pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

South Central Regional Office
CLEAN WATER PROGRAM

Application Type	**Amendment**	Application No.	**PA0261670 A-1**
Facility Type	**Municipal**	APS ID	**762640**
Major / Minor	**Minor**	Authorization ID	**1135773**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Fredericksburg S&W Authority**	Facility Name	**Fredericksburg Little Swatara STP**
Applicant Address	PO Box 161	Facility Address	1 FSWA Lane
	Fredericksburg, PA 17026-0161		Fredericksburg, PA 17026
Applicant Contact	James Heisey	Facility Contact	James Heisey
Applicant Phone	(717) 865-7452	Facility Phone	(717) 272-7110
Client ID	85895	Site ID	753917
Ch 94 Load Status	Not Overloaded	Municipality	Bethel Township
Connection Status	No Limitations	County	Lebanon
Date Application Received	December 23, 2019	EPA Waived?	No
Date Application Accepted	January 7, 2020	If No, Reason	Significant CB Discharge

Purpose of Application: Permit amendment to upgrade plant's hydraulic and organic capacities.

Summary of Review

1.0 General Discussion

This fact sheet supports the amendment of an existing NPDES permit for discharge of treated domestic wastewater from Fredericksburg Sewer and Water Authority (Authority) wastewater treatment plant. The Authority owns, operates, and maintains the wastewater treatment plant. The facility is located in Bethel Township, Lebanon County. The sewer collection system is not combined in these areas and there are no bypasses or overflows approved in the collection system. The facility had been expanded and relocated to its current location during the past permit cycle. The planning approval for the expansion was granted on April 21, 2011 and calls for two phased expansion from 0.15MGD to 0.433MGD and ultimately to a capacity of 0.65MGD when needed. Phase 1 of plant expansion had been completed with a hydraulic design capacity of 0.433MGD and organic design capacity of 1993 lbs/day- BOD5. The facility was determined to be overloaded according the Department's Chapter 94 regulations and was required to provide a corrective action plan(CAP). The Department received and approved the CAP on 10/30/2019. The CAP proposed an upgrade to the treatment plant's capacity to address the overload. The facility submitted an amendment application to expand the treatment facility's hydraulic capacity to 0.65MGD and organic capacity to 2994 lbs/day- BOD5. The facility had numerous effluent violations during the past 12 months of operation which the upgrade is expected to address as well. The discharge goes to Little Swatara Creek classified for warm water fishes (WWF). The existing NPDES permit was issued on June 15, 2018 with an effective date of July 1, 2018 and expiration date of June 30, 2023.

A topographic map showing the discharge location is presented in attachment A.

Approve	Deny	Signatures	Date
X		J. Pascal Kwedza, P.E. / Environmental Engineer	April 1, 2020
X		Daniel W. Martin, P.E. / Environmental Engineer Manager	May 29, 2020
X		Maria D. Bebenek, P.E./Program Manager	May 29, 2020

Summary of Review

1.1 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.

1.2 Changes to the existing Permit

- Limitation on ammonia has been added for summer months
- Mass limits have changed for TP, TSS and CBOD5

1.3 Existing Permit Limits 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
D.O	XXX	XXX	5.0	XXX	XXX	XXX	1/Day	Grab
TSS	108	163	XXX	30	45	60	1/Week	24-hr comp
$CBOD_5$	90	145	XXX	25	40	50	1/Week	24-hr comp
Total Phos	7.0	XXX	XXX	2.0	XXX	4.0	1/Week	24-hr comp
Fecal Coliform (5/1 to 9/30)[5]	XXX	XXX	XXX	200	XXX	1,000	1/Week	Grab
Fecal Coliform (10/1 to 4/30)	XXX	XXX	XXX	2,000	XXX	10,000	1/Week	Grab
Zinc	Report	XXX	XXX	Report	XXX	Report	1/Week	24-hr comp

1.3.1 Chesapeake Bay Limits

Discharge Parameter	Effluent Limitations					Monitoring Requirements	
	Mass Load(lbs)		Concentrations (mg/l)			Minimum Measurement Frequency	Required Sample Type
	Monthly	Annual	Minimum	Monthly Average	Maximum		
Ammonia---N	Report	Report	XXX	Report	XXX	2/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	2/week	24-hr Comp
Net Total Nitrogen	Report	7,306	XXX	XXX	XXX	1/Month	Calculate
Net Total Phos.	Report	974	XXX	XXX	XXX	1/Month	Calculate

1.4 Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	.65
Latitude	40º 24' 40.59"	Longitude	-76º 25' 55.81"
Quad Name	Fredericksburg	Quad Code	1534
Wastewater Description:	Sewage Effluent		

Receiving Waters	Little Swatara Creek	Stream Code	09888
NHD Com ID	56396387	RMI	3.52
Drainage Area	86.15	Yield (cfs/mi^2)	0.0565
Q_{7-10} Flow (cfs)	5.65	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	Pennsylvania American Water Company		
PWS Waters	Swatara Creek	Flow at Intake (cfs)	
PWS RMI		Distance from Outfall (mi)	33

Changes Since Last Permit Issuance:

1.5 Water Supply Intake:

The closest water supply intake located downstream from the discharge is Pennsylvania American Water Company in South Hanover Township, Dauphin County on Swatara Creek. The distance downstream from the discharge to the intake is approximately 33 miles. No impact is expected from this discharge.

2.0 Treatment Facility Summary

Treatment Facility Name: Fredericksburg Little Swatara STP

WQM Permit No.	Issuance Date
3811404	
3811404 A-1	03/2/2017
3811404 A-2	

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Secondary With Ammonia And Phosphorus	Sequencing Batch Reactor	Ultraviolet	0.65

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
0.650	2,994	Not Overloaded	Aerobic Digestion	

Changes Since Last Permit Issuance: Permit amendment to add an additional SBR treatment train to the existing 2 SBRs is concurrently under review to increase the hydraulic capacity to 0.65MGD and organic capacity to 2994lb/day-BOB5

2.1 Treatment Facility Details

The existing wastewater Treatment facility consists of influent pumping station, screening unit with grit removal, 2 SBRs, 2 cloth media filters, ultraviolet disinfection, cascade aeration, alum feed system, supplemental carbon feed system, a caustic feed system and aerobic sludge digesters and a trailer mounted volute press for dewatering. Current upgrade will add another SBR and another UV unit for a total of SBRs and upgrade to increase the number disks in the 2 filters,

3.0 Compliance History

3.1 DMR Data for Outfall 001 (from February 1, 2019 to January 31, 2020)

Parameter	JAN-20	DEC-19	NOV-19	OCT-19	SEP-19	AUG-19	JUL-19	JUN-19	MAY-19	APR-19	MAR-19	FEB-19
Flow (MGD) Average Monthly	0.4656	0.4475	0.4734	0.4333	0.378	0.402	0.428	0.492	0.4752	0.4433	0.4275	0.4022
Flow (MGD) Daily Maximum	0.6475	0.6683	1.0991	0.756	0.5053	0.567	0.6752	1.1984	0.781	0.7532	0.784	0.5209
pH (S.U.) Daily Minimum	7.04	6.82	6.69	6.70	6.66	6.93	6.84	6.92	6.89	6.46	6.89	6.92
pH (S.U.) Daily Maximum	7.71	8.48	6.96	7.33	7.65	8.07	7.8	7.35	7.44	7.17	7.18	7.3
DO (mg/L) Daily Minimum	6.02	7.30	7.37	7.4	5.7	6.52	6.25	7.7	7.67	7.67	8.12	7.56
CBOD5 (lbs/day) Average Monthly	85	72	26	21	18	14	13	< 12	13	61	15	17
CBOD5 (lbs/day) Weekly Average	239	119	32	24	35	15	18	16	16	200	21	25
CBOD5 (mg/L) Average Monthly	20	17	6	5	5	4	3	< 3	3	13	4	4
CBOD5 (mg/L) Weekly Average	52	30	7	6	9	4	4	3	4	42	5	7
BOD5 (lbs/day) Raw Sewage Influent Aver. Monthly	1238	1180	256	1151	1057	1763	281	1128	1183	1306	1547	1269
BOD5 (lbs/day) Raw Sewage Influent Daily Maximum	1678	1398	1750	16.96	1323	2733	350	1424	1363	1373	1933	1666
BOD5 (mg/L) Raw Sewage Influent Aver. Monthly	299	292	256	296	284	407	281	273	298	321	401	362
TSS (lbs/day) Average Monthly	154	125	89	37	17	41	76	< 18	< 20	< 23	< 21	< 17
TSS (lbs/day) Raw Sewage Influent Ave. Monthly	1114	1082	1533	831	795	1051	308	906	847	856	1009	764
TSS (lbs/day) Raw Sewage Influent Daily Maximum	2174	1934	3214	1248	903	365	420	1276	1233	1121	1427	1135
TSS (lbs/day) Weekly Average	524	261	148	59	18	53	276	< 19	26	32	28	21

TSS (mg/L) Average Monthly	35	30	20	9	4	11	20	< 4	5	5	< 5	< 4
TSS (mg/L) Raw Sewage Influent Ave. Monthly	278	274	334	218	214	239	308	219	210	213	258	219
TSS (mg/L) Weekly Average	113	58	34	14	5	15	73	< 4	6	8	6	6
Fecal Coliform (No./100 ml) Geometric Mean	112	111	< 23	79	11	23	< 5	< 2	< 5	20	7	< 59
Fecal Coliform (No./100 ml) Instant. Maximum	6600	419	3100	3100	11	23	18	5	496	2600	29	20000
UV Transmittance (%) Daily Minimum	35	43	48	72	1	73	68	50	26	45	42	47
Nitrate-Nitrite (mg/L) Average Monthly	0.52	0.31	26.65	< 6	3.41	3.31	0.21	7.38	4.7	3	1.9	0.91
Nitrate-Nitrite (lbs) Total Monthly	50.7	39.8	154.2	17.6	13.6	13.3	32	910.7	649.2	385.2	248.2	96.7
Total Nitrogen (mg/L) Average Monthly	30.88	22.22	5.79	8.28	7.64	7.38	7.13	9.16	8.62	8.49	8.69	13.29
Total Nitrogen (lbs) Effluent Net Total Monthly	3333.7	2667.1	164.6	33.7	7.64	29.4	28.7	1122.6	1183.2	1096	527.9	1416.9
Total Nitrogen (lbs) Total Monthly	3333.7	2667.1	164.6	17.6	30.3	29.4	28.7	1122.6	1183.2	1096	1123	1416.9
Total Nitrogen (lbs) Effluent Net Total Annual					11077							
Total Nitrogen (lbs) Total Annual					11077							
Ammonia (lbs/day) Average Monthly	64	45	13	5.9	9	1.75	< 1	< 0.5	1.55	11	17	32
Ammonia (mg/L) Average Monthly	18.2	10.66	< 0.1	1.55	2.44	1.75	< 0.23	< 0.13	7	2.54	7.05	8.52
Ammonia (lbs) Total Monthly	1969.6	1409	13	182	7.2	6.9	35	< 15.8	228.9	327.4	527.9	907.4
Ammonia (lbs) Total Annual					2645							
TKN (mg/L) Average Monthly	30.36	21.91	2.7	4.02	4.23	4.07	4.1	1.78	3.92	5.49	6.79	12.38
TKN (lbs) Total Monthly	3283.1	2627.3	10.3	16	16.7	16.2	16.4	211.9	534.1	710.9	874.8	1320.2

Total Phosphorus (lbs/day) Average Monthly	2.7	2.9	3.1	4.5	10.5	9.2	1.2	5.0	10.5	3.1	1.0	0.8
Total Phosphorus (mg/L) Average Monthly	0.7	0.7	0.7	1.1	2.8	2.4	0.3	1.2	2.3	0.7	0.2	0.2
Total Phosphorus (lbs) Effluent Net Total Monthly	83	84.6	35.1	5.9	4	3.8	28.7	148.7	346.9	94	30.7	21.5
Total Phosphorus (lbs) Total Monthly	83	89.8	35.1	14	315.1	3.8	36.1	148.7	346.9	94	30.7	21.5
Total Phosphorus (lbs) Effluent Net Total Annual					1477							
Total Phosphorus (lbs) Total Annual					1477							
Total Zinc (lbs/day) Average Monthly	0.4	0.4	0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2
Total Zinc (mg/L) Average Monthly	0.092	0.08	0.079	0.12	0.09	0.099	0.073	0.065	0.072	0.058	0.06	0.062

3.2 Effluent Violations for Outfall 001, from: March 1, 2019 To: January 31, 2020

Parameter	Date	SBC	DMR Value	Units	Limit Value	Units
pH	11/30/19	Daily Max	9.96	S.U.	9.0	S.U.
CBOD5	11/30/19	Avg Mo	772	lbs/day	90	lbs/day
CBOD5	01/31/20	Wkly Avg	239	lbs/day	145	lbs/day
CBOD5	04/30/19	Wkly Avg	200	lbs/day	145	lbs/day
CBOD5	01/31/20	Wkly Avg	239	lbs/day	145	lbs/day
CBOD5	01/31/20	Wkly Avg	239	lbs/day	145	lbs/day
CBOD5	01/31/20	Wkly Avg	52	mg/L	40	mg/L
CBOD5	01/31/20	Wkly Avg	52	mg/L	40	mg/L
CBOD5	04/30/19	Wkly Avg	42	mg/L	40	mg/L

CBOD5	01/31/20	Wkly Avg	52	mg/L	40	mg/L
TSS	12/31/19	Avg Mo	125	lbs/day	108	lbs/day
TSS	01/31/20	Avg Mo	154	lbs/day	108	lbs/day
TSS	01/31/20	Avg Mo	154	lbs/day	108	lbs/day
TSS	01/31/20	Avg Mo	154	lbs/day	108	lbs/day
TSS	12/31/19	Wkly Avg	261	lbs/day	163	lbs/day
TSS	01/31/20	Wkly Avg	524	lbs/day	163	lbs/day
TSS	07/31/19	Wkly Avg	276	lbs/day	163	lbs/day
TSS	01/31/20	Wkly Avg	524	lbs/day	163	lbs/day
TSS	01/31/20	Wkly Avg	524	lbs/day	163	lbs/day
TSS	01/31/20	Avg Mo	35	mg/L	30	mg/L
TSS	01/31/20	Avg Mo	35	mg/L	30	mg/L
TSS	01/31/20	Avg Mo	35	mg/L	30	mg/L
TSS	12/31/19	Wkly Avg	58	mg/L	45	mg/L
TSS	01/31/20	Wkly Avg	113	mg/L	45	mg/L
TSS	07/31/19	Wkly Avg	73	mg/L	45	mg/L
TSS	01/31/20	Wkly Avg	113	mg/L	45	mg/L
TSS	01/31/20	Wkly Avg	113	mg/L	45	mg/L
Total Nitrogen	09/30/19	Total Annual	11077	lbs	7306	lbs
Total Phosphorus	09/30/19	Avg Mo	10.5	lbs/day	7.0	lbs/day
Total Phosphorus	09/30/19	Avg Mo	10.5	lbs/day	7.0	lbs/day
Total Phosphorus	05/31/19	Avg Mo	10.5	lbs/day	7.0	lbs/day

Total Phosphorus	08/31/19	Avg Mo	9.2	lbs/day	7.0	lbs/day
Total Phosphorus	09/30/19	Avg Mo	2.8	mg/L	2.0	mg/L
Total Phosphorus	09/30/19	Avg Mo	2.8	mg/L	2.0	mg/L
Total Phosphorus	08/31/19	Avg Mo	2.4	mg/L	2.0	mg/L
Total Phosphorus	05/31/19	Avg Mo	2.3	mg/L	2.0	mg/L
Total Phosphorus	09/30/19	Total Annual	1477	lbs	974	lbs

DMR summary for the past 12 months of operation are shown in section 3.1 above. Numerous effluent violations occurred during the period as listed in section 3.2 above as well. The numerous effluent violations are attributable to the hydraulic and organic capacity overload of the treatment plant. The plant upgrade is expected to address these effluent violations at the facility

4.0 Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** .65
Latitude 40º 24' 41.00" **Longitude** -76º 25' 56.00"
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.

4.1.1 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)

Comments: TRC is not applicable to this facility

4.2 Water Quality-Based Limitations

4.2.1 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

4.2.2 Receiving Stream

The receiving stream is the Little Swatara Creek. According to 25 PA § 93.9o, this stream is protected for Warm Water Fishes (WWF) and Migratory Fishes (MF). It is located in Drainage List o and State Watershed 7-D. It has been assigned stream code 09888. According to eMapPA, Little Swatara Creek is attaining its designated uses.

4.2.3 Streamflow:

Streamflows for the water quality analysis were determined by correlating with the yield of USGS gauging station No 01573000 on Swatara Creek at Harper Tavern. The Q_{7-10} and drainage area at the gage is 22.1ft3/s and 337 mi^2 respectively. The resulting yields are as follows:

- Q_{7-10} = (22.1ft^3/s)/337 mi^2 = 0.0656ft^3/s/ mi^2
- Q_{30-10} / Q_{7-10} = 1.40
- Q_{1-10} / Q_{7-10} = 0.80

The drainage area at discharge is calculated by USGS StreamStats = 86.15mi^2

The Q_{7-10} at discharge = 86.15 mi^2 x 0.0.0656ft^3/s/mi^2 = 5.65 ft^3/s.

4.2.4 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	= 7.4 (July -Sept DMR median)
*	Discharge Temperature	= 25 ° C (Default)
*	Stream pH	= 7.0 (Default)
*	Stream Temperature	= 20°C (Default)
*	Background NH_3-N	= 0.0 (Default)

4.2.5 $CBOD_5$ & NH_3-N

WQM 7.0 Model results presented in attachment B indicate that for a discharge of 0.65 MGD, an average monthly limit (AML) of 25mg/l $CBOD_5$ is required to protect the water quality of the stream. This limit is consistent with the existing permit but the STP is unable to consistently comply with the limitation. The current upgrade should provide adequate treatment capacity for the facility to comply with the limitation. Therefore, a limit of 25mg/l AML, 40mg/l average weekly limit (AWL) and 50 mg/l IMAX is recommended for the expanded discharge. Mass limits are calculated as follows:

Mass based AML (lb/day) = 25 (mg/L) × 0.65(mgd) × 8.34 = 136
Mass based AWL (lb/day) = 40(mg/L) × 0.65(mgd) × 8.34 = 217

The attached results of the WQM 7.0 stream model (attachment B) also indicates that a summer limitation of 13.5 NH_3 as a monthly average and 27 mg/l instantaneous maximum is necessary to protect the aquatic life from toxicity effects. Ammonia monitoring will be required for winter months in the permit to ensure treatment efficiency.

Mass limits are calculated as follows:

Mass based summer AML (lb/day) = 13.5 (mg/L) × 0.65(mgd) × 8.34 = 73

4.2.6 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 per DEP guidance.

4.2.7 Total Suspended Solids(TSS):

There is no water quality criterion for TSS. A limit of 30 mg/l AML will be required 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). Mass limits are calculated as follows:

Mass based AML (lb/day) = 30 (mg/L) × 0.65(mgd) × 8.34 = 163
Mass based AWL (lb/day) = 45(mg/L) × 0.65(mgd) × 8.34 = 244

4.2.8 Total Residual Chlorine:

The discharge does not have any reasonable potential to cause or contribute to a water quality standards violation for total residual chlorine since the permittee utilizes UV instead of chlorine for wastewater disinfection. Therefore, the proposed permit does not contain effluent limits for total residual chlorine. The permittee may use chlorine based chemicals for cleaning and is required to optimize chlorine usage to prevent negative impacts on receiving stream. Daily UV transmittance monitoring in % will be required in the permit to ensure efficiency of the UV unit.

4.2.9 Toxics

A reasonable potential (RP) analysis was done for pollutant Groups submitted with the renewal application since there was no sampling for the amendment. All pollutants detected in the renewal application sampling were entered into the Toxics Screening Analysis spreadsheet (attachment D) to determine if any pollutants were candidates for PENTOXSD modeling. Total Dissolved Solids and Total Zinc were determined to be candidates for PENTOXSD modeling and were entered into the PENTOXSD model. The most stringent WQBELs recommended by the PENTOXSD model (attachment C) was then entered into the same Toxics Screening Analysis spreadsheet in order to determine if limitation or monitoring was required in the permit. The RP Screening Analysis spreadsheet (attachment D) recommends monitoring for Total Zinc. PENTOXSD did not recommend a WQBEL for Total Dissolved Solids. The permittee is already monitoring Total Zinc and will continue to monitor it in the current amendment.

Limitation and /or monitoring recommendation on the spreadsheet 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.

4.2.10 Chesapeake Bay Strategy:

The facility is a phase 5 facility that was expanded from 0.15mgd to 0.433mgd and will to 0.65MGD under this amendment. Under the Chesapeake Bay Strategy, implementation of Phase 4 & 5 cap loads was to start after Phases 1 through 3 were completed. However, any facility in phases 4 & 5 that undergoes expansion gets a cap load immediately based on approved flow prior to August 29, 2005 with no net increase in loading. Planning approval for the expanded flow of 0.65mgd was granted after the August 29, 2005 CBS date, hence the facility's cap load was based on 0.15MGD. For phases 4 & 5, DEP's strategy is to is to establish annual mass load limits for TN and TP based upon the lesser of existing performance levels at design annual average daily flow on August 29, 2005 or loads equivalent to 6 mg/l TN and 0.8mg/l TP at 0.4 mgd (7306 lbs. TN and 974 lbs. TP). Since this was a new wastewater treatment plant at the time of the phase1 expansion, there was no existing performance data. Cap load was based on the lesser of default values of 4mg/l TP and 22mg/l TN or 974lbs TP or 7,306lbs TN. 974lbs/year TP and 7306 lbs/year were the lesser of the two scenarios and were allocated to the facility. Better treatment and/or credits or offsets maybe used to meet the cap load. The load was transferred from the abandoned facility with permit number PA0080705 to PA0261670 and it has been documented in the Phase II WIP Supplement of the Watershed Implementation Plan.

4.2.11 Total Phosphorus

The limit of 2 mg/l established in the existing permit was for the protection of the Lower Susquehanna River basin which has been superseded by the Chesapeake Bay Strategy but will remain in the permit due to anti-backsliding. Mass limits are calculated as follows:

Mass based AML (lb/day) = 2 (mg/L) × 0.65(mgd) × 8.34 = 11

4.2.12 TDS, Chloride, Sulfate, Bromide, and 1,4-dioxane

There was no sampling for this amendment request, the renewal application listed maximum daily TDS discharge as 570 mg/l which is equivalent to 3,092lbs/day based on the permitted flow of 0.65 MGD. The discharge level for TDS based on the data in the renewal application is well below 1000 mg/l and 20,000lbs/day, therefore no monitoring for TDS, Chloride, Sulfate, Bromide will be required in the permit. There is no data on 1,4-dioxane.

4.2.13 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.

4.2.14 Pretreatment Requirements

The design annual average flow of the treatment plant is 0.65 MGD and the facility only receives sewage flow from significant Industrial users. EPA does not require development of pretreatment program for facilities with design flow less than 5MGD. However, the permit contains standard conditions requiring the permittee to monitor and control industrial users if applicable.

5.0 Other Requirements

5.1 The permit contains the following special conditions:

The permit contains the following special conditions:

Stormwater Prohibition, Approval Contingencies, Proper Waste/solids Management, Restriction on receipt of hauled in waste under certain conditions and Chlorine minimization requirement

5.2 Stormwater

There is no stormwater outfall associated with this facility.

5.3 Biosolids Management

Digested sludge is dewatered with a trailer mounted volute press prior to ultimate disposal at Greater Lebanon Refuse Authority Landfill.

5.4 Anti-backsliding

Not applicable to this permit

5.5 Antidegradation (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.

5.6 Class A Wild Trout Fisheries:

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

5.7 303d listed stream

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

5.8 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).

5.9 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.

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 Daily Min	XXX	9.0 Daily Max	XXX	1/day	Grab
DO	XXX	XXX	5.0 Daily Min	XXX	XXX	XXX	1/day	Grab
CBOD5	136	217	XXX	25	40	50	1/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	1/week	24-Hr Composite
TSS Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	1/week	24-Hr Composite
TSS	163	244	XXX	30	45	60	1/week	24-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2,000 Geo Mean	XXX	10,000	1/week	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1,000	1/week	Grab
Ammonia-Nitrogen Nov 1 - Apr 30	XXX	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Ammonia-Nitrogen May 1 - Oct 31	73	XXX	XXX	13.5	XXX	27.0	1/week	24-Hr Composite
Total Phosphorus	11	XXX	XXX	2.0	XXX	4	2/week	24-Hr Composite
Total Zinc	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Ultra Violet Light Transmittance (%)	XXX	XXX	Report	XXX	XXX	XXX	1/day	Recorded

Compliance Sampling Location: at Outfall 001

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.

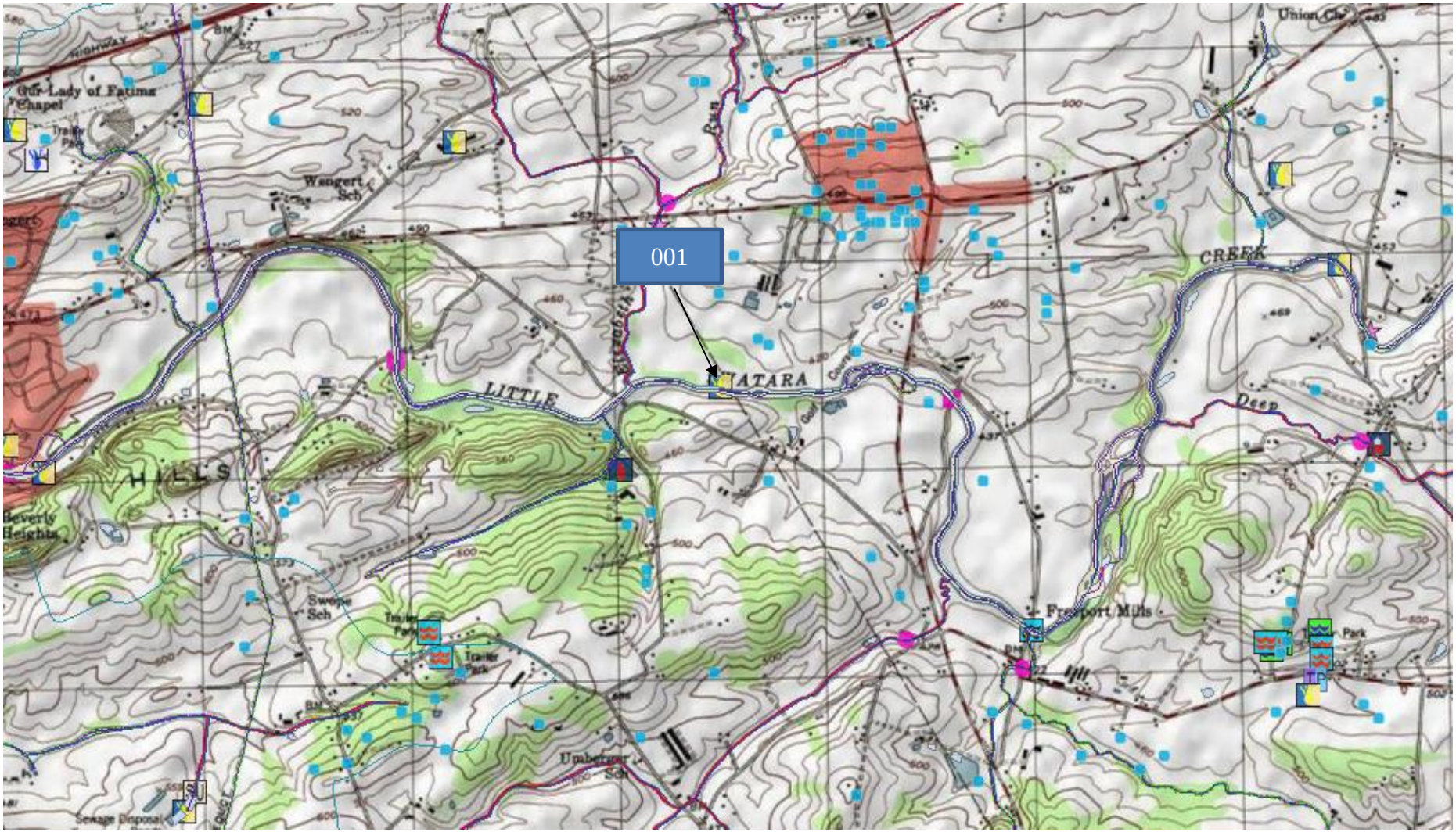
Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Monthly	Annual	Monthly	Monthly Average	Maximum	Instant. Maximum		
Ammonia--N	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Kjeldahl--N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Nitrate-Nitrite as N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Total Nitrogen	Report	Report	XXX	Report	XXX	XXX	1/month	Calculation
Total Phosphorus	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Net Total Nitrogen	Report	7,306	XXX	XXX	XXX	XXX	1/month	Calculation
Net Total Phosphorus	Report	974	XXX	XXX	XXX	XXX	1/month	Calculation

Compliance Sampling Location: at Outfall 001

Tools and References Used to Develop Permit	
☒	WQM for Windows Model (see Attachment **B**)
☒	PENTOXSD for Windows Model (see Attachment **C**)
☐	TRC Model Spreadsheet (see Attachment)
☐	Temperature Model Spreadsheet (see Attachment)
☒	Toxics Screening Analysis Spreadsheet (see Attachment **D**)
☐	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: Establishing effluent limitation for individual sewage permit
☐	Other:

Attachment

A. Topographical Map



B. WQM Model Results

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
07D	9888	LITTLE 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)
6.970	Keystone Prot	PA0266345	3.000	CBOD5	10.72		
				NH3-N	3.22	6.44	
				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)
3.520	Fredericksburg	PA026167	0.650	CBOD5	25		
				NH3-N	13.68	27.36	
				Dissolved Oxygen			5

Monday, March 30, 2020 Version 1.0b Page 1 of 1

WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
07D	9888	LITTLE 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
6.970	Keystone Prot	7.91	14.14	7.91	14.14	0	0
3.520	Fredericksburg	8.74	48.03	7.77	48.03	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
6.970	Keystone Prot	1.65	3.92	1.65	3.35	2	15
3.520	Fredericksburg	1.81	16.03	1.63	13.68	2	15

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)		
6.97	Keystone Prot	10.72	10.72	3.22	3.22	5	5	0	0
3.52	Fredericksburg	25	25	13.68	13.68	5	5	0	0

Monday, March 30, 2020 Version 1.0b Page 1 of 1

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
07D	9888	LITTLE SWATARA CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
6.970	3.000	22.519	7.000
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
47.618	0.766	62.163	0.253
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
6.39	0.818	1.62	0.850
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
6.609	2.802	Tsivoglou	5
Reach Travel Time (days)			
0.835			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.083	5.92	1.51	5.97
0.167	5.48	1.41	5.55
0.250	5.08	1.31	5.28
0.334	4.70	1.22	5.14
0.417	4.36	1.14	5.09
0.501	4.04	1.06	5.11
0.584	3.74	0.99	5.17
0.668	3.46	0.92	5.28
0.751	3.21	0.86	5.40
0.835	2.97	0.80	5.55

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
3.520	3.650	22.499	7.024
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
48.688	0.770	63.192	0.301
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
4.84	1.032	1.87	0.848
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
5.755	8.850	Tsivoglou	5
Reach Travel Time (days)			
0.085			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.009	4.79	1.85	5.84
0.017	4.74	1.84	5.93
0.026	4.70	1.83	6.01
0.034	4.65	1.81	6.08
0.043	4.61	1.80	6.15
0.051	4.56	1.79	6.22
0.060	4.52	1.78	6.28
0.068	4.47	1.76	6.34
0.077	4.43	1.75	6.40
0.085	4.38	1.74	6.45

Monday, March 30, 2020 Version 1.0b Page 1 of 1

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	0.8	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.4	Temperature Adjust Kr	☑
D.O. Saturation	90.00%	Use Balanced Technology	☑
D.O. Goal	5		

WQM 7.0 Hydrodynamic Outputs

SWP Basin	Stream Code	Stream Name
07D	9888	LITTLE 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												
6.970	4.57	0.00	4.57	4.641	0.00110	.766	47.62	62.16	0.25	0.835	22.52	7.00
3.520	5.65	0.00	5.65	5.6465	0.00406	.77	48.69	63.19	0.30	0.085	22.50	7.02
Q1-10 Flow												
6.970	3.66	0.00	3.66	4.641	0.00110	NA	NA	NA	0.24	0.885	22.80	7.00
3.520	4.52	0.00	4.52	5.6465	0.00406	NA	NA	NA	0.28	0.090	22.78	7.03
Q30-10 Flow												
6.970	6.40	0.00	6.40	4.641	0.00110	NA	NA	NA	0.28	0.754	22.10	7.00
3.520	7.91	0.00	7.91	5.6465	0.00406	NA	NA	NA	0.33	0.077	22.08	7.02

Monday, March 30, 2020 Version 1.0b Page 1 of 1

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	9888	LITTLE SWATARA CREEK	**6.970**	435.00	69.70	0.00110	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	0.066	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	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
Keystone Prot	PA0266345	3.0000	3.0000	3.0000	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	15.00	2.00	0.00	1.50
Dissolved Oxygen	5.00	8.24	0.00	0.00
NH3-N	15.00	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	9888	LITTLE SWATARA CREEK	**3.520**	423.00	86.15	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	0.066	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	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
Fredericksburg	PA026167	0.6500	0.6500	0.6500	0.000	25.00	7.40

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	9888	LITTLE SWATARA CREEK	**3.100**	414.00	94.20	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	0.066	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	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

C. PENNTOX SD Model Results

PENTOXSD Analysis Results

Recommended Effluent Limitations

SWP Basin	Stream Code:	Stream Name:
07D	9888	LITTLE SWATARA CREEK

RMI	Name	Permit Number	Disc Flow (mgd)
3.52	Fredericksburg	PA026167	0.6500

Parameter	Effluent Limit (µg/L)	Governing Criterion	Max. Daily Limit (µg/L)	Most Stringent WQBEL (µg/L)	Most Stringent WQBEL Criterion
COPPER	39.299	AFC	61.313	39.299	AFC
TOTAL DISSOLVED SOLIDS (PWS	1E+07	INPUT	1.56E+07	NA	NA
ZINC	336.354	AFC	524.767	336.354	AFC

Wednesday, April 1, 2020 Version 2.0d Page 1 of 1

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number
3.52	**Fredericksburg**	**PA026167**

AFC

Q7-10: **CCT (min)** 15 **PMF** 0.601 **Analysis pH** 7.064 **Analysis Hardness** 100

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
COPPER	0	0	0	0	13.439	13.999	61.313
	Dissolved WQC. Chemical translator of 0.96 applied.						
ZINC	0	0	0	0	117.18	119.816	524.767
	Dissolved WQC. Chemical translator of 0.978 applied.						
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

CFC

Q7-10: **CCT (min)** 41.479 **PMF** 1 **Analysis pH** 7.041 **Analysis Hardness** 100

Parameter	Stream Conc. (µg/L)	Stream CV	Trib Conc. (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
COPPER	0	0	0	0	8.956	9.329	61.76
	Dissolved WQC. Chemical translator of 0.96 applied.						
ZINC	0	0	0	0	118.139	119.816	793.214
	Dissolved WQC. Chemical translator of 0.986 applied.						
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

THH

Q7-10: **CCT (min)** 41.479 **PMF** NA **Analysis pH** NA **Analysis Hardness** NA

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
COPPER	0	0	0	0	NA	NA	NA
ZINC	0	0	0	0	NA	NA	NA
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	500000	500000	NA

CRL

Qh: **CCT (min)** 18.23 **PMF** 1

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
COPPER	0	0	0	0	NA	NA	NA
ZINC	0	0	0	0	NA	NA	NA

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number						
3.52	**Fredericksburg**	**PA026167**						
TOTAL DISSOLVED SOLIDS (PWS)			0	0	0	0	NA	NA	NA

PENTOXSD Analysis Results

Hydrodynamics

SWP Basin	Stream Code:	Stream Name:
07D	9888	LITTLE SWATARA CREEK

RMI	Stream Flow (cfs)	PWS With (cfs)	Net Stream Flow (cfs)	Disc Analysis Flow (cfs)	Reach Slope	Depth (ft)	Width (ft)	WD Ratio	Velocity (fps)	Reach Trav Time (days)	CMT (min)
Q7-10 Hydrodynamics											
3.520	5.6514	0	5.6514	1.00554	0.0041	0.7287	40.791	55.979	0.224	0.1146	41.479
3.100	6.1795	0	6.1795	NA	0	0	0	0	0	0	NA
Qh Hydrodynamics											
3.520	33.758	0	33.758	1.00554	0.0041	1.508	40.791	27.050	0.5652	0.0454	18.23
3.100	36.499	0	36.499	NA	0	0	0	0	0	0	NA

PENTOXSD

Modeling Input Data

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS Wtih (mgd)	Apply FC
9888	3.52	423.00	86.15	0.00000	0.00	☑

Stream Data

	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Rch Velocity (fps)	Rch Trav Time (days)	Tributary Hard (mg/L)	Tributary pH	Stream Hard (mg/L)	Stream pH	Analysis Hard (mg/L)	Analysis pH
Q7-10	0.0656	0	0	0	0	0	0	0	100	7	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard (mg/L)	Disc pH
Fredericksburg	PA026167	0.65	0.65	0.65	0	0	0	0	0	100	7.4

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
COPPER	1E+07	0	0.5	0.5	0	0	0	0	1	0
TOTAL DISSOLVED SOLIDS (PWS)	1E+07	0	0.5	0.5	0	0	0	0	1	0
ZINC	1E+07	0	0.5	0.5	0	0	0	0	1	0

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS Wtth (mgd)	Apply FC
9888	3.10	414.00	94.20	0.00000	0.00	☑

Stream Data

	LFY	Trib Flow	Stream Flow	WD Ratio	Rch Width	Rch Depth	Rch Velocity	Rch Trav Time	Tributary Hard	Tributary pH	Stream Hard	Stream pH	Analysis Hard	Analysis pH
	(cfsm)	(cfs)	(cfs)		(ft)	(ft)	(fps)	(days)	(mg/L)		(mg/L)		(mg/L)	
Q7-10	0.0656	0	0	0	0	0	0	0	100	7	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow	Permitted Disc Flow	Design Disc Flow	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard	Disc pH
		(mgd)	(mgd)	(mgd)						(mg/L)	
		0	0	0	0	0	0	0	0	100	7

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
COPPER	0	0	0.5	0.5	0	0	0	0	1	0
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
ZINC	0	0	0.5	0.5	0	0	0	0	1	0

D. Toxic Screening Analysis

TOXICS SCREENING ANALYSIS
WATER QUALITY POLLUTANTS OF CONCERN
VERSION 2.7

CLEAR FORM

Facility: **Fredericksburg STP** NPDES Permit No.: **PA0261670** Outfall: **001**
Analysis Hardness (mg/L): **100** Discharge Flow (MGD): **0.65** Analysis pH (SU): **7.4**
Stream Flow, Q_{7-10} (cfs): **5.65**

	Parameter		Maximum Concentration in Application or DMRs (µg/L)	Most Stringent Criterion (µg/L)	Candidate for PENTOXSD Modeling?	Most Stringent WQBEL (µg/L)	Screening Recommendation
Group 1	Total Dissolved Solids		570000	500000	Yes	10000000	No Limits/Monitoring
	Chloride		220000	250000	No		
	Bromide		200	N/A	No		
	Sulfate			250000			
Group 2	Total Aluminum			750			
	Total Antimony			5.6			
	Total Arsenic			10			
	Total Barium			2400			
	Total Beryllium			N/A			
	Total Boron			1600			
	Total Cadmium			0.271			
	Total Chromium			N/A			
	Hexavalent Chromium			10.4			
	Total Cobalt			19			
	Total Copper		8	9.3	No	39	
	Free Available Cyanide			5.2			
	Total Cyanide			N/A			
	Dissolved Iron			300			
	Total Iron			1500			
	Total Lead		0.4	3.2	No		
	Total Manganese			1000			
	Total Mercury			0.05			
	Total Nickel			52.2			
	Total Phenols (Phenolics)			5			
	Total Selenium			5.0			
	Total Silver			3.8			
	Total Thallium			0.24			
	Total Zinc		140	119.8	Yes	336	Monitor
	Total Molybdenum			N/A			