pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Southcentral Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0026735**
Facility Type	**Municipal**	APS ID	**66**
Major / Minor	**Major**	Authorization ID	**1307794**

NPDES PERMIT FACT SHEET INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Swatara Township Authority**	Facility Name	**Swatara Township STP**
Applicant Address	PO Box 4920	Facility Address	8675 Paxton Street
	Harrisburg, PA 17111-0920		Hummelstown, PA 17036-8673
Applicant Contact	George Moppin	Facility Contact	George Moppin
Applicant Phone	(717) 566-3361	Facility Phone	(717) 566-3361
Client ID	2359	Site ID	257273
Ch 94 Load Status	Not Overloaded	Municipality	Swatara Township
Connection Status	No Exceptions Allowed	County	Dauphin
Date Application Received	February 28, 2020	EPA Waived?	No
Date Application Accepted	March 12, 2020	If No, Reason	Major Facility, Pretreatment, Significant CB Discharge

Purpose of Application: NPDES permit renewal for discharge of treated sewage

Summary of Review

1.0 General Discussion

This factsheet supports the renewal of an existing NPDES permit for discharge of treated domestic wastewater from Swatara Township Authority (Authority) wastewater treatment plant. The Authority owns, operates, and maintains the wastewater treatment plant located in Hummelstown, Dauphin County. The facility receives flows from Swatara Township (25.492%), Lower Paxton (60.238%), Hummelstown (9.762%) and South Hanover (0.508%). The facility is designed to provide biological nutrient removal using vertical loop reactors in conjunction with alternate anoxic/oxic treatment process. The facility discharges treated municipal wastewater to Swatara Creek, which is classified for warm water fishes and migratory fishes. The collection system has no combined sewers. The facility has a design average annual flow of 6.3 MGD with a hydraulic design capacity of 8.95 MGD and has organic design capacity of 10,508 lbs BOD5/day. The existing NPDES permit was issued on August 19, 2015 with an effective date of September 1, 2015 and expiration date of August 31, 2020. The applicant submitted a timely NPDES renewal application to the Department and is currently operating under the terms and conditions in the existing permit under administrative extension provisions pending Department action on the renewal application. A topographic map showing the discharge location is presented in attachment A.

1.1 Sludge use and disposal description and location(s):

Sludge is pumped from either the sludge holding tank or the gravity thickener to a centrifuge in the solids handling building for dewatering. Dewatered sludge is sent to the dryer to produce Class A Biosolids which land is applied at Oelig Farms under a beneficial use permit PAG07-3521 issued on November 1, 2017. Sludge is also disposed at Capital Region Water Authority WWTP, Kline's Services treatment facility, Manheim Area Water & Sewer Authority and Derry Township WWTP for further processing.

Approve	Deny	Signatures	Date
X		*J. Pascal Kwedza* J. Pascal Kwedza, P.E. / Environmental Engineer	November 04, 2021
X		Daniel W. Martin Daniel W. Martin, P.E. / Environmental Engineer Manager	November 14, 2021

Summary of Review

1.2 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.

1.3 Changes to Existing Permit

Weekly monitoring of Total Zinc and monthly monitoring of E.Coli have been added.

1.4 Existing Limit and Monitoring Requirements

Discharge Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day)		Concentrations (mg/L)				Minimum Measurement Frequency	Required Sample Type
	Monthly Average	Weekly Average	Minimum	Monthly Average	Weekly Average	Instantaneous Maximum		
Flow (mgd)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0	1/Day	Grab
Dissolved Oxygen	XXX	XXX	5.0	XXX	XXX	XXX	1/Day	Grab
Total Residual Chlorine	XXX	XXX	0.5	XXX	XXX	1.6	1/Day	Grab
TSS	1576	2364	XXX	30	45	60	3/week	24-hr comp
$CBOD_5$ (5/1 to 10/31)	998	1576	XXX	19	30	38	3/week	24-hr comp
$CBOD_5$ (11/1 to 4/30)	1313	2101	XXX	25	40	50	3/week	24-hr comp
NH3-N (5/1 to 10/31)	338	XXX	XXX	6	XXX	12	3/week	24-hr comp
NH3-N (11/1 to 4/30)	900	XXX	XXX	18	XXX	36	3/week	24-hr comp
Total Phosphorus	105	XXX	XXX	2.0	XXX	4.0	3/week	24-hr comp
Fecal Coliform (5/1 to 9/30)[(5)]	XXX	XXX	XXX	200	XXX	1000	3/week	Grab
Fecal Coliform (10/1 to 4/30)	XXX	XXX	XXX	2,000	XXX	10,0000	3/week	Grab

1.4.1 Chesapeake Bay Permit Requirements

Summary of Review

Discharge Parameter	Effluent Limitations					Monitoring Requirements	
	Mass Load(lbs)		Concentrations (mg/l)				
	Monthly	Annual	Minimum	Monthly Average	Maximum	Minimum Measurement Frequency	Required Sample Type
Ammonia---N	Report	Report	XXX	Report	XXX	3/week	24-hr Comp
Kjeldahl---N	Report	XXX	XXX	Report	XXX	2/Week	24-hr Comp
Nitrate-Nitrite as N	Report	XXX	XXX	Report	XXX	2/Week	24-hr Comp
Total Nitrogen	Report	Report	XXX	Report	XXX	1/Month	Calculate
Total Phosphorus	Report	Report	XXX	Report	XXX	3/week	24-hr Comp
Net Total Nitrogen	Report	118,339	XXX	XXX	XXX	1/Month	Calculate
Net Total Phos.	Report	15,866	XXX	XXX	XXX	1/Month	Calculate

1.5 Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	6.3
Latitude	40° 15’ 33.26”	Longitude	76° 43’ 45.18”
Quad Name	Hershey	Quad Code	1632
Wastewater Description:	Sewage		

Receiving Waters	Swatara Creek	Stream Code	09361
NHD Com ID	56402353	RMI	9.1
Drainage Area	549	Yield (cfs/mi^2)	0.14
Q_{7-10} Flow (cfs)	76.86	Q_{7-10} Basis	USGS gage station
Elevation (ft)		Slope (ft/ft)	
Watershed No.	7-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)		
Temperature (°F)		
Hardness (mg/L)		
Other:		

Nearest Downstream Public Water Supply Intake		Colombia Water Company	
PWS Waters	Susquehanna River	Flow at Intake (cfs)	
PWS RMI		Distance from Outfall (mi)	26

Changes Since Last Permit Issuance: None

1.5.1 Water Supply Intake

The nearest downstream water supply intake is approximately 26 miles downstream by Colombia Water Company on Susquehanna River in York County. Due to the distance and dilution, no impact is expected from this discharge.

1.6 Discharge, Receiving Waters and Water Supply Information

Outfall No.	002	Design Flow (MGD)	0.00
Latitude	40° 15’ 32.15”	Longitude	76° 43’ 46.34”
Quad Name	Hershey	Quad Code	1632
Wastewater Description:	Storm water		
Receiving Waters	Swatara Creek	Stream Code	09361
NHD Com ID	56402353	RMI	
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	7-D	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status			
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			
PWS Waters		Flow at Intake (cfs)	
PWS RMI		Distance from Outfall (mi)	

Changes Since Last Permit Issuance: None

1.6.1 Other comments

This outfall receives storm water from the treatment plant site, effluent limit not required. See section 4.4.10 of the report for further details.

1.7 Discharge, Receiving Waters and Water Supply Information

Outfall No.	003	Design Flow (MGD)	0.00
Latitude	40° 15’ 30.80”	Longitude	76° 43’ 48.40”
Quad Name	Hershey	Quad Code	1632
Wastewater Description:	Storm water		

Receiving Waters	Swatara Creek	Stream Code	09361
NHD Com ID	56402353	RMI	
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	7-D	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status			
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			
PWS Waters		Flow at Intake (cfs)	
PWS RMI		Distance from Outfall (mi)	

Changes Since Last Permit Issuance: None

1.7.1 Other comments

This outfall receives storm water from the treatment plant site, effluent limit not required. See section 4.4.10 of the report for further details.

2.0 Treatment Facility Summary				
Treatment Facility Name: Swatara Township STP				
WQM Permit No.	**Issuance Date**			
2285409	January, 1986			
2208407	October 15, 2008			
Waste Type	**Degree of Treatment**	**Process Type**	**Disinfection**	**Avg Annual Flow (MGD)**
Sewage	Tertiary	Modified BNR	Hypochlorite	6.300000
Hydraulic Capacity (MGD)	**Organic Capacity (lbs/day)**	**Load Status**	**Biosolids Treatment**	**Biosolids Use/Disposal**
8.950000	10508.00	Not Overloaded	Combination	Combination of methods

Changes Since Last Permit Issuance: None

2.1 Treatment Facility Description

The treatment facility consists of 2 bar screens, 1 comminutor, influent wet well, influent pump station, 2 mechanical fine screens, 1 grit removal, 2 anaerobic tanks, 4 vertical loop rectors, 2 fine bubble tanks (with 3 aerobic zones and 2 anoxic zones), 4 final clarifies, 4 chlorine contact tanks, 1 sludge thickener, 2 sludge holding tanks, 1 centrifuge and 1 sludge dyer. The system is designed to operate in two parallel trains with an internal mix liquor pump to return nitrified mix liquor to the head of the anoxic zones.

2.2 Treatment Chemicals

- Sodium Hypochlorite for disinfection.
- Ferrous Chloride for Phosphorus removal.
- Polymer for sludge dewatering.
- Soda ash for alkalinity or pH adjustment.
- Methanol for carbon source if needed.

3.0 Compliance History

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

Parameter	AUG-21	JUL-21	JUN-21	MAY-21	APR-21	MAR-21	FEB-21	JAN-21	DEC-20	NOV-20	OCT-20	SEP-20
Flow (MGD) Average Monthly	3.866	4.184	3.109	3.734	4.272	5.249	4.746	4.108	4.829	3.465	3.162	3.025
Flow (MGD) Daily Maximum	5.777	8.109	3.632	6.002	9.285	13.842	10.106	6.335	14.474	5.025	5.464	4.031
pH (S.U.) Minimum	6.9	6.8	6.8	6.8	6.7	6.7	6.7	6.7	6.6	6.8	6.9	6.9
pH (S.U.) Maximum	7.3	7.3	7.1	7.0	7.1	7.3	7.6	7.2	7.2	7.2	7.3	7.3
DO (mg/L) Minimum	7.4	7.4	7.8	8.4	9.1	9.6	9.8	9.6	8.0	7.8	7.1	7.0
TRC (mg/L) Average Monthly	0.33	0.37	0.31	0.35	0.31	0.32	0.35	0.27	0.28	0.28	0.26	0.3
TRC (mg/L) Instant. Maximum	0.61	0.58	0.46	0.53	0.46	0.51	0.75	0.42	0.54	0.52	0.41	0.4
CBOD5 (lbs/day) Average Monthly	< 129	< 77	< 54	< 66	< 71	< 94	< 82	< 67	< 75	< 92	< 54	< 81
CBOD5 (lbs/day) Weekly Average	344	< 103	< 64	< 95	< 106	< 141	< 114	< 91	< 108	< 181	< 61	< 193
CBOD5 (mg/L) Average Monthly	< 3	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 3	< 2	< 3
CBOD5 (mg/L) Weekly Average	8	< 3	< 2	< 2	< 2	< 3	< 2	< 2	< 2	< 7	< 2	< 6
BOD5 (lbs/day) Raw Sewage Influent Ave. Monthly	6612	6885	5724	7458	4910	4902	4909	5437	5639	10017	5263	4890
BOD5 (lbs/day) Raw Sewage Influent Daily Maximum	8919	12420	7209	12509	7258	7895	5797	8527	8235	23619	7700	8909
BOD5 (mg/L) Raw Sewage Influent Ave. Monthly	211	220	218	252	154	126	138	165	164	356	207	190
TSS (lbs/day) Average Monthly	87	104	< 77	96	108	< 131	< 89	69	< 90	94	84	89
TSS (lbs/day) Raw Sewage Influent Ave. Monthly	8155	7410	6532	8153	5482	4304	4187	4251	5343	9957	5023	5090

TSS (lbs/day) Raw Sewage Influent Daily Maximum	13851	11295	11253	13888	8356	8896	5128	5400	8270	27452	8391	6788
TSS (lbs/day) Weekly Average	120	127	96	181	180	160	148	84	120	116	129	103
TSS (mg/L) Average Monthly	3	3	< 3	3	3	< 3	< 2	2	< 2	3	3	4
TSS (mg/L) Raw Sewage Influent Ave. Monthly	259	234	249	273	171	108	116	131	152	352	195	199
TSS (mg/L) Weekly Average	3	5	4	4	4	4	3	3	3	4	4	4
Fecal Coliform (CFU/100 ml) Geometric Mean	11	24	34	24	15	< 18	16	10	< 4	9	7	16
Fecal Coliform (CFU/100 ml) Instant. Maximum	29	56	124	64	36	73	78	226	32	44	28	71
Nitrate-Nitrite (mg/L) Average Monthly	2.18	2	2.35	2.51	2.5	3.47	3.17	3.2	3.91	3.79	3.89	3.68
Nitrate-Nitrite (lbs) Total Monthly	2313.4	2039.8	1848.6	2477.9	2468.8	4655.3	3403.3	3215.6	4333.6	3283.8	3171.5	2800.9
Total Nitrogen (mg/L) Average Monthly	< 3.29	2.79	< 3.13	< 3.22	< 3.18	4.57	< 3.87	< 4.01	< 4.85	< 4.64	5.1	4.76
Total Nitrogen (lbs) Effluent Net Total Monthly	< 3457.1	2810.1	< 2452.9	< 3236.4	< 3131.5	6046.7	< 4220.1	< 4003.4	< 5321.1	< 4028.8	4157.6	3629.7
Total Nitrogen (lbs) Total Monthly	< 3457.1	2810.1	< 2452.9	< 3236.4	< 3131.5	6046.7	< 4220.1	< 4003.4	< 5321.1	< 4028.8	4157.6	3629.7
Total Nitrogen (lbs) Effluent Net Total Annual												< 63793
Total Nitrogen (lbs) Total Annual												< 63793
Ammonia (lbs/day) Average Monthly	< 4.3	< 3.34	< 2.64	3.25	< 3.43	< 11.41	< 9.97	< 3.52	< 4.85	< 3.27	< 2.60	< 2.56
Ammonia (mg/L) Average Monthly	< 0.15	< 0.1	< 0.1	< 0.1	< 0.1	< 0.25	< 0.24	< 0.11	< 0.13	< 0.11	< 0.1	< 0.1
Ammonia (lbs) Total Monthly	< 133.3	< 103.5	< 79.1	< 100.7	< 102.9	< 353.6	< 279.2	< 109.1	< 150.5	< 98	< 80.5	< 76.7
Ammonia (lbs) Total Annual												< 5963
TKN (mg/L) Average Monthly	< 1.1	0.79	< 0.77	< 0.71	< 0.68	1.1	< 0.7	< 0.8	< 0.94	< 0.85	1.21	1.07

TKN (lbs) Total Monthly	< 1143.7	770.3	< 604.3	< 758.5	< 662.7	1391.4	< 816.8	< 787.8	< 987.5	< 744.9	986	828.8
Total Phosphorus (lbs/day) Average Monthly	6.27	8.92	5.41	5.55	< 4.71	6.85	6.36	< 4.27	< 6.55	5.04	5.04	5.48
Total Phosphorus (mg/L) Ave. Monthly	0.2	0.28	0.21	0.16	< 0.14	0.16	0.16	< 0.13	< 0.18	0.18	0.2	0.22
Total Phosphorus (lbs) Effluent Net Total Monthly	194.3	276.6	162.3	172.1	< 141.3	212.4	178.2	< 132.3	< 203.1	151.1	156.3	164.4
Total Phosphorus (lbs) Total Monthly	194.3	276.6	162.3	172.1	< 141.3	212.4	178.2	< 132.3	< 203.1	151.1	156.3	164.4
Total Phosphorus (lbs) Effluent Net Total Annual												< 1916
Total Phosphorus (lbs) Total Annual												< 1916

3.2 Summary of Discharge Monitoring Reports (DMRs)**:**

DMRs review for the facility for the last 12 months of operation, presented on the table above in section 3.1 indicate permit limits have been met consistently. No effluent violations noted on DMRs during the period reviewed.

3.3 Summary of Inspections:

The facility has been inspected a couple times during last permit cycle. No effluent violations identified during plant inspections. The facility has been operated and maintained well.

4.0 Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** 6.3
Latitude 40º 15' 33.26" **Longitude** -76º 43' 45.18"
Wastewater Description: Sewage Effluent

4.1 Basis for Effluent Limitations

In general, the Clean Water Act(AWA) requires that the effluent limits for a particular pollutant be the more stringent of either technology-based limits or water quality-based limits. Technology-based limits are set according to the level of treatment that is achievable using available technology. A water quality-based effluent limit is designed to ensure that the water quality standards applicable to a waterbody are being met and may be more stringent than technology-based effluent limits.

4.2 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)

4.3 Mass-Based Limits

The federal regulation at 40 CFR 122.45(f) requires that effluent limits be expressed in terms of mass, if possible. The regulation at 40 CFR 122.45(b) requires that effluent limitations for POTWs be calculated based on the design flow of the facility. The mass-based limits are expressed in pounds per day and are calculated as follows:

Mass based limit (lb/day) = concentration limit (mg/L) × design flow (mgd) × 8.34

4.4 Water Quality-Based Limitations

4.4.1 Streamflow:

The Technical Support Document for Water Quality-Based Toxics Control (TSD) (EPA, 1991) and the Pennsylvania Water Quality Standards PA WQS) recommend the flow conditions for use in calculating water quality-based effluent limits (WQBELs) using steady-state modeling. The TSD and the PA WQS state that WQBELs intended to protect aquatic life uses should be based on the lowest seven-day average flow rate expected to occur once every ten years ($Q_{7\text{-}10}$) for chronic criteria and the lowest one-day average flow rate expected to occur once every ten years ($Q_{1\text{-}10}$) for acute criteria. However, because the chronic criterion for ammonia is a 30-day average concentration not to be exceeded more than once every three years, EPA has used the $Q_{30\text{-}10}$ for the chronic ammonia criterion instead of the $Q_{7\text{-}10}$. The $Q_{30\text{-}10}$ is a biologically based design flow intended to ensure an excursion frequency of once every three years for a 30-day average flow rate. These flows were determined by correlating with the yield of USGS gage No. 01573560 on Swatara Creek near Hershey.
The $Q_{7\text{-}10}$ and drainage area at the gage is 67.7ft3/s and 483mi^2 respectively. The resulting yields are as follows:

- Q_{7-10} = (67.7ft^3/s)/483 mi^2 = 0.14ft^3/s/ mi^2
- Q_{30-10} / Q_{7-10} = 0.89
- Q_{1-10} / Q_{7-10} = 1.23

The drainage area at discharge calculated by streamStats = 549 mi^2

The Q_{7-10} at discharge = 549 mi^2 x 0.14 ft^3/s/mi^2 = 76.86 ft^3/s.

4.4.2 NH_3N Calculations

NH_3N calculations will be based on the Department's Implementation Guidance of Section 93.7 Ammonia Criteria, dated 11/4/97 (ID No. 391-2000-013). The following data is necessary to determine the instream NH_3N criteria used in the attached computer model of the stream:

- Discharge pH = 6.9 (DMR median July - Sept)
- Discharge Temperature = 25 ^{o} C (Default)
- Stream pH = 8.0 (Previous Protection Report)
- Stream Temperature = 23 ^{o} C (Previous Protection Report)
- Background NH_3-N = 0.0 (default

4.4.3 $CBOD_5$

The two Derry Township MA's facilities, (Clearwater and Southwest), along with Suez Water Hummelstown Plant and the Swatara Township STP were modeled together due to their proximity to each other. The attached results of the WQM 7.0 stream model presented in attachment B indicates that for Swatara Township STP discharge, a summer monthly average limit of 20 mg/l CBOD5 is required to protect the water quality of the stream. However, due to anti-backsliding restrictions, the existing summer average monthly limit(AML) of 19 mg/l, average weekly limit(AWL) of 30mg/l and IMAX of 38mg/l and 25mg/l AML, 40mg/l AWL and 50 IMAX for the winter months will remain in the permit. Past DMRs and inspection reports show the STP has been consistently achieving below 10 mg/l CBOD5. Mass limits are calculated using the equation presented in section 4.3.

4.4.4 NH_3-N

The attached results of the WQM 7.0 stream model (attachment B) also indicates a summer monthly average limit of 7.7mg/l of NH3-N is necessary to protect the aquatic life from toxicity effects. The existing summer average monthly limit of 6 mg/l and winter limit of 18mg/l will remain in the permit due to anti-backsliding restrictions. Mass limits are calculated using the equation presented in section 4.3.

4.4.5 Dissolved Oxygen

The existing permit contains a limit of 5 mg/l for Dissolved Oxygen (DO). DEP's Technical Guidance for the Development and Specification of Effluent Limitations (362-0400-001, 10/97) suggests that either the adopted minimum stream D.O. criteria for the receiving stream or the effluent level determined through water quality modeling be used for the limit. Since the WQM 7.0 model was run using a minimum D.O. of 5.0 mg/l, this limit will be continued in the renewed permit with a daily monitoring requirement.

4.4.6 Phosphorus

The limit of 2 mg/l established in the existing permit was for the protection of the Lower Susquehanna River basin. This approach has been superseded by the Chesapeake Bay Strategy, but the limit will remain in the permit due to anti-backsliding. This STP was designed to remove phosphorus and contains phosphorus limits in all previous permits. Past DMRs and inspection reports show that the STP is in compliance with the phosphorus effluent limits. Mass limits are calculated using the equation presented in section 4.3.

4.4.7 Total Residual Chlorine

The attached results of TRC calculation presented in attachment D utilizes the equations and calculations as presented in the Department's May 1, 2003 Implementation Guidance for Total Residual Chlorine (TRC) (ID No. 391-2000-015) for

developing chlorine limitations. The Guidance references Chapter 92a, Section 92a.48 (b) which establishes a standard BAT limit of 0.5 mg/l unless a facility-specific BAT has been developed. The attached result indicates that a technology limit of 0.5 mg/l and 1.6mg/l IMAX would be needed to prevent toxicity concerns. This is consistent with the existing permit. The facility has no problem meetings the limits.

4.3.8 Total Suspended Solids (TSS):

There is no water quality criterion for TSS. A limit of 30 mg/l AML in the existing permit which was based on the minimum level of effluent quality attainable by secondary treatment as defined in 40 CFR 133.102b(1) and 25 PA § 92a.47(a)(1) and an AWL of 45mg/l per 40CFR 133.102(b)(2) and 25 PA § 92a.47(a)(2) with associated mass limits will remain in the permit. Mass limits are calculated using the equation presented in section 4.3.

4.4.9 Toxics

A reasonable potential (RP) analysis was done for pollutants sampled in support of the permit renewal application. All pollutants that were presented in the application sampling data were entered into DEP's Toxics Management Spreadsheet (TMS) which combines the logic in the previous Toxics Screening Analysis Spreadsheet and PENTOXSD Model to calculate WQBELs. The results of the TMS presented in attachment C indicate the discharge levels for all parameters analyzed except Total Zinc were well below DEP's target quantitation limits (TQL) and calculated WQBELs, therefore no limitation or monitoring is required in the permit. Monitoring was recommended for Total Zinc. Weekly monitoring of Total Zinc is required in the permit to collect additional data for analysis at the next permit renewal.

The recommended limits follow the logic presented in DEPs SOP, to establish limits in the permit where the maximum reported concentration exceeds 50% of the WQBEL, or for non-conservative pollutants to establish monitoring requirements where the maximum reported concentration is between 25% - 50% of the WQBEL, or to establish monitoring requirements for conservative pollutants where the maximum reported concentration is between 10% - 50% of the WQBEL.

4.4.10 Influent BOD and TSS Monitoring

The permit includes influent BOD5 and TSS monitoring at the same frequency as is done for effluent in order to implement Chapter 94.12 and assess percent removal requirements.

4.4.11 Industrial Users

Swatara Township wastewater treatment plant receives wastewater from some industrial users throughout its service area. The industrial users and a brief description are as follows:

Industrial Users*	Discharge Rate (GPD)					Significant Industrial User?
	Process	NCCW	Sanitary	Other	*Total*	
Lower Paxton Township Landfill	-	-	-	70,000	70,000	Yes
Fresh Express Incorporated	330,000	-	-	-	330,000	Yes
TOTAL	330,000	-	-	70,000	400,000	-

*The facility is implementing an approved EPA pretreatment program which is expected to control discharge of pollutants and address any negative impact from these significant industrial users.

4.4.12 Pretreatment Requirements

The design annual average flow of the treatment plant is 6.3 MGD and the facility receives flow from two significant industrial users as presented in section 4.4.11. EPA requires development and implementation of pretreatment program for this type of facility. Swatara Township Authority currently maintains and operates an EPA-approved pretreatment program. Consequently, the Department will continue to include permit conditions that dictate the operation and implementation of a pretreatment program in the permit.

4.4.13 Chesapeake Bay Strategy

The Department formulated a strategy in April 2007, to comply with the EPA and Chesapeake Bay Foundation requirements to reduce point source loadings of Total Nitrogen (TN) and Total Phosphorus (TP) to the Bay. In the Strategy, sewage dischargers have been prioritized by Central Office based on their delivered TN loadings to the Bay. The highest priority (Phases 1, 2, and 3) dischargers will receive annual loading caps based on their design flow on August 29, 2005 and concentrations of 6 mg/l TN and 0.8 mg/l TP. These limits may be achieved through a combination of treatment technology, credits, or offsets. Phase 4 (0.2 -0.4mgd) and Phase 5(below 0.2mdg) will be required to monitor and report TN and TP during permit renewal. Any facility in Phases 4 and 5 that undergoes expansion is subjected to cap load right away.

EPA published the Chesapeake Bay TMDL in December of 2010. In order to address the TMDL, Pennsylvania developed Chesapeake Watershed Implementation Plan (WIP) Phase 1, Phase 2 and currently Phase 3 WIP and a supplement to the WIPs in addition to the original Chesapeake Bay Strategy. As outlined in the current Phase 3 WIP and supplement to the WIP, re-issuing permits for significant dischargers follow the same phased approach formulated in the original Bay strategy. This facility falls in phase 1 of the strategy and is required to meet a total maximum annual Total Nitrogen Cap load of 115,367 lbs/year based on a design annual wasteflow of 6.3MGD and 6 mg/l and a TP cap load of 15,342 lbs/year based on annual wasteflow of 6.3 MGD and 0.8 mg/l total phosphorus in addition to a TN load of 3,272lbs/day and TP load of 524lbs/day transferred from Permit Number PA0087017.

Lower Paxton Township (Springford Village) 0.075MGD package plant with Permit Number PA0087017 was decommissioned and the flow is connected to the Swatara Township STP for treatment. The Cap load was transferred from the facility to Swatara Township in accordance with the Phase II WIP Wastewater Supplement, revised March 27, 2015. The loadings were calculated based on actual flow of 0.043MGD with a default TN of 25 mg/l and TP of 4mg/l. A cap load of 3,272lbs/year (0.043 x 25x 8.34 x365) TN and 524lbs/year (0.043 x4x8.34 x365) TP has been added to the original cap load of Swatara Township. The total TN and TP cap loads for Swatara Township are respectively 118,339lbs/year and 15,866lbs/year. Lower Paxton Township - Springford Village facility was previously considered non-significant, and its load has been moved from the non-significant aggregate load to the Phase 1 aggregate in the phase 3 WIP wastewater supplement.

The Department also approved a total nitrogen offset of 300lbs of nitrogen based on 12 EDUs at 25lbs/EDU for the Swatara Township Authority. The offsets are for 12 on-lot disposal systems that have been connected to the sewer conveyance system. These on-lot systems were put into use prior to January 1, 2003 and retired after January 1, 2003. The approved offsets are only for compliance purposes and are not available for trading or selling and will not be added to the base TN cap load. The permit will show the base cap load on the effluent page and show the offsets as a foot note with a language indicating the offsets may be applied throughout the compliance year or during the truing period. A complete list of addresses of the dwellings that were served by the retired on-lot systems that are now connected to the sewage conveyance system is on file.

4.4.14 Stormwater

The application identifies outfall 002 (40°15’32.19”/76°43’46.34”) and outfall 003 (40°15’30.80”/76°43’48.40”) as receiving stormwater runoff from the treatment plant site. To comply with stormwater requirements of 40 CFR 122.26(b)(14)(ix), part C of the permit will require the permittee to comply with the standard requirements applicable to stormwater outfalls for 002 and 003 with BMP conditions

4.4.15 Fecal Coliform and E. Coli

The existing Fecal Coliform limit is consistent with the technology limits recommended in 92a.47(a)(4) and (a)(5) and will remain in the permit. Monthly monitoring of E. Coli is required in the permit following DEP recommendation of 1/month monitoring of E. Coli at a minimum for this type of facility.

5.0 Other Requirements

5.1 Anti-backsliding

Not applicable to this permit

5.2 Anti-Degradation (93.4)

The effluent limits for this discharge have been developed to ensure that existing instream water uses and the level of water quality necessary to protect the existing uses are maintained and protected. No High-Quality Waters are impacted by this discharge. No Exceptional Value Waters are impacted by this discharge.

5.3 Class A Wild Trout Fisheries

No Class A Wild Trout Fisheries are impacted by this discharge.

5.4 303d Listed Streams

The discharge is not located on a 303d listed stream segment.

5.5 Special Permit Conditions

The permit contains the following special conditions:

- Stormwater Prohibition, Approval Contingencies, Solids Management, Restriction on receipt of hauled in waste under certain conditions, and requirement for pretreatment program implementation, Storm water requirement and WET testing requirement.

5.6 Basis for Effluent and Surface Water Monitoring

Section 308 of the CWA and federal regulation 40 CFR 122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limitations are required and/or to monitor effluent impacts on receiving water quality. The permittee is responsible for conducting the monitoring and for reporting results on Discharge Monitoring Reports (DMRs).

5.7 Effluent Monitoring Frequency

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. Permittees have the option of taking more frequent samples than are required under the permit. These samples can be used for averaging if they are conducted using EPA-approved test methods (generally found in 40 CFR 136) and if the Method Detection Limits are less than the effluent limits. The sampling location must be after the last treatment unit and prior to discharge to the receiving water. If no discharge occurs during the reporting period, "no discharge" shall be reported on the DMR.

6.0 Whole Effluent Toxicity (WET)

Whole Effluent Toxicity (WET) is a term used to describe the aggregate toxic effect of an aqueous sample (i.e whole effluent wastewater discharge) as measured by an organism's response upon exposure to the sample (lethality, impaired growth or reproduction). WET tests replicate, to the greatest extent possible, the total effect and actual environmental exposure of aquatic life to toxic pollutants in an effluent without requiring the identification of the specific pollutants. WET testing is a vital component of the water quality standards implementation through the NPDES permitting process. EPA's promulgated WET test methods include acute and chronic tests.

6.1 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:

The dilution series used for the tests was: 100%, 56%, 12%, 6%, and 3%. The Target Instream Waste Concentration (TIWC) to be used for analysis of the results is: 12%.

6.2 Summary of Four Most Recent Test Results

TST Data Analysis

WET Summary and Evaluation

Facility Name	Swatara Township Authority
Permit No.	PA0026735
Design Flow (MGD)	6.3
Q_{7-10} Flow (cfs)	76.86
PMF_s	0.042
PMF_c	0.291

		Test Results (Pass/Fail)			
		Test Date	Test Date	Test Date	Test Date
Species	Endpoint	10/2/17	9/19/18	9/16/19	10/6/20
Ceriodaphnia	Survival	PASS	PASS	PASS	PASS

		Test Results (Pass/Fail)			
		Test Date	Test Date	Test Date	Test Date
Species	Endpoint	10/2/17	9/19/18	9/17/19	10/6/20
Ceriodaphnia	Reproduction	PASS	PASS	PASS	PASS

		Test Results (Pass/Fail)			
		Test Date	Test Date	Test Date	Test Date
Species	Endpoint	10/3/17	9/20/18	9/17/19	10/6/20
Pimephales	Survival	PASS	PASS	PASS	PASS

		Test Results (Pass/Fail)			
		Test Date	Test Date	Test Date	Test Date
Species	Endpoint	10/3/17	9/20/18	9/17/19	10/6/20
Pimephales	Growth	PASS	PASS	PASS	PASS

Reasonable Potential? NO

Permit Recommendations

Test Type	**Chronic**
TIWC	**30** % Effluent
Dilution Series	**8, 15, 30, 65, 100** % Effluent
Permit Limit	**None**
Permit Limit Species	

See attachment E for additional TST data analysis

** 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**

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

Acute Partial Mix Factor (PMFa): **0.042** Chronic Partial Mix Factor (PMFc): **0.291**

6.3.1. Determine IWC – Acute (IWCa):

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

[(6.3 MGD x 1.547) / ((76.86cfs x 0.042) + (6.3 MGD x 1.547))] x 100 = **75%**

Is IWCa < 1%? ☐ **YES** ☒ **NO** **(YES - Acute Tests Required OR NO - Chronic Tests Required)**

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

N/A

6.3.2 Type of Test for Permit Renewal:

Chronic Test

6.3.2a. Determine Target IWCa (If Acute Tests Required)

TIWCa = IWCa / 0.3 = **%**

6.3.2b. Determine Target IWCc (If Chronic Tests Required)

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

[(6.3 MGD x 1.547) / ((76.86 cfs x 0.291) + (6.3 MGD x 1.547))] x 100 = **30%**

6.3.3. Determine Dilution Series

(NOTE – check Attachment C of WET SOP for dilution series based on TIWCa or TIWCc, whichever applies).

Dilution Series = 100%, 65%, 30%, 15%, and 8%.

6.4 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:
N/A

No WETT limit or monitoring is deemed necessary. The standard Part C condition for WET testing will be included in the permit.

7.0 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	Weekly Average	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Flow (MGD)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Inst Min	XXX	XXX	9.0	1/day	Grab
DO	XXX	XXX	5.0 Daily Min	XXX	XXX	XXX	1/day	Grab
TRC	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
CBOD5 Nov 1 - Apr 30	1313	2101	XXX	25	40	50	3/week	24-Hr Composite
CBOD5 May 1 - Oct 31	998	1576	XXX	19	30	38	3/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	3/week	24-Hr Composite
TSS Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	3/week	24-Hr Composite
TSS	1576	2364	XXX	30	45	60	3/week	24-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	3/week	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1000	3/week	Grab
E. Coli (No./100 ml)	XXX	XXX	XXX	XXX	XXX	Report	1/month	Grab
Nitrate-Nitrite	XXX	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite

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

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Nitrate-Nitrite (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Total Nitrogen	XXX	XXX	XXX	Report	XXX	XXX	1/month	Calculation
Total Nitrogen (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Total Nitrogen (lbs) Effluent Net	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Ammonia Nov 1 - Apr 30	900	XXX	XXX	18	XXX	36	3/week	24-Hr Composite
Ammonia May 1 - Oct 31	338	XXX	XXX	6	XXX	12	3/week	24-Hr Composite
Ammonia (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
TKN	XXX	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
TKN (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Total Phosphorus	105	XXX	XXX	2.0	XXX	4	3/week	24-Hr Composite
Total Phosphorus (lbs) Effluent Net	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Total Phosphorus (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Zinc, Total	Report	Report	XXX	Report	Report	XXX	1/week	24-Hr Composite

Compliance Sampling Location: Outfall 001

7.1 Proposed Effluent Limitations and Monitoring Requirements

The limitations and monitoring requirements specified below are proposed for the draft permit, to comply with Pennsylvania's Chesapeake Bay Tributary Strategy.

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
	Monthly	Annual	Monthly	Monthly Average	Maximum	Instant. Maximum		
Total Nitrogen* (lbs) Effluent Net	XXX	118339 Total Annual	XXX	XXX	XXX	XXX	1/year	Calculation
Total Nitrogen (lbs)	XXX	Report Total Annual	XXX	XXX	XXX	XXX	1/year	Calculation
Ammonia (lbs)	XXX	Report Total Annual	XXX	XXX	XXX	XXX	1/year	Calculation
Total Phosphorus (lbs) Effluent Net	XXX	15866 Total Annual	XXX	XXX	XXX	XXX	1/year	Calculation
Total Phosphorus (lbs)	XXX	Report Total Annual	XXX	XXX	XXX	XXX	1/year	Calculation

Compliance Sampling Location: Outfall 001

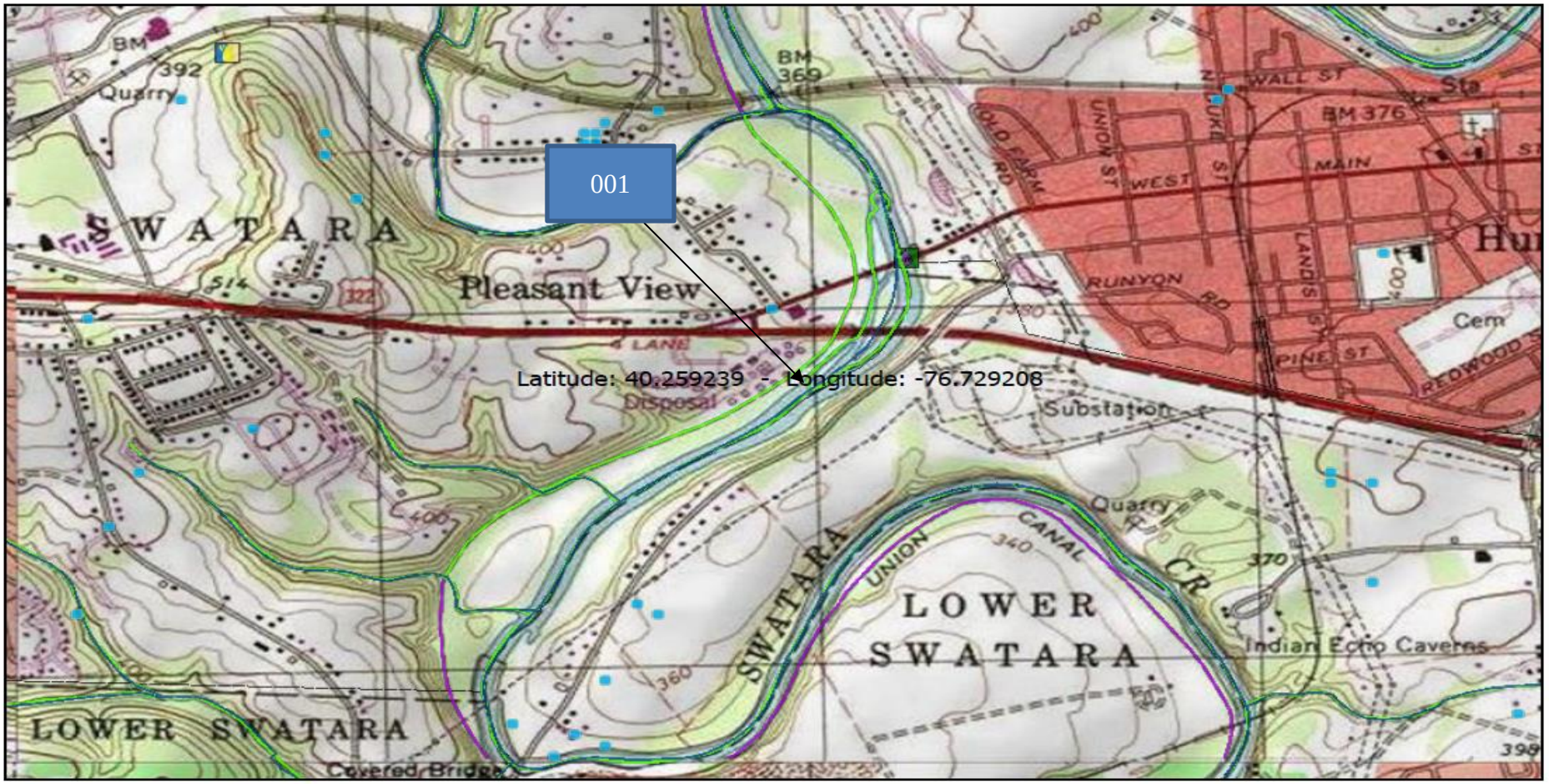
Other Comments:

*The permittee is authorized to use 300 lbs/year as Total Nitrogen (TN) offsets toward compliance with the Annual Net TN mass load limitations (Cap Loads), in accordance with Part C of this permit. These Offsets may be applied throughout the Compliance Year or during the Truing Period. The application of offsets must be reported to DEP as described in Part C. The Offsets are authorized for the following pollutant load reduction activities: Connection of 12 on-lot sewage disposal systems to the public sewer system after January 1, 2003, in which 25 lbs/year of TN offsets are granted per connection.

8.0 Tools and References Used to Develop Permit	
☒	WQM for Windows Model (see Attachment B)
☒	Toxics Management Spreadsheet (see Attachment C)
☒	TRC Model Spreadsheet (see Attachment **D**)
☐	Temperature Model Spreadsheet (see Attachment)
☒	Water Quality Toxics Management Strategy, 361-0100-003, 4/06.
☒	Technical Guidance for the Development and Specification of Effluent Limitations, 362-0400-001, 10/97.
☐	Policy for Permitting Surface Water Diversions, 362-2000-003, 3/98.
☐	Policy for Conducting Technical Reviews of Minor NPDES Renewal Applications, 362-2000-008, 11/96.
☐	Technology-Based Control Requirements for Water Treatment Plant Wastes, 362-2183-003, 10/97.
☐	Technical Guidance for Development of NPDES Permit Requirements Steam Electric Industry, 362-2183-004, 12/97.
☐	Pennsylvania CSO Policy, 385-2000-011, 9/08.
☒	Water Quality Antidegradation Implementation Guidance, 391-0300-002, 11/03.
☐	Implementation Guidance Evaluation & Process Thermal Discharge (316(a)) Federal Water Pollution Act, 391-2000-002, 4/97.
☒	Determining Water Quality-Based Effluent Limits, 391-2000-003, 12/97.
☒	Implementation Guidance Design Conditions, 391-2000-006, 9/97.
☒	Technical Reference Guide (TRG) WQM 7.0 for Windows, Wasteload Allocation Program for Dissolved Oxygen and Ammonia Nitrogen, Version 1.0, 391-2000-007, 6/2004.
☐	Interim Method for the Sampling and Analysis of Osmotic Pressure on Streams, Brines, and Industrial Discharges, 391-2000-008, 10/1997.
☐	Implementation Guidance for Section 95.6 Management of Point Source Phosphorus Discharges to Lakes, Ponds, and Impoundments, 391-2000-010, 3/99.
☐	Technical Reference Guide (TRG) PENTOXSD for Windows, PA Single Discharge Wasteload Allocation Program for Toxics, Version 2.0, 391-2000-011, 5/2004.
☒	Implementation Guidance for Section 93.7 Ammonia Criteria, 391-2000-013, 11/97.
☐	Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers, 391-2000-014, 4/2008.
☒	Implementation Guidance Total Residual Chlorine (TRC) Regulation, 391-2000-015, 11/1994.
☐	Implementation Guidance for Temperature Criteria, 391-2000-017, 4/09.
☒	Implementation Guidance for Section 95.9 Phosphorus Discharges to Free Flowing Streams, 391-2000-018, 10/97.
☐	Implementation Guidance for Application of Section 93.5(e) for Potable Water Supply Protection Total Dissolved Solids, Nitrite-Nitrate, Non-Priority Pollutant Phenolics and Fluorides, 391-2000-019, 10/97.
☐	Field Data Collection and Evaluation Protocol for Determining Stream and Point Source Discharge Design Hardness, 391-2000-021, 3/99.
☐	Implementation Guidance for the Determination and Use of Background/Ambient Water Quality in the Determination of Wasteload Allocations and NPDES Effluent Limitations for Toxic Substances, 391-2000-022, 3/1999.
☒	Design Stream Flows, 391-2000-023, 9/98.
☐	Field Data Collection and Evaluation Protocol for Deriving Daily and Hourly Discharge Coefficients of Variation (CV) and Other Discharge Characteristics, 391-2000-024, 10/98.
☐	Evaluations of Phosphorus Discharges to Lakes, Ponds and Impoundments, 391-3200-013, 6/97.
☒	Pennsylvania's Chesapeake Bay Tributary Strategy Implementation Plan for NPDES Permitting, 4/07.
☒	SOP: WETT, Establishing Effluent Limitations for Individual Sewage Permits
☐	Other:

9. Attachment

A. Topographical Map



B. WQM Model Results

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
07D	9361	SWATARA CREEK

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)
14.600	Derry Clearwatr	PA0026484	5.020	CBOD5	20.63		
				NH3-N	6.51	13.02	
				Dissolved Oxygen			5

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)
10.100	Suez Water	PA001464	0.250	CBOD5	25		
				NH3-N	16.39	32.78	
				Dissolved Oxygen			5

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)
9.100	Swatara Twp	PA0026735	6.300	CBOD5	20.26		
				NH3-N	7.74	15.48	
				Dissolved Oxygen			5

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)
4.600	Derry SW	PA0082393	0.600	CBOD5	25		
				NH3-N	25	50	
				Dissolved Oxygen			5

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
07D	9361	SWATARA CREEK	4.600	289.00	557.00	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	0.140	0.00	0.00	0.000	0.000	0.0	0.00	0.00	23.00	8.00	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
Derry SW	PA0082393	0.6000	0.6000	0.6000	0.000	25.00	6.90

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	5.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
07D	9361	SWATARA CREEK	**2.300**	277.00	569.00	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	0.140	0.00	0.00	0.000	0.000	0.0	0.00	0.00	23.00	8.00	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	0.00	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
07D	9361	SWATARA CREEK

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												
14.600	70.70	0.00	70.70	7.7659	0.00029	1.103	153.08	138.73	0.46	0.592	23.20	7.92
10.100	73.64	0.00	73.64	8.1527	0.00114	1.08	148.85	137.88	0.51	0.120	23.18	7.86
9.100	76.86	0.00	76.86	17.8988	0.00067	1.096	161.96	147.71	0.53	0.515	23.36	7.60
4.600	77.98	0.00	77.98	18.827	0.00099	1.092	161.14	147.62	0.55	0.255	23.37	7.58
Q1-10 Flow												
14.600	62.92	0.00	62.92	7.7659	0.00029	NA	NA	NA	0.44	0.628	23.22	7.91
10.100	65.54	0.00	65.54	8.1527	0.00114	NA	NA	NA	0.48	0.127	23.20	7.84
9.100	68.41	0.00	68.41	17.8988	0.00067	NA	NA	NA	0.51	0.543	23.39	7.57
4.600	69.40	0.00	69.40	18.827	0.00099	NA	NA	NA	0.52	0.269	23.40	7.56
Q30-10 Flow												
14.600	86.96	0.00	86.96	7.7659	0.00029	NA	NA	NA	0.52	0.533	23.16	7.93
10.100	90.58	0.00	90.58	8.1527	0.00114	NA	NA	NA	0.57	0.108	23.15	7.88
9.100	94.54	0.00	94.54	17.8988	0.00067	NA	NA	NA	0.59	0.468	23.30	7.64
4.600	95.92	0.00	95.92	18.827	0.00099	NA	NA	NA	0.61	0.232	23.31	7.63

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	0.89	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.23	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
07D	9361	SWATARA CREEK

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
14.600	Derry Clearwatr	3.55	32.35	3.55	28.63	3	11
10.100	Suez Water	3.6	50	4	44.26	3	11
9.100	Swatara Twp	5.93	47.55	6.24	42.09	3	11
4.600	Derry SW	3.41	50	6.37	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
14.600	Derry Clearwatr	.7	8.54	.7	6.51	3	24
10.100	Suez Water	.7	25	.75	19.05	3	24
9.100	Swatara Twp	.95	10.16	.98	7.74	3	24
4.600	Derry SW	.68	25	1	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)		
14.60	Derry Clearwatr	25	20.63	6.51	6.51	5	5	3	10
10.10	Suez Water	25	25	19.05	16.39	5	5	3	10
9.10	Swatara Twp	25	20.26	7.74	7.74	5	5	3	10
4.60	Derry SW	25	25	25	25	5	5	0	0

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
07D	9361	SWATARA CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
14.600	5.020	23.198	7.916
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
153.076	1.103	138.733	0.465
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
3.84	0.528	0.64	0.895
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
7.922	0.689	Tsivoglou	5
Reach Travel Time (days)			
0.592			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.059	3.71	0.61	7.60
0.118	3.58	0.58	7.31
0.178	3.45	0.55	7.04
0.237	3.33	0.52	6.80
0.296	3.21	0.49	6.58
0.355	3.09	0.47	6.38
0.414	2.98	0.44	6.20
0.474	2.88	0.42	6.04
0.533	2.77	0.40	5.89
0.592	2.68	0.38	5.77

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
10.100	5.270	23.176	7.857
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
148.849	1.080	137.885	0.509
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
2.76	0.416	0.44	0.894
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
5.851	2.909	Tsivoglou	5
Reach Travel Time (days)			
0.120			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.012	2.74	0.44	5.90
0.024	2.73	0.43	5.95
0.036	2.71	0.43	6.00
0.048	2.69	0.42	6.05
0.060	2.68	0.42	6.09
0.072	2.66	0.41	6.14
0.084	2.65	0.41	6.18
0.096	2.63	0.40	6.22
0.108	2.62	0.40	6.27
0.120	2.60	0.40	6.31

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
07D	9361	SWATARA CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
9.100	11.570	23.357	7.597
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
161.955	1.096	147.709	0.534
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
4.40	0.665	1.14	0.906
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
6.238	1.815	Tsivoglou	5
Reach Travel Time (days)			
0.515			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.052	4.23	1.09	5.98
0.103	4.06	1.04	5.76
0.155	3.90	0.99	5.58
0.206	3.75	0.94	5.44
0.258	3.60	0.90	5.32
0.309	3.46	0.86	5.23
0.361	3.32	0.82	5.17
0.412	3.19	0.78	5.13
0.464	3.07	0.75	5.11
0.515	2.95	0.71	5.10

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
4.600	12.170	23.369	7.584
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
161.138	1.092	147.620	0.550
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
3.15	0.560	0.94	0.907
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
5.133	2.748	Tsivoglou	5
Reach Travel Time (days)			
0.255			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.026	3.10	0.92	5.20
0.051	3.05	0.90	5.26
0.077	3.00	0.88	5.33
0.102	2.95	0.86	5.39
0.128	2.90	0.84	5.45
0.153	2.85	0.82	5.51
0.179	2.80	0.80	5.57
0.204	2.76	0.78	5.63
0.230	2.71	0.76	5.69
0.255	2.66	0.74	5.74

C. Toxics Management Spreadsheet

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.3, March 2021

Discharge Information

Instructions | Discharge | Stream

Facility: **Swatara Twp Authority** NPDES Permit No.: **PA0026735** Outfall No.: **001**

Evaluation Type: **Major Sewage / Industrial Waste** Wastewater Description: **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
6.3	151	6.9						

					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		452									
	Chloride (PWS)	mg/L		107									
	Bromide	mg/L		0.2									
	Sulfate (PWS)	mg/L		35.9									
	Fluoride (PWS)	mg/L											
Group 2	Total Aluminum	µg/L		5									
	Total Antimony	µg/L	<	0.4									
	Total Arsenic	µg/L	<	1									
	Total Barium	µg/L		56									
	Total Beryllium	µg/L	<	0.4									
	Total Boron	µg/L		145									
	Total Cadmium	µg/L	<	0.08									
	Total Chromium (III)	µg/L	<	1									
	Hexavalent Chromium	µg/L	<	0.1									
	Total Cobalt	µg/L	<	1									
	Total Copper	µg/L		2									
	Free Cyanide	µg/L		5									
	Total Cyanide	µg/L		18									
	Dissolved Iron	µg/L		25									
	Total Iron	µg/L		54									
	Total Lead	µg/L	<	1									
	Total Manganese	µg/L		37									
	Total Mercury	µg/L	<	0.2									
	Total Nickel	µg/L		2									
	Total Phenols (Phenolics) (PWS)	µg/L		22									
	Total Selenium	µg/L	<	2									
	Total Silver	µg/L		0.06									
	Total Thallium	µg/L	<	0.4									
	Total Zinc	µg/L		85									
	Total Molybdenum	µg/L	<	1									
	Acrolein	µg/L	<	1									
	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		1.4									
	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		0.2									
	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	<	0.091									
	2,4-Dichlorophenol	µg/L	<	0.082									
	2,4-Dimethylphenol	µg/L	<	0.437									
	4,6-Dinitro-o-Cresol	µg/L	<	0.118									
	2,4-Dinitrophenol	µg/L	<	3									
	2-Nitrophenol	µg/L	<	0.051									
	4-Nitrophenol	µg/L	<	0.0486									
	p-Chloro-m-Cresol	µg/L	<	0.099									
	Pentachlorophenol	µg/L	<	0.104									
	Phenol	µg/L	<	0.099									
	2,4,6-Trichlorophenol	µg/L	<	0.099									
Group 5	Acenaphthene	µg/L	<	0.103									
	Acenaphthylene	µg/L	<	0.091									
	Anthracene	µg/L	<	0.091									
	Benzidine	µg/L	<	5									
	Benzo(a)Anthracene	µg/L	<	0.24									
	Benzo(a)Pyrene	µg/L	<	0.072									
	3,4-Benzofluoranthene	µg/L	<	0.049									
	Benzo(ghi)Perylene	µg/L	<	0.082									
	Benzo(k)Fluoranthene	µg/L	<	0.083									
	Bis(2-Chloroethoxy)Methane	µg/L	<	0.085									
	Bis(2-Chloroethyl)Ether	µg/L	<	0.078									
	Bis(2-Chloroisopropyl)Ether	µg/L	<	0.089									
	Bis(2-Ethylhexyl)Phthalate	µg/L	<	1.18									
	4-Bromophenyl Phenyl Ether	µg/L	<	0.108									
	Butyl Benzyl Phthalate	µg/L	<	0.066									
	2-Chloronaphthalene	µg/L	<	0.091									
	4-Chlorophenyl Phenyl Ether	µg/L	<	0.095									
	Chrysene	µg/L		0.22									
	Dibenzo(a,h)Anthrancene	µg/L	<	0.053									
	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	<	0.0139									
	Diethyl Phthalate	µg/L	<	0.117									
	Dimethyl Phthalate	µg/L	<	0.091									
	Di-n-Butyl Phthalate	µg/L		0.86									
	2,4-Dinitrotoluene	µg/L	<	0.084									

	2,6-Dinitrotoluene	µg/L	<	0.11									
	Di-n-Octyl Phthalate	µg/L	<	0.076									
	1,2-Diphenylhydrazine	µg/L	<	0.118									
	Fluoranthene	µg/L	<	0.089									
	Fluorene	µg/L	<	0.108									
	Hexachlorobenzene	µg/L	<	0.088									
	Hexachlorobutadiene	µg/L	<	0.082									
	Hexachlorocyclopentadiene	µg/L	<	0.045									
	Hexachloroethane	µg/L	<	0.069									
	Indeno(1,2,3-cd)Pyrene	µg/L	<	0.058									
	Isophorone	µg/L		0.257									
	Naphthalene	µg/L	<	0.064									
	Nitrobenzene	µg/L	<	0.062									
	n-Nitrosodimethylamine	µg/L	<	0.066									
	n-Nitrosodi-n-Propylamine	µg/L	<	0.092									
	n-Nitrosodiphenylamine	µg/L	<	0.21									
	Phenanthrene	µg/L	<	0.099									
	Pyrene	µg/L	<	0.092									
	1,2,4-Trichlorobenzene	µg/L	<	0.093									
Group 6	Aldrin	µg/L	<										
	alpha-BHC	µg/L	<										
	beta-BHC	µg/L	<										
	gamma-BHC	µg/L	<										
	delta BHC	µg/L	<										
	Chlordane	µg/L	<										
	4,4-DDT	µg/L	<										
	4,4-DDE	µg/L	<										
	4,4-DDD	µg/L	<										
	Dieldrin	µg/L	<										
	alpha-Endosulfan	µg/L	<										
	beta-Endosulfan	µg/L	<										
	Endosulfan Sulfate	µg/L	<										
	Endrin	µg/L	<										
	Endrin Aldehyde	µg/L	<										
	Heptachlor	µg/L	<										
	Heptachlor Epoxide	µg/L	<										
	PCB-1016	µg/L	<										
	PCB-1221	µg/L	<										
	PCB-1232	µg/L	<										
	PCB-1242	µg/L	<										
	PCB-1248	µg/L	<										
	PCB-1254	µg/L	<										
	PCB-1260	µg/L	<										
	PCBs, Total	µg/L	<										
	Toxaphene	µg/L	<										
	2,3,7,8-TCDD	ng/L	<										
Group 7	Gross Alpha	pCi/L											
	Total Beta	pCi/L	<										
	Radium 226/228	pCi/L	<										
	Total Strontium	µg/L	<										
	Total Uranium	µg/L	<										
	Osmotic Pressure	mOs/kg											

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.3, March 2021

Stream / Surface Water Information

Swatara Twp Authority, NPDES Permit No. PA0026735, Outfall 001

Instructions | Discharge | *Stream*

Receiving Surface Water Name: **Susquehanna River**

No. Reaches to Model: 1

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

Location	Stream Code*	RMI*	Elevation (ft)*	DA (mi²)*	Slope (ft/ft)	PWS Withdrawal (MGD)	Apply Fish Criteria*
Point of Discharge	009361	9.1	305	549			Yes
End of Reach 1	009361	4.6	289	557			Yes

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

Location	RMI	LFY (cfs/mi²)*	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	9.1	0.14	807.35									149	8		
End of Reach 1	4.6	0.14	807.38												

Q_h

Location	RMI	LFY (cfs/mi²)	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	9.1														
End of Reach 1	4.6														

Model Results

Swatara Twp Authority, NPDES Permit No. PA0026735, Outfall 001

Instructions | Results | RETURN TO INPUTS | SAVE AS PDF | PRINT | (●) All ( ) Inputs ( ) Results ( ) Limits

☑ ***Hydrodynamics***

Q_{7-10}

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)
9.1	807.35		807.35	9.746	0.00067	1.073	427.233	398.345	1.783	0.154	8474.031
4.6	807.38		807.38								

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)
9.1	2580.84		2580.84	9.746	0.00067	1.782	427.233	239.753	3.403	0.081	4022.504
4.6	2580.923		2580.92								

☑ ***Wasteload Allocations***

☑ ***AFC*** CCT (min): 15 PMF: 0.042 Analysis Hardness (mg/l): 149.45 Analysis pH: 7.45

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	750	750	3,364	
Total Antimony	0	0		0	1,100	1,100	4,934	
Total Arsenic	0	0		0	340	340	1,525	Chem Translator of 1 applied
Total Barium	0	0		0	21,000	21,000	94,190	
Total Boron	0	0		0	8,100	8,100	36,330	
Total Cadmium	0	0		0	2.976	3.21	14.4	Chem Translator of 0.927 applied
Total Chromium (III)	0	0		0	791.766	2,506	11,238	Chem Translator of 0.316 applied
Hexavalent Chromium	0	0		0	16	16.3	73.1	Chem Translator of 0.982 applied
Total Cobalt	0	0		0	95	95.0	426	
Total Copper	0	0		0	19.623	20.4	91.7	Chem Translator of 0.96 applied
Free Cyanide	0	0		0	22	22.0	98.7	

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	99.731	136	611	Chem Translator of 0.732 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	1.400	1.65	7.39	Chem Translator of 0.85 applied
Total Nickel	0	0		0	657.776	659	2,956	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	6.420	7.55	33.9	Chem Translator of 0.85 applied
Total Thallium	0	0		0	65	65.0	292	
Total Zinc	0	0		0	164.701	168	755	Chem Translator of 0.978 applied
Acrolein	0	0		0	3	3.0	13.5	
Acrylonitrile	0	0		0	650	650	2,915	
Benzene	0	0		0	640	640	2,871	
Bromoform	0	0		0	1,800	1,800	8,073	
Carbon Tetrachloride	0	0		0	2,800	2,800	12,559	
Chlorobenzene	0	0		0	1,200	1,200	5,382	
Chlorodibromomethane	0	0		0	N/A	N/A	N/A	
2-Chloroethyl Vinyl Ether	0	0		0	18,000	18,000	80,734	
Chloroform	0	0		0	1,900	1,900	8,522	
Dichlorobromomethane	0	0		0	N/A	N/A	N/A	
1,2-Dichloroethane	0	0		0	15,000	15,000	67,278	
1,1-Dichloroethylene	0	0		0	7,500	7,500	33,639	
1,2-Dichloropropane	0	0		0	11,000	11,000	49,338	
1,3-Dichloropropylene	0	0		0	310	310	1,390	
Ethylbenzene	0	0		0	2,900	2,900	13,007	
Methyl Bromide	0	0		0	550	550	2,467	
Methyl Chloride	0	0		0	28,000	28,000	125,586	
Methylene Chloride	0	0		0	12,000	12,000	53,823	
1,1,2,2-Tetrachloroethane	0	0		0	1,000	1,000	4,485	
Tetrachloroethylene	0	0		0	700	700	3,140	
Toluene	0	0		0	1,700	1,700	7,625	
1,2-trans-Dichloroethylene	0	0		0	6,800	6,800	30,500	
1,1,1-Trichloroethane	0	0		0	3,000	3,000	13,456	
1,1,2-Trichloroethane	0	0		0	3,400	3,400	15,250	
Trichloroethylene	0	0		0	2,300	2,300	10,316	
Vinyl Chloride	0	0		0	N/A	N/A	N/A	
2-Chlorophenol	0	0		0	560	560	2,512	
2,4-Dichlorophenol	0	0		0	1,700	1,700	7,625	
2,4-Dimethylphenol	0	0		0	660	660	2,960	
4,6-Dinitro-o-Cresol	0	0		0	80	80.0	359	
2,4-Dinitrophenol	0	0		0	660	660	2,960	
2-Nitrophenol	0	0		0	8,000	8,000	35,882	
4-Nitrophenol	0	0		0	2,300	2,300	10,316	
p-Chloro-m-Cresol	0	0		0	160	160	718	
Pentachlorophenol	0	0		0	13.652	13.7	61.2	
Phenol	0	0		0	N/A	N/A	N/A	
2,4,6-Trichlorophenol	0	0		0	460	460	2,063	

Acenaphthene	0	0		0	83	83.0	372	
Anthracene	0	0		0	N/A	N/A	N/A	
Benzidine	0	0		0	300	300	1,346	
Benzo(a)Anthracene	0	0		0	0.5	0.5	2.24	
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	134,557	
Bis(2-Chloroisopropyl)Ether	0	0		0	N/A	N/A	N/A	
Bis(2-Ethylhexyl)Phthalate	0	0		0	4,500	4,500	20,184	
4-Bromophenyl Phenyl Ether	0	0		0	270	270	1,211	
Butyl Benzyl Phthalate	0	0		0	140	140	628	
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	3,678	
1,3-Dichlorobenzene	0	0		0	350	350	1,570	
1,4-Dichlorobenzene	0	0		0	730	730	3,274	
3,3-Dichlorobenzidine	0	0		0	N/A	N/A	N/A	
Diethyl Phthalate	0	0		0	4,000	4,000	17,941	
Dimethyl Phthalate	0	0		0	2,500	2,500	11,213	
Di-n-Butyl Phthalate	0	0		0	110	110	493	
2,4-Dinitrotoluene	0	0		0	1,600	1,600	7,176	
2,6-Dinitrotoluene	0	0		0	990	990	4,440	
1,2-Diphenylhydrazine	0	0		0	15	15.0	67.3	
Fluoranthene	0	0		0	200	200	897	
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	44.9	
Hexachlorocyclopentadiene	0	0		0	5	5.0	22.4	
Hexachloroethane	0	0		0	60	60.0	269	
Indeno(1,2,3-cd)Pyrene	0	0		0	N/A	N/A	N/A	
Isophorone	0	0		0	10,000	10,000	44,852	
Naphthalene	0	0		0	140	140	628	
Nitrobenzene	0	0		0	4,000	4,000	17,941	
n-Nitrosodimethylamine	0	0		0	17,000	17,000	76,249	
n-Nitrosodi-n-Propylamine	0	0		0	N/A	N/A	N/A	
n-Nitrosodiphenylamine	0	0		0	300	300	1,346	
Phenanthrene	0	0		0	5	5.0	22.4	
Pyrene	0	0		0	N/A	N/A	N/A	
1,2,4-Trichlorobenzene	0	0		0	130	130	583	

☑ ***CFC*** CCT (min): 720 PMF: 0.291 Analysis Hardness (mg/l): 149.08 Analysis pH: 7.84

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

Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	220	220	5,532	
Total Arsenic	0	0		0	150	150	3,772	Chem Translator of 1 applied
Total Barium	0	0		0	4,100	4,100	103,100	
Total Boron	0	0		0	1,600	1,600	40,234	
Total Cadmium	0	0		0	0.325	0.36	9.15	Chem Translator of 0.892 applied
Total Chromium (III)	0	0		0	102.786	120	3,005	Chem Translator of 0.86 applied
Hexavalent Chromium	0	0		0	10	10.4	261	Chem Translator of 0.962 applied
Total Cobalt	0	0		0	19	19.0	478	
Total Copper	0	0		0	12.598	13.1	330	Chem Translator of 0.96 applied
Free Cyanide	0	0		0	5.2	5.2	131	
Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	1,500	1,500	125,757	WQC = 30 day average; PMF = 1
Total Lead	0	0		0	3.876	5.29	133	Chem Translator of 0.733 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	0.770	0.91	22.8	Chem Translator of 0.85 applied
Total Nickel	0	0		0	72.907	73.1	1,839	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	125	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	327	
Total Zinc	0	0		0	165.703	168	4,226	Chem Translator of 0.986 applied
Acrolein	0	0		0	3	3.0	75.4	
Acrylonitrile	0	0		0	130	130	3,269	
Benzene	0	0		0	130	130	3,269	
Bromoform	0	0		0	370	370	9,304	
Carbon Tetrachloride	0	0		0	560	560	14,082	
Chlorobenzene	0	0		0	240	240	6,035	
Chlorodibromomethane	0	0		0	N/A	N/A	N/A	
2-Chloroethyl Vinyl Ether	0	0		0	3,500	3,500	88,012	
Chloroform	0	0		0	390	390	9,807	
Dichlorobromomethane	0	0		0	N/A	N/A	N/A	
1,2-Dichloroethane	0	0		0	3,100	3,100	77,954	
1,1-Dichloroethylene	0	0		0	1,500	1,500	37,720	
1,2-Dichloropropane	0	0		0	2,200	2,200	55,322	
1,3-Dichloropropylene	0	0		0	61	61.0	1,534	
Ethylbenzene	0	0		0	580	580	14,585	
Methyl Bromide	0	0		0	110	110	2,766	
Methyl Chloride	0	0		0	5,500	5,500	138,305	
Methylene Chloride	0	0		0	2,400	2,400	60,351	
1,1,2,2-Tetrachloroethane	0	0		0	210	210	5,281	
Tetrachloroethylene	0	0		0	140	140	3,520	
Toluene	0	0		0	330	330	8,298	

1,2-trans-Dichloroethylene	0	0		0	1,400	1,400	35,205	
1,1,1-Trichloroethane	0	0		0	610	610	15,339	
1,1,2-Trichloroethane	0	0		0	680	680	17,100	
Trichloroethylene	0	0		0	450	450	11,316	
Vinyl Chloride	0	0		0	N/A	N/A	N/A	
2-Chlorophenol	0	0		0	110	110	2,766	
2,4-Dichlorophenol	0	0		0	340	340	8,550	
2,4-Dimethylphenol	0	0		0	130	130	3,269	
4,6-Dinitro-o-Cresol	0	0		0	16	16.0	402	
2,4-Dinitrophenol	0	0		0	130	130	3,269	
2-Nitrophenol	0	0		0	1,600	1,600	40,234	
4-Nitrophenol	0	0		0	470	470	11,819	
p-Chloro-m-Cresol	0	0		0	500	500	12,573	
Pentachlorophenol	0	0		0	10.474	10.5	263	
Phenol	0	0		0	N/A	N/A	N/A	
2,4,6-Trichlorophenol	0	0		0	91	91.0	2,288	
Acenaphthene	0	0		0	17	17.0	427	
Anthracene	0	0		0	N/A	N/A	N/A	
Benzidine	0	0		0	59	59.0	1,484	
Benzo(a)Anthracene	0	0		0	0.1	0.1	2.51	
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	150,878	
Bis(2-Chloroisopropyl)Ether	0	0		0	N/A	N/A	N/A	
Bis(2-Ethylhexyl)Phthalate	0	0		0	910	910	22,883	
4-Bromophenyl Phenyl Ether	0	0		0	54	54.0	1,358	
Butyl Benzyl Phthalate	0	0		0	35	35.0	880	
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	4,023	
1,3-Dichlorobenzene	0	0		0	69	69.0	1,735	
1,4-Dichlorobenzene	0	0		0	150	150	3,772	
3,3-Dichlorobenzidine	0	0		0	N/A	N/A	N/A	
Diethyl Phthalate	0	0		0	800	800	20,117	
Dimethyl Phthalate	0	0		0	500	500	12,573	
Di-n-Butyl Phthalate	0	0		0	21	21.0	528	
2,4-Dinitrotoluene	0	0		0	320	320	8,047	
2,6-Dinitrotoluene	0	0		0	200	200	5,029	
1,2-Diphenylhydrazine	0	0		0	3	3.0	75.4	
Fluoranthene	0	0		0	40	40.0	1,006	
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	50.3	

Hexachlorocyclopentadiene	0	0		0	1	1.0	25.1	
Hexachloroethane	0	0		0	12	12.0	302	
Indeno(1,2,3-cd)Pyrene	0	0		0	N/A	N/A	N/A	
Isophorone	0	0		0	2,100	2,100	52,807	
Naphthalene	0	0		0	43	43.0	1,081	
Nitrobenzene	0	0		0	810	810	20,369	
n-Nitrosodimethylamine	0	0		0	3,400	3,400	85,498	
n-Nitrosodi-n-Propylamine	0	0		0	N/A	N/A	N/A	
n-Nitrosodiphenylamine	0	0		0	59	59.0	1,484	
Phenanthrene	0	0		0	1	1.0	25.1	
Pyrene	0	0		0	N/A	N/A	N/A	
1,2,4-Trichlorobenzene	0	0		0	26	26.0	654	

☑ ***THH*** CCT (min): 720 PMF: 0.291 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	500,000	500,000	N/A	
Chloride (PWS)	0	0		0	250,000	250,000	N/A	
Sulfate (PWS)	0	0		0	250,000	250,000	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	5.6	5.6	141	
Total Arsenic	0	0		0	10	10.0	251	
Total Barium	0	0		0	2,400	2,400	60,351	
Total Boron	0	0		0	3,100	3,100	77,954	
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	101	
Dissolved Iron	0	0		0	300	300	7,544	
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	25,146	
Total Mercury	0	0		0	0.050	0.05	1.26	
Total Nickel	0	0		0	610	610	15,339	
Total Phenols (Phenolics) (PWS)	0	0		0	5	5.0	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	0.24	0.24	6.04	
Total Zinc	0	0		0	N/A	N/A	N/A	
Acrolein	0	0		0	3	3.0	75.4	
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	2,515	
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	830	
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	1,710	
Methyl Bromide	0	0		0	100	100.0	2,515	
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	1,433	
1,2-trans-Dichloroethylene	0	0		0	100	100.0	2,515	
1,1,1-Trichloroethane	0	0		0	10,000	10,000	251,464	
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	754	
2,4-Dichlorophenol	0	0		0	10	10.0	251	
2,4-Dimethylphenol	0	0		0	100	100.0	2,515	
4,6-Dinitro-o-Cresol	0	0		0	2	2.0	50.3	
2,4-Dinitrophenol	0	0		0	10	10.0	251	
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	100,586	
2,4,6-Trichlorophenol	0	0		0	N/A	N/A	N/A	
Acenaphthene	0	0		0	70	70.0	1,760	
Anthracene	0	0		0	300	300	7,544	
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	5,029	
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	2.51	
2-Chloronaphthalene	0	0		0	800	800	20,117	
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	25,146	
1,3-Dichlorobenzene	0	0		0	7	7.0	176	
1,4-Dichlorobenzene	0	0		0	300	300	7,544	
3,3-Dichlorobenzidine	0	0		0	N/A	N/A	N/A	
Diethyl Phthalate	0	0		0	600	600	15,088	
Dimethyl Phthalate	0	0		0	2,000	2,000	50,293	
Di-n-Butyl Phthalate	0	0		0	20	20.0	503	
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	503	
Fluorene	0	0		0	50	50.0	1,257	
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	101	
Hexachloroethane	0	0		0	N/A	N/A	N/A	
Indeno(1,2,3-cd)Pyrene	0	0		0	N/A	N/A	N/A	
Isophorone	0	0		0	34	34.0	855	
Naphthalene	0	0		0	N/A	N/A	N/A	
Nitrobenzene	0	0		0	10	10.0	251	
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	503	
1,2,4-Trichlorobenzene	0	0		0	0.07	0.07	1.76	

☑ ***CRL*** CCT (min): 720 PMF: 0.423 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Total 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	6.78	
Benzene	0	0		0	0.58	0.58	65.6	
Bromoform	0	0		0	7	7.0	791	
Carbon Tetrachloride	0	0		0	0.4	0.4	45.2	
Chlorobenzene	0	0		0	N/A	N/A	N/A	
Chlorodibromomethane	0	0		0	0.8	0.8	90.4	
2-Chloroethyl Vinyl Ether	0	0		0	N/A	N/A	N/A	
Chloroform	0	0		0	5.7	5.7	644	
Dichlorobromomethane	0	0		0	0.95	0.95	107	
1,2-Dichloroethane	0	0		0	9.9	9.9	1,119	
1,1-Dichloroethylene	0	0		0	N/A	N/A	N/A	
1,2-Dichloropropane	0	0		0	0.9	0.9	102	
1,3-Dichloropropylene	0	0		0	0.27	0.27	30.5	
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	2,261	
1,1,2,2-Tetrachloroethane	0	0		0	0.2	0.2	22.6	
Tetrachloroethylene	0	0		0	10	10.0	1,130	
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	62.2	
Trichloroethylene	0	0		0	0.6	0.6	67.8	
Vinyl Chloride	0	0		0	0.02	0.02	2.26	
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	3.39	
Phenol	0	0		0	N/A	N/A	N/A	
2,4,6-Trichlorophenol	0	0		0	1.5	1.5	170	
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	0.011	
Benzo(a)Anthracene	0	0		0	0.001	0.001	0.11	
Benzo(a)Pyrene	0	0		0	0.0001	0.0001	0.011	
3,4-Benzofluoranthene	0	0		0	0.001	0.001	0.11	
Benzo(k)Fluoranthene	0	0		0	0.01	0.01	1.13	
Bis(2-Chloroethyl)Ether	0	0		0	0.03	0.03	3.39	
Bis(2-Chloroisopropyl)Ether	0	0		0	N/A	N/A	N/A	
Bis(2-Ethylhexyl)Phthalate	0	0		0	0.32	0.32	36.2	
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	13.6	
Dibenzo(a,h)Anthrancene	0	0		0	0.0001	0.0001	0.011	
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	5.65	
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	5.65	
2,6-Dinitrotoluene	0	0		0	0.05	0.05	5.65	
1,2-Diphenylhydrazine	0	0		0	0.03	0.03	3.39	
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	0.009	
Hexachlorobutadiene	0	0		0	0.01	0.01	1.13	
Hexachlorocyclopentadiene	0	0		0	N/A	N/A	N/A	
Hexachloroethane	0	0		0	0.1	0.1	11.3	
Indeno(1,2,3-cd)Pyrene	0	0		0	0.001	0.001	0.11	
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	0.079	
n-Nitrosodi-n-Propylamine	0	0		0	0.005	0.005	0.57	
n-Nitrosodiphenylamine	0	0		0	3.3	3.3	373	

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

	Mass Limits		*Concentration Limits*						
Pollutants	AML (lbs/day)	MDL (lbs/day)	AML	MDL	IMAX	Units	Governing WQBEL	WQBEL Basis	Comments
Total Zinc	Report	Report	Report	Report	Report	µg/L	484	AFC	Discharge Conc > 10% WQBEL (no RP)

D. TRC Calculations

TRC EVALUATION

Input appropriate values in A3:A9 and D3:D9

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

Source	Reference	AFC Calculations	Reference	CFC Calculations
TRC	1.3.2.iii	WLA afc = 2.535	1.3.2.iii	WLA cfc = 2.464
PENTOXSD TRG	5.1a	LTAMULT afc = 0.373	5.1c	LTAMULT cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc= 0.944	5.1d	LTA_cfc = 1.432

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

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

E. WETT Test Results

DEP Whole Effluent Toxicity (WET) Analysis Spreadsheet

Type of Test	Chronic
Species Tested	Ceriodaphnia
Endpoint	Survival
TIWC (decimal)	0.12
No. Per Replicate	1
T ST b value	0.75
T ST alpha value	0.2

Facility Name: Swatara Township Authority

Permit No.: PA0026735

Test Completion Date: 10/2/2017

Replicate No.	Control	TIWC
1	1	1
2	1	1
3	1	1
4	1	1
5	1	1
6	1	1
7	1	1
8	1	1
9	1	1
10	1	1
11		
12		
13		
14		
15		
Mean	1.000	1.000
Std Dev.	0.000	0.000
# Replicates	10	10

T-Test Result
Deg. of Freedom
Critical T Value
Pass or Fail: PASS

Test Completion Date: 9/19/2018

Replicate No.	Control	TIWC
1	1	1
2	1	1
3	1	1
4	1	1
5	1	1
6	1	1
7	1	1
8	1	1
9	1	1
10	1	1
11		
12		
13		
14		
15		
Mean	1.000	1.000
Std Dev.	0.000	0.000
# Replicates	10	10

T-Test Result
Deg. of Freedom
Critical T Value
Pass or Fail: PASS

Test Completion Date: 9/16/2019

Replicate No.	Control	TIWC
1	1	1
2	1	1
3	1	1
4	1	1
5	0	1
6	1	1
7	1	1
8	1	1
9	1	1
10	1	1
11		
12		
13		
14		
15		
Mean	0.900	1.000
Std Dev.	0.316	0.000
# Replicates	10	10

T-Test Result: 4.3333
Deg. of Freedom: 9
Critical T Value: 0.8834
Pass or Fail: PASS

Test Completion Date: 10/6/2020

Replicate No.	Control	TIWC
1	1	1
2	1	1
3	1	1
4	1	1
5	1	1
6	1	1
7	1	1
8	1	1
9	1	1
10	1	1
11		
12		
13		
14		
15		
Mean	1.000	1.000
Std Dev.	0.000	0.000
# Replicates	10	10

T-Test Result
Deg. of Freedom
Critical T Value
Pass or Fail: PASS

DEP Whole Effluent Toxicity (WET) Analysis Spreadsheet

Type of Test	Chronic
Species Tested	Ceriodaphnia
Endpoint	Reproduction
TIWC (decimal)	0.12
No. Per Replicate	1
TST b value	0.75
TST alpha value	0.2

Facility Name: Swatara Township Authority

Permit No.: PA0026735

Replicate No.	Test Completion Date 10/2/2017 Control	TIWC
1	23	22
2	29	12
3	24	27
4	21	26
5	28	27
6	21	24
7	24	30
8	28	26
9	29	29
10	10	25
11		
12		
13		
14		
15		
Mean	23.700	24.800
Std Dev.	5.736	5.051
# Replicates	10	10
T-Test Result	3.3484	
Deg. of Freedom	17	
Critical T Value	0.8633	
Pass or Fail	PASS	

Replicate No.	Test Completion Date 9/19/2018 Control	TIWC
1	29	31
2	33	14
3	24	34
4	26	31
5	23	41
6	27	28
7	29	31
8	22	25
9	37	36
10	32	29
11		
12		
13		
14		
15		
Mean	28.200	30.000
Std Dev.	4.780	7.165
# Replicates	10	10
T-Test Result	3.4933	
Deg. of Freedom	14	
Critical T Value	0.8681	
Pass or Fail	PASS	

Replicate No.	Test Completion Date 9/17/2019 Control	TIWC
1	33	38
2	5	34
3	40	25
4	29	40
5	15	32
6	36	29
7	35	36
8	35	37
9	38	39
10	43	35
11		
12		
13		
14		
15		
Mean	30.900	34.500
Std Dev.	11.883	4.696
# Replicates	10	10
T-Test Result	3.5549	
Deg. of Freedom	17	
Critical T Value	0.8633	
Pass or Fail	PASS	

Replicate No.	Test Completion Date 10/6/2020 Control	TIWC
1	32	28
2	27	28
3	25	26
4	33	12
5	15	30
6	26	27
7	24	31
8	28	32
9	36	32
10	25	32
11		
12		
13		
14		
15		
Mean	27.100	27.800
Std Dev.	5.820	5.978
# Replicates	10	10
T-Test Result	3.1935	
Deg. of Freedom	16	
Critical T Value	0.8647	
Pass or Fail	PASS	

DEP Whole Effluent Toxicity (WET) Analysis Spreadsheet

Type of Test	Chronic
Species Tested	Pimephales
Endpoint	Survival
TWC (decimal)	0.12
No. Per Replicate	10
TST b value	0.75
TST alpha value	0.25

Facility Name: Swatara Township Authority

Permit No.: PA0026735

Test Completion Date: 10/3/2017

Replicate No.	Control	TWC
1	10	10
2	8	10
3	8	10
4	8	9
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	8.500	9.750
Std Dev.	1.000	0.500
# Replicates	4	4
T-Test Result	6.8914	
Deg. of Freedom	5	
Critical T Value	0.7267	
Pass or Fail	PASS	

Test Completion Date: 9/20/2018

Replicate No.	Control	TWC
1	10	8
2	10	9
3	10	10
4	9	7
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	9.750	8.500
Std Dev.	0.500	1.291
# Replicates	4	4
T-Test Result	1.6827	
Deg. of Freedom	4	
Critical T Value	0.7407	
Pass or Fail	PASS	

Test Completion Date: 9/17/2019

Replicate No.	Control	TWC
1	10	10
2	10	10
3	10	10
4	10	9
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	10.000	9.750
Std Dev.	0.000	0.500
# Replicates	4	4
T-Test Result	7.6643	
Deg. of Freedom	3	
Critical T Value	0.7649	
Pass or Fail	PASS	

Test Completion Date: 10/6/2020

Replicate No.	Control	TWC
1	9	10
2	10	10
3	9	10
4	10	10
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	9.500	10.000
Std Dev.	0.577	0.000
# Replicates	4	4
T-Test Result	11.7367	
Deg. of Freedom	3	
Critical T Value	0.7649	
Pass or Fail	PASS	

DEP Whole Effluent Toxicity (WET) Analysis Spreadsheet

Type of Test	Chronic
Species Tested	Pimephales
Endpoint	Growth
TIWC (decimal)	0.12
No. Per Replicate	10
T ST b value	0.75
T ST alpha value	0.25

Facility Name: Swatara Township Authority

Permit No.: PA0026735

Replicate No.	Test Completion Date 10/3/2017 Control	TIWC
1	0.61	0.62
2	0.583	0.683
3	0.613	0.639
4	0.374	0.667
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.545	0.652
Std Dev.	0.115	0.028
# Replicates	4	4
T-Test Result	5.3762	
Deg. of Freedom	5	
Critical T Value	0.7267	
Pass or Fail	PASS	

Replicate No.	Test Completion Date 9/20/2018 Control	TIWC
1	0.666	0.55
2	0.591	0.614
3	0.663	0.714
4	0.704	0.528
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.656	0.602
Std Dev.	0.047	0.083
# Replicates	4	4
T-Test Result	2.4173	
Deg. of Freedom	4	
Critical T Value	0.7407	
Pass or Fail	PASS	

Replicate No.	Test Completion Date 9/17/2019 Control	TIWC
1	0.508	0.484
2	0.498	531
3	0.623	0.532
4	0.545	0.539
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.544	133.139
Std Dev.	0.067	265.241
# Replicates	4	4
T-Test Result	1.0008	
Deg. of Freedom	3	
Critical T Value	0.7649	
Pass or Fail	PASS	

Replicate No.	Test Completion Date 10/6/2020 Control	TIWC
1	0.681	0.514
2	0.646	0.572
3	0.517	0.543
4	0.563	0.603
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Mean	0.602	0.558
Std Dev.	0.075	0.038
# Replicates	4	4
T-Test Result	3.1346	
Deg. of Freedom	5	
Critical T Value	0.7267	
Pass or Fail	PASS	