Backsliding considerations do not apply since the effluent limitations are all remaining the same as in the previous permit renewal.

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 in comment letters and email correspondence on other NPDES permits, 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.

Although the application form associated with the subject NPDES permit renewal does require sampling for ammonia-nitrogen, NPDES permits for sewage facilities of this nature do not, generally, include routine monitoring requirements for pollutants such as chloride, nickel and zinc (The facility is less than 0.1 MGD and does not have any industrial users so the renewal application does not require sampling for chloride, nickel, or zinc). The Department has historically lacked sufficient data to support its assumption that a properly constructed, operated and maintained minor sewage facility of this size is expected to produce an effluent that would be protective of all the uses of the receiving stream including threatened and endangered mussels.

A summary of the sampling and effluent quality data for the Pine Township STP is as follows:

Sampling and Effluent Quality Data for USFWS Parameters of Concern	
Parameter	**November 2020 NPDES Renewal Application Data**
Ammonia-Nitrogen (NH_3-N) (mg/L)	1.0 mg/l (maximum) / 0.28 mg/l (average) of 109 total samples
Chloride (mg/L)	No Data
Total Nickel (µg/L)	No Data
Total Zinc (µg/L)	No Data
NOTES: 1. The application samples are all grab samples. 2. The current STP has chlorine disinfection.	

The Department prepared the following calculations (included on the following pages) to determine the area of river that will be required to assimilate the maximum reported effluent concentrations of Ammonia-Nitrogen, Chloride, Nickel, and Zinc to achieve pollutant concentrations that at or below the USFWS criteria in the river.

Parameter Considerations:

Ammonia-Nitrogen

The facility has a sufficient dataset (109 samples) to evaluate potential impacts associated with ammonia-nitrogen. The calculated in-stream criteria for Ammonia-Nitrogen is 0.920 mg/L (see “Impact Area” calculations). The maximum reported concentration for Ammonia-Nitrogen in the effluent is 1.0 mg/L. Therefore, the Department would not anticipate there being any in-stream impact to threatened and endangered mussel species considering the size of the discharge and the assimilative capacity of the Allegheny River. However, considering that the maximum reported concentration does exceed the calculated in-stream chronic criteria, the Department has evaluated the potential “impact area” in the included “Impact Area” calculations.

Chloride

The Department has historically had limited chloride data for the effluent from sewage treatment plants. However, the Department has been incorporating monthly and quarterly monitoring for chloride in NPDES permits for publicly owned treatment plants that are discharging to waterways known to contain state and federally listed threatened and endangered mussel species since 2017. A summary of the data collected at the POTWs with chloride monitoring is as follows:

CHLORIDE SAMPLING DATA SUMMARY

		PA0103373	PA0023931	PA0239861	PA0026271	PA0101923	PA0025470	PA0037397	PA0047201	PA0027367	PA0023566	PA0222585	PA0029467	PA0025291	PA0027120
		FOXBURG STP	CAMBRIDGE AREA JT AUTH STP	COCHRANTON BORO STP	MEADVILLE AREA STP	SAEGERTOWN AREA STP	FREDERICKSBURG STP	WATERFORD BORO STP	TIONESTA BORO WWTP	GREENVILLE SANI AUTH	EMLENTON STP	BROKENSTRAW VALLEY AREA AUTH STP	NORTH WARREN MUNI STP	SOUTHWEST WARREN CNTY STP	WARREN CITY WWTP
UNITS		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L
	Nov														44.3
	Dec														70.9
2018	Jan								50.2	91.7					83
	Feb		145		351				86	122					143
	Mar			105	342				46.3	82.2					103
	Apr			84.5	269				55.1	81.8					125
	May		112	97	262				41.9	82.6					112
	Jun			81.2	235				27.1	77.8					74.2
	Jul			93.9	220.3				35.7	74					71.3
	Aug		81	87.9	251				64.1	84.7					81.4
	Sep	54.2		92.5	222			101	62.3	82.7					68.1
	Oct	84.5		95.7	224			65	57.6	76.8					50
	Nov	41.8	50	86.9	242			97.8	43.2	60.7					57
	Dec			95.8	242		89.3	69.8	59.9	75.4			210		90.7
2019	Jan	48.8		86	258		79	12.5	37	57.2			146	46.9	89.1
	Feb	42.7	141	96.6	300		142	87.6	91.4	139			395	46.9	167
	Mar	32.8		89.8	266		131	90.7	88.2	82.5	59.6		260	37	93.9
	Apr	32.8		93.6	236		75.7		57	75.7	64.3		181	29.6	100
	May	48.1	90.9	120	236		84.3	76	56.2	66.5	44.9		232	32.6	82.8
	Jun	63.1		83.5	221	193	93.5	83.75	38.7	71.3	48.8	120	166	28.6	73.4
	Jul	31.3		80.3	228	287	141	97.8	53.7	88.1	49.5	152	228	35.8	55.4
	Aug	63.3	84.4	84.6	220	259	71	84.4	67.5	64.7	41	119	204	25.6	61.4
	Sep	84		88.7	241	215	139	86.1	37.7	66.4	59.8	159	206	30.1	45.9
	Oct	82.5		86	210	249	224	85.95	51.8	84.5	55.9	99	279	29.1	48.7
	Nov	70	79.6	86.3	265	200	83.8	92.5	46.7	64.8	31.2	55	186	23.9	74
	Dec	57		88.7	242	173	71.7	83.5	45.9	67.9	43.3	106	197	38.3	69.74
2020	Jan	49		89.7	276	175	97	90.7	61.7	65.9	52.9	80	229	38.3	133
	Feb	63	149	89.5	300	195	127	77.15	131	82.1	49.7	89	299	68.9	103
	Mar	49		108	235	183	62.1	113	140	94	49.6	78	231	32.8	122
	Apr	40		103	210	173	105	96.2	64	71	33.8	104	248	28.1	79.7
	May	39	86	93.9	212	181	91.8	84.9	54	75	37.9	110	264	30	72.3
	Jun	63		93	225	194	85	76.5	66.5	75.6	46.5	112	228	26.8	65.8
	Jul	90		105	224	192	169	86.75	77	83.1	48.8	136	288	15	65
	Aug	129	85.2	89.8	242	198	217	86.9	62.6	72.4	46.6	132	226	29.7	78.6
	Sep	92		80	212	237	196	84.6	68.6	72.5	51.4	142	59	27.4	62
	Oct	79		99	222	205	228	83	52.6	81.4	27	142	230	26.7	58.5
	Nov	78	96.9	87	206	220	98.6	95	56.7	66.3	48.9	142	222	21.4	117
	Dec	63		80.1	267	152	76.2	95.3	22	69	36.5	96	218	27.5	47.7
2021	Jan	72		87.7	284	146	67.4	81.9	77.4	65.5	49.6	88	175	24.3	102
	Feb	81	142	71	351	208	86.4	86.3	99.4	130	86.7	115	347	50.4	149
	Mar	62		95.2	267	207	304	100	116	125	87.9	80.9	179	31.2	97.5
	Apr	60		78.1	247	162	94.9	86.6	72	84.8	54.7	131	241	21.2	86
	May	26	106	82.4	236	133	82.6	90.2	57.9	84.1	44.3	86.6	185	31.7	
	Jun	71		88.4	236	187	166	83.8	78.3	88.7	50.1	105	223	21.5	72.8
	Jul	76.1		71.2	228	202	201	104	64.5	88.1	53.6	81.6	263	51.6	74.4
	Aug	74.5	82.5	73.3	226	224	157	79.3	64.4	82.5	52.7	78.4	222	15.9	77.1
	Sep	73.8		73	246	193	173	92.2	60.6	72	49.3	120	203	27.3	77.4
	Oct	95		79.7	205	166	143	87.7	51.8	86.9	46.2	85.7	255	11.9	61
	Nov	53.5	81.5	94.1	213	130	81.9	82.55	35.3	74.9	46	88.3	124	17	76.8
	Dec	70.6		94	218	144	77.6	72.3	41.8	110	58	65.4	206	2.36	71.1
2022	Jan	47.7		90.6	252		81.1	69.45	43.5	65.6		80.9	154	17.9	72.3

As seen from this data, chloride concentrations are fairly consistent with sewage treatment plants. Although not confirmed, data submitted to the Department suggests that facilities with the higher concentrations are facilities that are largely serving residential areas with well water and water softeners. The highest reported value that appears to be an outlier was 395 mg/L at the North Warren Municipal STP in February 2019. As the USFWS indicated in a December 16, 2021 letter regarding the Eldred Borough STP, the USFWS supports the use of the 95% Upper Confidence Limit (UCL) for nickel calculations. Therefore, the Department calculated the 95% Upper Confidence limit from the data above and has used this value of 115.3 mg/l in the included “impact area” calculations for the Pine Township STP.

Additionally, the Department has issued NPDES permits to two facilities that require instream monitoring for Chloride (upstream and in the discharge plume). The Department has reviewed this data and it appears to support the assumption of “instantaneous mixing” and the associated “impact area” calculations. A summary of the data collected at the POTWs with chloride instream monitoring is as follows:

		PA0026271			PA0037397		
		MEADVILLE AREA STP			WATERFORD BORO STP		
		Upstream	Effluent	Plume (~ 200-feet from outfall pipe)	Upstream	Effluent	Plume (~ 5-feet from outfall pipe)
UNITS		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2018	Jan	-	-	-	-	-	-
	Feb	13.2	351	15.3	-	-	-
	Mar	21.3	342	12.5	-	-	-
	Apr	< 20.0	269	< 20.0	-	-	-
	May	10.2	262	11.4	-	-	-
	Jun	< 20.0	235	< 20.0	-	-	-
	Jul	22.0	220.3	27.5	-	-	-
	Aug	22.9	251	30.2	-	101	-
	Sep	< 20.0	222	20.4	-	65	-
	Oct	13.5	224	15.0	-	97.8	-
	Nov	11.3	242	12.4	-	69.8	-
	Dec	74.1	242	17.3	-	12.5	-
2019	Jan	13.0	258	15.0	-	87.6	-
	Feb	19.4	300	23.5	-	90.7	-
	Mar	15.3	266	17.4	-	0	-
	Apr	16.4	236	18.0	-	76	-
	May	< 10.0	236	11.3	12.1	83.75	24.8
	Jun	8.08	221	9.46	15	97.8	15
	Jul	15.0	228	21.0	11.1	84.4	16
	Aug	16.2	220	20.5	14	86.1	30.4
	Sep	11.6	241	12.1	9.07	85.95	9.88
	Oct	20.9	210	28.0	0.1	92.5	0.1
	Nov	13.0	265	16.6	-	83.5	-
	Dec	10.2	242	10.7	-	90.7	-
2020	Jan	2.43	276	2.99	-	77.15	-
	Feb	14.5	300	30.9	-	113	-
	Mar	12.8	235	13.8	-	96.2	-
	Apr	< 10.0	210	< 10.0	-	84.9	-
	May	15.5	212	18.5	11.3	76.5	25.3
	Jun	17.3	225	19.0	10.4	86.75	22.3
	Jul	14.6	224	17.2	10.6	86.9	14.4
	Aug	4.92	242	30.7	< 0.3	84.6	18.4
	Sep	22.2	212	30.5	15.8	83	35.2
	Oct	25	222	48	17.5	95	23.2
	Nov	16.4	206	< 2	-	95.3	-
	Dec	15.0	267	16.7	-	81.9	-
2021	Jan	17.3	284	17.5	-	86.3	-
	Feb	38.8	351	28.7	-	100	-
	Mar	15.1	267	16.5	-	86.6	-
	Apr	18.1	247	20.1	-	90.2	-
	May	13.7	236	15.6	28.3	83.8	16.6
	Jun	14.9	236	19.1	17.3	104	0.3
	Jul	10.4	228	10.3	11.6	79.3	< 11.1
	Aug	16.7	226	17.1	12.7	92.2	22
	Sep	17.3	246	23.7	< 0.3	87.7	0.33
	Oct	14.0	205	16.3	12.5	82.55	20.2
	Nov	11.2	213	12.7	-	72.3	-
	Dec	12.3	218	13.4	-	69.45	-
2022	Jan	17.8	252	22.0	-	-	-

Nickel

The Department has limited dissolved nickel data for the effluent from sewage treatment plants. However, the Department has been incorporating quarterly monitoring for total nickel in NPDES permits for publicly owned treatment plants that are discharging to waterways known to contain state and federally listed threatened and endangered mussel species. A summary of the data collected at the POTWs with nickel monitoring is as follows:

NICKEL SAMPLING DATA SUMMARY													
		PA0103373	PA0023931	PA0239861	PA0026271	PA0101923	PA0025470	PA0047201	PA0027367	PA0222585	PA0029467	PA0025291	PA0027120
		FOXBURG STP	CAMBRIDGE AREA JT AUTH STP	COCHRANTON BORO STP	MEADVILLE AREA STP	SAEGERTOWN AREA STP	FREDERICKSBURG STP	TIONESTA BORO WWTP	GREENVILLE SANI AUTH	BROKENSTRAW VALLEY AREA AUTH STP	NORTH WARREN MUNI STP	SOUTHWEST WARREN CNTY STP	WARREN CITY WWTP
UNITS		ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L
2017	4th QTR												0.05
2018	1st QTR		< 0.01	< 0.005	< 0.005			0.006	0.001				< 0.005
	2nd QTR		< 0.01	< 0.005	< 0.005			0.001	0.003				0.05
	3rd QTR		< 0.04	< 0.005	< 0.005			0.016	0.0001				0.01
	4th QTR		< 0.04	< 0.005	< 0.005		< 0.005	0.003	0.001		0.00518		< 0.05
2019	1st QTR		< 0.007	< 0.005	< 0.005		< 0.005	0.001	0.001		< 0.00400	< 0.02	< 0.05
	2nd QTR		< 0.007	< 0.005	< 0.005	0.007	< 0.005	0.001	0.0009	< 0.005	0.007	< 0.02	< 0.05
	3rd QTR		< 0.007	< 0.005	< 0.005	0.009	< 0.005	0.0003	0.002	< 0.005	0.04	< 0.02	< 0.05
	4th QTR	0.005	< 0.007	< 0.005	< 0.005	0.008	< 0.005	0.019	0.002	< 0.005	< 0.007	< 0.02	< 0.05
2020	1st QTR	< 0.005	< 0.007	< 0.005	< 0.005	< 0.007	< 0.005	0.001	0.0009	< 0.005	< 0.007	< 0.02	< 0.05
	2nd QTR	0.007	< 0.007	< 0.005	< 0.005	< 0.007	< 0.005	0.002	0.0007	< 0.005	< 0.007	< 0.02	< 0.05
	3rd QTR	0.006	< 0.007	< 0.005	< 0.005	0.011	< 0.005	0.004	0.001	< 0.005	0.007	< 0.02	< 0.05
	4th QTR	< 0.005	< 0.007	< 0.005	< 0.005	0.012	< 0.005	0.003	0.003	< 0.005	0.007	< 0.02	< 0.05
2021	1st QTR	< 0.005	< 0.007	< 0.005	< 0.005	< 0.007	< 0.005	0.001	0.005	< 0.005	0.007	< 0.02	< 0.05
	2nd QTR	0.005	< 0.007	< 0.005	< 0.005	0.008	< 0.005	0.006	0.004	< 0.005	0.007	< 0.02	< 0.05
	3rd QTR	< 0.005	< 0.007	< 0.005	< 0.005	0.011	< 0.005	0.003	0.001	0.005	< 0.007	0.02	< 0.05

As seen from this data, nickel is rarely above the USFWS criteria of 7.5 ug/L. The highest reported value that appears to be an outlier was 19 ug/L at the Tionesta Borough WWTP in the fourth quarter of 2019. As the USFWS indicated in a December 16, 2021 letter regarding the Eldred Borough STP, the USFWS supports the use of the 95% Upper Confidence Limit (UCL) from the above dataset in the permit calculations to provide a robust and more realistic estimate of the potentially affected area. Therefore, the Department calculated the 95% Upper Confidence Interval from the data above and has used this value of 0.014 mg/l in the “impact area” calculations for the Pine Township STP included in this Fact Sheet.

NICKEL 95% UCL Calculations	
Mean	0.0116
Standard Error	0.0012
Median	0.005
Mode	0.005
Standard Deviation	0.0144
Sample Variance	0.0002
Kurtosis	2.5715
Skewness	1.9851
Range	0.0499
Minimum	0.0001
Maximum	0.05
Sum	1.6481
Count	142
Confidence Level(95.0%)	0.0024
Upper 95% Confidence Interval	0.014
Lower 95% Confidence Interval	0.0092

Zinc

The dissolved zinc criteria of 13.18 µg/l was provided to the Department in emails from the USFWS dated October 25, 2021 and November 8, 2021. The nickel criteria has been provided in numerous comment letters and other correspondence with the USFWS. As part of the October 25, 2021 correspondence and included as Attachment A to this document, the USFWS provided the Department with a "Hazard/Risk Assessment" for the "Evaluation of Acute and Chronic Toxicity of Nickel and Zinc to 2 Sensitive Freshwater Benthic Invertebrates Using Refined Testing Methods" as prepared by Ning Wang, James L. Kunz, Danielle M. Cleveland, Jeffery A. Steevens, Edward J. Hammer, Eric Van Genderen, Adam C. Ryan, and Christian E. Schlekat published in the Environmental Toxicology and Chemistry—Volume 39, Number 11—pp. 2256–2268, 2020, received May 11, 2020, revised June 3, 2020, and accepted July 30, 2020.

The Department has limited zinc data for the effluent from sewage treatment plants. Therefore, the Department used an effluent concentration of 20 ug/l in the included "impact area" calculations for the Pine Township STP.

"Impact Area" Calculations:

3/16/2022

Pine Township (Armstrong County)

Facility:	Pine Township STP
Permit Number:	PA0252760 Effective: N/A Expiration: N/A
Outfall No:	001
Location:	Pine Township, Armstrong County
Discharge to:	Allegheny River
Site Specific Mussel Survey Completed:	No

Discharge and Stream Characteristics			Comments
Q_S	Stream Flow	628 MGD / 972.4 cfs	Fact Sheet
Q_D	Discharge Flow	0.06 MGD / 0.09285 cfs	Fact Sheet
$C_{S(Cl^-)}$	Instream chloride Concentration	15.6 mg/L	Average WQN data (2010 to 2021 - USGS-03036500)
$C_{E(Cl^-)}$	Discharge chloride (existing)	115.3 mg/L	Upper 95% confidence interval of effluent data from 14 other facilities
$C_{P(Cl^-)}$	Discharge chloride (proposed)	115.3 mg/L	Upper 95% confidence interval of effluent data from 14 other facilities
$C_{S(Cl^-)}$	Instream nickel Concentration	5 µg/L	Assumed - No WQN data below the criteria of 7.3 µg/L (reported at < 50)
$C_{E(Ni)}$	Discharge nickel (existing)	14 µg/L	Upper 95% confidence interval of effluent data from 10 other facilities
$C_{P(Ni)}$	Discharge nickel (proposed)	14 µg/L	Upper 95% confidence interval of effluent data from 10 other facilities
$C_{S(Zn)}$	Instream zinc Concentration	16.26 µg/L	Average WQN data (2010 to 2021 - USGS-03036500)
$C_{E(Zn)}$	Discharge zinc (existing)	20 µg/L	Assumed - No data available
$Zn_{P(Cl^-)}$	Discharge zinc (proposed)	20 µg/L	Assumed - No data available
$C_{S(NH3-N)}$	Instream NH^3-N	0.03 mg/L	Average WQN data (2010 to 2021 - USGS-03036500)
$C_{E(NH3-N)}$	Discharge NH^3-N (existing)	1 mg/L	From renewal application - Max of 109 grab samples
$C_{P(NH3-N)}$	Discharge NH^3-N (proposed)	1 mg/L	From renewal application - Max of 109 grab samples
pH_S	Instream pH	7.6 S.U.	Average WQN data (2010 to 2021 - USGS-03036500)
T_S	Instream Temp.	25 °C	Default value for a WWF
$C_{C(NH3-N)}$	Ammonia criteria	0.920 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	266.8 meters	PaDEP eMAP

Ammonia Criteria Calculations:

	pH_S	7.6	S.U.	*(Default value is 7.0)*
	T_S	25	°C	*(Default value is 20 °)*

Acute Criteria

	METHOD and UNITS	CRITERIA	Comments	
	Old CMC (mg TAN/L) =	3.577		
	EPA 2013 CMC (mg TAN/L) =	5.226	Oncorhynchus present	* formula on pg. 41 (plateaus at 15.7 C)
		5.226	Oncorhynchus absent	* formula on pg. 42 (plateaus at 10.2 C)

Chronic Criteria

	METHOD and UNITS	CRITERIA	COMMENTS
	Old CMC (mg TAN/L) =	0.952	
$C_{C(NH3-N)}$	EPA 2013 CMC (mg TAN/L) =	0.920	* 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:	115	mg/L
C.	Chlorides in Proposed Discharge after Treatment Facility Upgrades:	115.3	mg/L
D.	Approximate Area of Impact after Treatment Facility Upgrades:	N/A	m^2

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

3/16/2022

Pine Township (Armstrong County)

Facility:	Pine Township STP		
Permit Number:	PA0252760	Effective: N/A	Expiration: N/A
Outfall No:	001		
Location:	Pine Township, Armstrong County		
Discharge to:	Allegheny River		
Site Specific Mussel Survey Completed:	No		

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 =	326,821 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 =	19 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 =	18.66492 lbs/Day
	$\%_{P(Cl^-)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(Cl^-)} / L_{S(Cl^-)}$ =	0.01% 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	0.0001 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 =	12,046 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 =	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 =	3.35268 lbs/Day
	$\%_{P(Ni)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(Ni)} / L_{S(Ni)}$ =	0.03% 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	0.0028 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 =	-16,132 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 =	3 lbs/Day
	$\%_{E(Zn)}$ = Percent of Stream Capacity for Current Loading = $L_{D\text{-}MAX(Zn)} / L_{S(Zn)}$ =	0% of Stream Capacity
	$L_{D(Zn)}$ = Proposed Discharge Zn Loading exceeding criteria after Treatment Facility Upgrades = $(C_{P(Zn)} - C_{PZn)}) \times Q_D$(MGD) X 8.34 =	3.412728 lbs/Day
	$\%_{P(Zn)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(Zn)} / L_{S(Zn)}$ =	-0.02% 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	0.0016 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 =	4,661 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 =	1 lbs/Day
	$\%_{E(NH3\text{-}N)}$ = Percent of Stream Capacity for Current Loading = $L_{D\text{-}MAX(NH3\text{-}N)} / L_{S(NH3\text{-}N)}$ =	0% 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 =	0 lbs/Day
	$\%_{P(NH3\text{-}N)}$ = Percent of Stream Capacity for Proposed Loading = $L_{D(NH3\text{-}N)} / L_{S(NH3\text{-}N)}$ =	0.00% 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	0.0000 m^2

3/16/2022

Pine Township (Armstrong County)

Facility:	Pine Township STP		
Permit Number:	PA0252760	Effective: N/A	Expiration: N/A
Outfall No:	001		
Location:	Pine Township, Armstrong County		
Discharge to:	Allegheny River		
Site Specific Mussel Survey Completed:	No		

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 $Q_{A(Cl^-)} = [(Q_D C_{P(Cl^-)} / C_{C(Cl^-)}) - Q_D)] / (1 - C_{S(Cl^-)}/C_{C(Cl^-)}) =$	0.05550168 cfs
	$\%_{P(Cl^-)}$ = Percent of Stream Width Required to Assimilate Chlorides to Criteria Concentration = $Q_{A(Cl^-)} / Q_S$ (cfs) =	0.0057%
	$W_{I(Cl^-)}$ = Proposed Width of Stream required to Assimilate Chlorides to Criteria Concentration = W_s X $\%_{P(Cl^-)}$	0.015228 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	0.0001 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 $Q_{A(Ni)} = [(Q_D C_{P(Ni)} / C_{C(Ni)}) - Q_D)] / (1 - C_{S(Ni)}/C_{C(Ni)}) =$	0.27047609 cfs
	$\%_{P(Cl^-)}$ = Percent of Stream Width Required to Assimilate Nickel to Criteria Concentration = $Q_{A(Ni)} / Q_S$ (cfs) =	0.0278%
	$W_{I(Ni)}$ = Proposed Width of Stream required to Assimilate Nickel to Criteria Concentration = W_s X $\%_{P(Ni)}$	0.074211 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	0.0028 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 $Q_{A(Zn)} = [(Q_D C_{PZn)} / C_{C(Zn)}) - Q_D)] / (1 - C_{S(Zn)}/C_{C(Zn)}) =$	-0.20559643 cfs
	$\%_{P(Cl^-)}$ = Percent of Stream Width Required to Assimilate Zinc to Criteria Concentration = $Q_{A(Zn)} / Q_S$ (cfs) =	-0.0211%
	$W_{I(Zn)}$ = Proposed Width of Stream required to Assimilate Zinc to Criteria Concentration = W_s X $\%_{PZn)}$	-0.056410 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	0.0016 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 $Q_{A(NH3\text{-}N)} = [(Q_D C_{P(NH3\text{-}N)} / C_{C(NH3\text{-}N)}) - Q_D)] / (1 - C_{S(NH3\text{-}N)}/C_{C(NH3\text{-}N)}) =$	0.008346 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) =	0.0009%
	$W_{I(NH3\text{-}N)}$ = Proposed Width of Stream required to Assimilate NH3-N to Criteria Concentration = W_s X $\%_{P(NH3\text{-}N)}$	0.002290 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	0.0000 m^2

Conclusions:

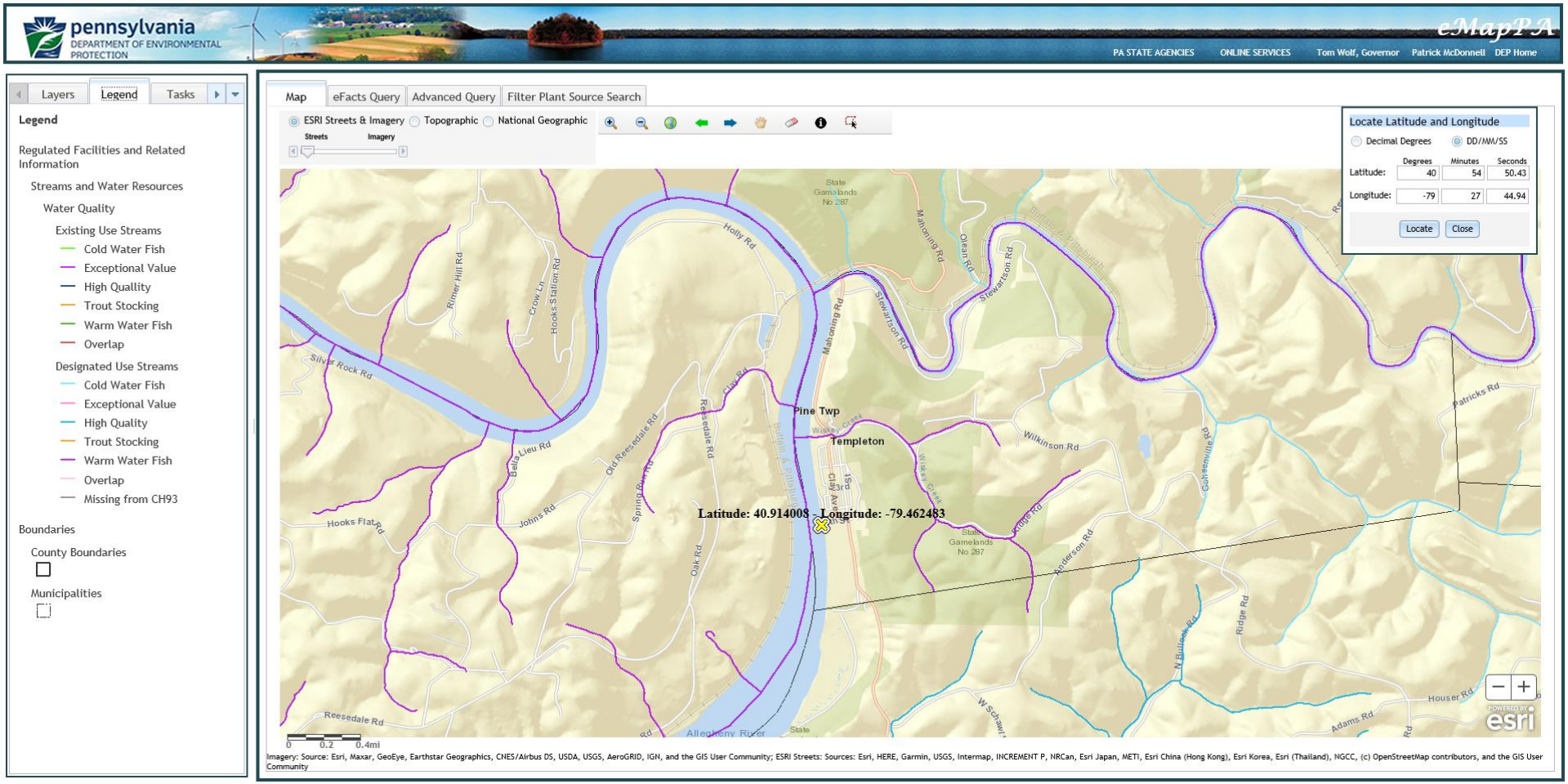
Based on the Ammonia-Nitrogen sampling data, the existing discharge from the Pine Township STP is not believed to be having any adverse effects on threatened or endangered mussel species in the Allegheny River considering that the discharge appears to be consistently meeting effluent concentrations that are well below the criteria established by the USFWS at the end of pipe. Additionally, the Department did consider what impacts, if any, nickel, chloride, and zinc potentially in the discharge effluent will have on threatened and endangered mussel species. The Department determined that the discharge is not expected to have any adverse effects on threatened or endangered mussel species in the Allegheny River considering the size of the proposed discharge and the instantaneous assimilative capacity of the river. This existing discharge (0.06 MGD) and its associated pollutants of concern, are not expected to be measurable at levels that would impact mussels once it mixes with the river. As shown on the "impact area" calculations, the subject discharge is expected to almost instantaneously dilute with the river for Chlorides, Ammonia-Nitrogen, Nickel, and Zinc. All of the "impact area" calculations are based on the worst-case stream condition scenario of the stream being at low flow (Q_{7-10}) flow conditions and the discharge from the treatment plant being at the design capacity. The likelihood of these conditions being at the "worst-case" scenario is not anticipated and, even if so, there does not appear to be any likelihood of there being any adverse impacts to threatened or endangered mussel species..

However, the Department will implement the following in this NPDES permit renewal for the Pine Township STP:

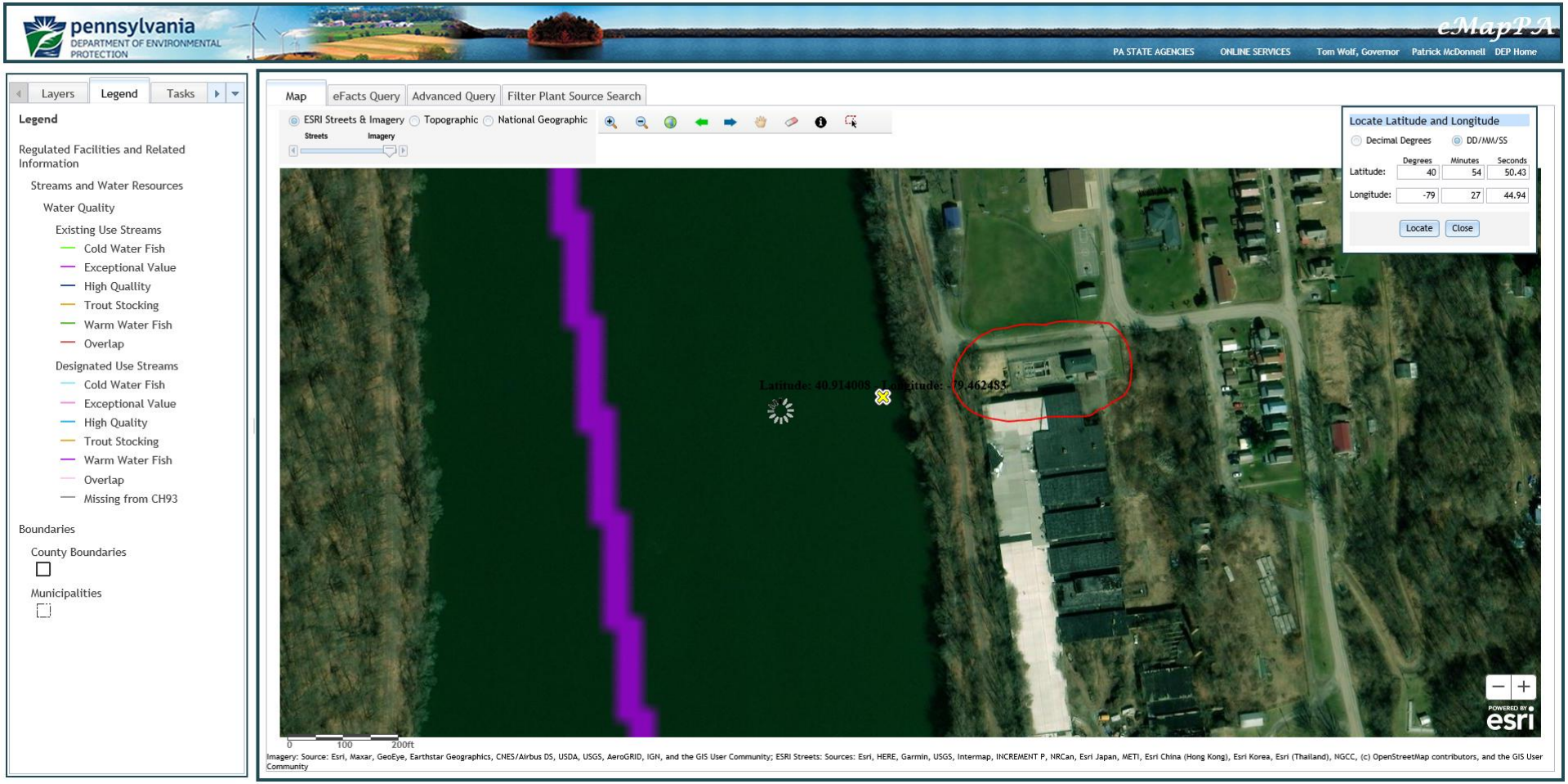
- Twice per month effluent monitoring for Ammonia-Nitrogen
- Monthly effluent monitoring for Chloride.
- Quarterly effluent monitoring for Nickel.
- Quarterly effluent monitoring for Zinc.

This monitoring will provide a dataset as a means of further evaluating potential impacts in the upcoming permit term. This data will also allow the Department to evaluate the need for pollutant reduction evaluations in future NPDES permit renewals for some or all of these pollutants.

OUTFALL AND STP LOCATIONS – Pa DEP eMap



OUTFALL AND STP LOCATIONS – Pa DEP eMap with Aerial Imagery



Proposed Effluent Limitations and Monitoring Requirements

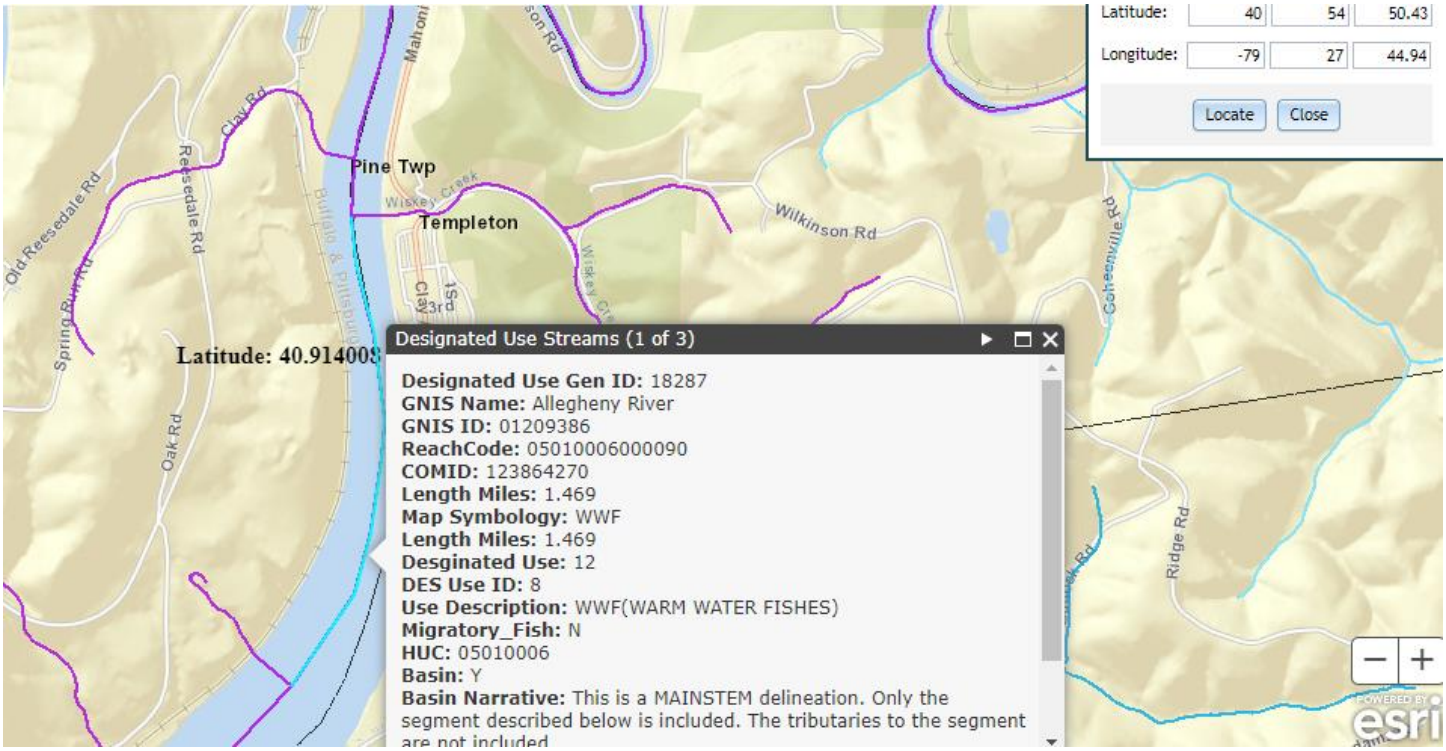
The limitations and monitoring requirements specified below are proposed for the draft permit, and reflect the most stringent limitations amongst technology, water quality and BPJ. Instantaneous Maximum (IMAX) limits are determined using multipliers of 2 (conventional pollutants) or 2.5 (toxic pollutants). 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	Average Weekly	Minimum	Average Monthly	Maximum	Instant. Maximum		
Flow (MGD)	Report	Report Wkly Avg	XXX	XXX	XXX	XXX	2/month	Measured
pH (S.U.)	XXX	XXX	6.0 Daily Min	XXX	XXX	9.0	1/day	Grab
DO	XXX	XXX	4.0 Daily Min	XXX	XXX	XXX	1/day	Grab
TRC	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
CBOD5	12.5	XXX	XXX	25.0	XXX	50.0	2/month	Grab
CBOD5 Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	2/month	Grab
TSS Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	2/month	Grab
TSS	15.0	XXX	XXX	30.0	XXX	60.0	2/month	Grab
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	2/month	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1000	2/month	Grab
E. Coli (No./100 ml)	XXX	XXX	XXX	XXX	XXX	Report	1/quarter	Grab
Total Nitrogen	XXX	XXX	XXX	Report Daily Max	XXX	XXX	1/year	Grab
Ammonia	12.5	XXX	XXX	25.0	XXX	50.0	2/month	Grab
Total Phosphorus	XXX	XXX	XXX	Report Daily Max	XXX	XXX	1/year	Grab
Chloride	XXX	XXX	XXX	Report	XXX	XXX	1/month	Grab
Total Nickel	XXX	XXX	XXX	Report Avg Qrtly	XXX	XXX	1/quarter	Grab
Total Zinc	XXX	XXX	XXX	Report Avg Qrtly	XXX	XXX	1/quarter	Grab

Compliance Sampling Location: Outfall 001 after disinfection.

Attachment A – eMAP Stream Designation



Attachment B – Streamstats Drainage Area (Discharge Point)

Region ID:	PA
Workspace ID:	PA20220211150027254000
Clicked Point (Latitude, Longitude):	40.91403, -79.46388
Time:	2022-02-11 10:00:54 -0500

Basin Characteristics

Parameter Code	Parameter Description	Valu
DRNAREA	Area that drains to a point on a stream	884
ELEV	Mean Basin Elevation	161
PRECIP	Mean Annual Precipitation	44

Low-Flow Statistics Parameters [99.9 Percent (8830 square miles) Low Flow Region 3]

Parameter Code	Parameter Name	Value	Units
DRNAREA	Drainage Area	8840	square miles
ELEV	Mean Basin Elevation	1613	feet
PRECIP	Mean Annual Precipitation	44	inches

Attachment C – WQM 7.0 Modeling

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)
54.260	Pine Twp STP	PA0252760	0.060	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
54.260	0.060	25.000	7.000
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
713.574	1.153	618.757	1.182
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
2.00	0.002	0.10	1.028
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
7.540	0.784	Tsivoglou	5
Reach Travel Time (days)			
0.078			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.008	2.00	0.10	7.54
0.016	2.00	0.10	7.54
0.023	2.00	0.10	7.54
0.031	2.00	0.10	7.54
0.039	2.00	0.10	7.54
0.047	2.00	0.10	7.54
0.054	2.00	0.10	7.54
0.062	2.00	0.10	7.54
0.070	2.00	0.10	7.54
0.078	2.00	0.10	7.54

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	**54.260**	801.00	8840.00	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	0.110	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
Pine Twp STP	PA0252760	0.0600	0.0600	0.0600	0.000	20.00	7.60

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	0.10	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	**52.760**	800.00	8841.00	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	0.110	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 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
54.260	Pine Twp STP	11.07	50	11.07	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
54.260	Pine Twp STP	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)		
54.26	Pine Twp STP	25	25	25	25	4	4	0	0

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												
54.260	972.40	0.00	972.40	.0928	0.00013	1.153	713.57	618.76	1.18	0.078	25.00	7.00
Q1-10 Flow												
54.260	622.34	0.00	622.34	.0928	0.00013	NA	NA	NA	0.92	0.100	25.00	7.00
Q30-10 Flow												
54.260	1322.46	0.00	1322.46	.0928	0.00013	NA	NA	NA	1.40	0.065	25.00	7.00

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		

Attachment D – Discharge pH

Pine Twp STP
Pine Twp, Armstrong County
PA0252760 Discharge pH

Date	pH min	pH max	10^ -pH min	10^ -pH max	& pH max)	-Log (Ave pH)
Sep-21	7.93	8.02	1.1749E-08	9.5499E-09	1.0649E-08	8.0
Aug-21	7.87	8.05	1.34896E-08	8.9125E-09	1.1201E-08	8.0
Jul-21	7.81	8	1.54882E-08	0.00000001	1.2744E-08	7.9
Sep-20	7.83	8	1.47911E-08	0.00000001	1.2396E-08	7.9
Aug-20	7.34	7.86	4.57088E-08	1.3804E-08	2.9756E-08	7.5
Jul-20	7.49	7.86	3.23594E-08	1.3804E-08	2.3082E-08	7.6
Sep-19	6.97	7.39	1.07152E-07	4.0738E-08	7.3945E-08	7.1
Aug-19	7.16	7.98	6.91831E-08	1.0471E-08	3.9827E-08	7.4
Jul-19	7.11	7.54	7.76247E-08	2.884E-08	5.3233E-08	7.3
Sep-18	7.04	7.35	9.12011E-08	4.4668E-08	6.7935E-08	7.2
					Median:	7.6

Attachment E – TRC CALC Spreadsheet

TRC EVALUATION

Input appropriate values in A3:A9 and D3:D9

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

Source	Reference	AFC Calculations	Reference	CFC Calculations
TRC	1.3.2.iii	WLA afc = 3340.549	1.3.2.iii	WLA cfc = 3256.766
PENTOXSD TRG	5.1a	LTAMULT afc = 0.373	5.1c	LTAMULT cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc= 1244.768	5.1d	LTA_cfc = 1893.331

Source		Effluent Limit Calculations	
PENTOXSD TRG	5.1f	AML MULT = 1.288	
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.500	BAT/BPJ
		INST MAX LIMIT (mg/l) = 1.563	

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

(0.011/EXP(-K*CFC_tc/1440))+(((CFC_Yc*Qs*0.011)/(1.547*Qd)....
....*EXP(-K*CFC_tc/1440)))+Xd+(CFC_Yc*Qs*Xs/1.547*Qd))*(1-FOS/100)