pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Southcentral Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0087700**
Facility Type	**Municipal**	APS ID	**39654**
Major / Minor	**Minor**	Authorization ID	**1177443**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**South Londonderry Township Municipal Authority**	Facility Name	**South Londonderry Campbelltown East STP**
Applicant Address	27 W Market Street	Facility Address	27 W Market Street
	Palmyra, PA 17078-8736		Palmyra, PA 17078
Applicant Contact	Scott Galbraith	Facility Contact	Scott Galbraith
Applicant Phone	(717) 838-5556	Facility Phone	(717) 838-5556
Client ID	43038	Site ID	250908
Ch 94 Load Status	Not Overloaded	Municipality	South Londonderry Township
Connection Status		County	Lebanon
Date Application Received	March 28, 2017	EPA Waived?	No
Date Application Accepted	April 14, 2017	If No, Reason	Discharge to TMDL Waters

Purpose of Application: NPDES permit renewal to discharge treated sewage

Summary of Review

1.0 General Discussion

This fact sheet supports the re-issuance of an existing NPDES permit for discharge of treated domestic wastewater from Campbelltown East wastewater treatment plant located in South Londonderry Township, Lebanon County. South Londonderry Township Municipal Authority owns and operates the wastewater treatment plant, which provides sanitary services to South Londonderry Township. The sewer collection system is not combined and there is no bypasses or overflows approved in the collection system. The treatment plant has a hydraulic design capacity of 0.21 MGD and an organic design capacity of 350 lbs/day- BOD5. The permittee listed 490 lbs/day- BOD5 as organic capacity of in their Chapter 94 report which the Department disagreed with and that created organic overload condition at the facility. The permittee is under a corrective action plan to increase the organic capacity to address the organic overload at the facility. The discharge goes to Killinger Creek classified for Trout Stocking (TSF). The existing NPDES permit was issued on July 31, 2012 with an effective date of August 1, 2012 and expiration date of July 31, 2017. The permit was amended on September 23, 2015 to revise copper limitation as a results of water effect ratio (WER) study that established a site-specific criterion for copper for the site. The applicant submitted an administratively complete NPDES renewal application to the Department on March 28, 2017 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.

Approve	Deny	Signatures	Date
X		J. Pascal Kwedza / Environmental Engineer, P.E.	April 10, 2019
X		Daniel W. Martin, P.E. / Environmental Engineer Manager	July 1, 2019
X		Maria D. Bebenek, P.E. / Program Manager	July 1, 2019

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

- Monthly monitoring of Total Copper has been added

1.3 Existing Permit Limits and Monitoring Requirements

DISCHARGE LIMITATIONS								MONITORING REQUIREMENTS	
	Mass Units lbs/day			Concentrations mg/l					
Discharge Parameter	Average Monthly	Average Weekly	Maximum Daily	Average Monthly	Average Weekly	Maximum Daily	Inst. Maximum	Monitoring Frequency	Sample Type
Flow (mgd)	Monitor & Report	XXX	Monitor & Report	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	XXX	From 6.0 to 9.0 inclusive				1/day	Grab
D.O.	XXX	XXX	XXX	Minimum of 5.0 mg/l at all times				1/day	Grab
TRC	XXX	XXX	XXX	0.12	XXX	XXX	0.40	1/day	Grab
TSS	52	78	XXX	30	45	XXX	60	1/week	24-hour comp
$CBOD_5$	43	70	XXX	25	40	XXX	50	1/week	24-hour comp
NH3N (5/1 to 10/31)	4.3	XXX	XXX	2.5	XXX	XXX	5.0	1/week	24-hr comp
NH3N (11/1 to 4/30)	13.1	XXX	XXX	7.5	XXX	XXX	15	1/week	24-hr comp
Fecal Col. (5/1 to 9/30)	XXX	XXX	XXX	200	XXX	XXX	XXX	1/week	Grab
Fecal Col. (10/1 to 4/30)	XXX	XXX	XXX	2,000	XXX	XXX	XXX	1/week	Grab
Total Phosphorus	3.5	XXX	XXX	2.0	XXX	XXX	4.0	1/week	24-hour comp
Nitrate-Nitrite	XXX	XXX	XXX	Report	XXX	XXX	XXX	1/month	24-hour comp
Total Nitrogen	XXX	XXX	XXX	Report	XXX	XXX	XXX	1/month	Calculation
TKN	XXX	XXX	XXX	Report	XXX	XXX	XXX	1/month	24-hour comp
Total Phosphorus (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Total Phosphorus (lbs)	XXX	974 Total Annual	XXX	XXX	XXX	XXX	XXX	1/year	Calculation

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	001	Design Flow (MGD)	.21
Latitude	40Âº 17' 18.74"	Longitude	-76Âº 33' 43.12"
Quad Name		Quad Code	
Wastewater Description:	Sewage Effluent		
Receiving Waters	Killinger Creek (TSF)	Stream Code	09705
NHD Com ID	56400711	RMI	4.05
Drainage Area	2.01	Yield (cfs/mi^2)	0.14
Q_{7-10} Flow (cfs)	0.28	Q_{7-10} Basis	USGS Gage station
Elevation (ft)	423	Slope (ft/ft)	
Watershed No.	7-D	Chapter 93 Class.	TSF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	Nutrients, Pathogens		
Source(s) of Impairment	Agriculture, Source Unknown		
TMDL Status	Final	Name	Quittapahilla Creek Watershed
Background/Ambient Data		Data Source	
pH (SU)			
Temperature (°F)			
Hardness (mg/L)			
Other:			
Nearest Downstream Public Water Supply Intake	PA American Water Company		
PWS Waters	Swatara Creek	Flow at Intake (cfs)	
PWS RMI		Distance from Outfall (mi)	16

Changes Since Last Permit Issuance: None

1.4.1 Water Supply Intake

The nearest downstream water supply intake is approximately 16 miles downstream for PA American Water on Swatara Creek in South Hanover Township, Dauphin County. No impact is expected from this discharge on the intake.

Treatment Facility Summary				
Treatment Facility Name: S Londonderry Campbell E STP				
WQM Permit No.	**Issuance Date**			
Waste Type	**Degree of Treatment**	**Process Type**	**Disinfection**	**Avg Annual Flow (MGD)**
Sewage	Secondary With Ammonia And Phosphorus	Extended Aeration	Gas Chlorine	0.21
Hydraulic Capacity (MGD)	**Organic Capacity (lbs/day)**	**Load Status**	**Biosolids Treatment**	**Biosolids Use/Disposal**
0.21		Not Overloaded		

Changes Since Last Permit Issuance: None

2.1 Treatment Facility

The plant consist of an influent pump station, a comminutor/bypass bar screen, one aerated equalization tank fitted with duplex submersible discharge pumps and a flow control box, two aeration tanks equipped with coarse bubble diffusers, two dual hopper bottom clarifiers, a chlorine contact tank fitted with a chlorine gas diffuser at the inlet for chlorination and a sulfur dioxide at the end for de-chlorination, one aerobic digester and four reed beds for sludge processing.

2.2 Chemicals

- Lime for pH adjustment as needed
- Chlorine Gas for disinfection
- Sulfur Dioxide for de-chlorination
- DelPac 2000 for phosphorus removal

3.0 Compliance History

3.1 DMR Data for Outfall 001 (from March 1, 2018 to February 28, 2019)

Parameter	FEB-19	JAN-19	DEC-18	NOV-18	OCT-18	SEP-18	AUG-18	JUL-18	JUN-18	MAY-18	APR-18	MAR-18
Flow (MGD) Average Monthly	0.163	0.184	0.180	0.185	0.144	0.177	0.192	0.209	0.164	0.176	0.172	0.167
Flow (MGD) Daily Maximum	0.222	0.318	0.277	0.298	0.174	0.326	0.349	0.609	0.257	0.325	0.261	0.215
pH (S.U.) Minimum	6.36	6.54	6.36	6.39	6.19	6.29	6.44	6.12	6.17	6.51	6.43	6.29
pH (S.U.) Maximum	7.55	7.13	7.16	7.17	7.23	7.15	7.30	7.37	7.14	7.18	7.10	7.15
DO (mg/L) Minimum	5.56	6.07	6.25	5.65	5.89	5.06	4.99	4.36	5.73	5.91	6.27	6.41
TRC (mg/L) Average Monthly	0.02	0.02	0.03	0.02	0.04	0.01	0.04	0.02	0.01	0.02	0.01	0.01
TRC (mg/L) Instant. Maximum	0.12	0.11	0.14	0.16	0.39	0.11	0.28	0.40	0.09	0.13	0.05	0.08
CBOD5 (lbs/day) Average Monthly	35.73	7.15	< 4.34	6.40	< 3.08	< 3.24	< 4.07	< 6.15	6.11	5.87	6.37	< 3.44
CBOD5 (lbs/day) Weekly Average	126.00	11.33	5.63	12.88	3.88	4.32	5.49	13.65	11.08	7.98	7.43	4.89
CBOD5 (mg/L) Average Monthly	24.18	4.40	< 2.93	4.86	< 2.50	< 2.28	< 2.64	< 4.33	4.75	4.10	4.78	< 2.42
CBOD5 (mg/L) Weekly Average	84.20	5.00	3.90	9.30	3.00	3.10	3.50	8.10	8.80	4.60	5.50	3.60
BOD5 (lbs/day) Raw Sewage Influent Ave. Monthly	419.1	583.5	548.4	429.9	316.7	361.6	394.2	384.5	440.9	374.2	362.40	303.5
BOD5 (lbs/day) Raw Sewage Influent Daily Maximum	697.2	1080.5	636.6	461.7	325.7	447.7	595.8	518.1	482.2	663.4	476.0	482.0
BOD5 (mg/L) Raw Sewage Influent Ave. Monthly	300.8	353.8	374.5	332.6	263.7	253.5	253.8	290.5	339.5	272.2	273.8	213.8
TSS (lbs/day) Average Monthly	< 124.80	< 16.25	< 7.34	< 8.03	< 6.70	10.10	< 11.26	< 12.20	< 10.02	< 9.77	12.10	< 11.02
TSS (lbs/day) Raw Sewage Influent Ave. Monthly	292	796	738	447	375	400	389	384	441	423	367	217

TSS (lbs/day) Raw Sewage Influent Daily Maximum	418	1410	930	583	555	481	651	547	546	762	446	295
TSS (lbs/day) Weekly Average	474.00	45.33	< 8.67	14.31	8.17	14.85	17.41	21.90	13.85	13.88	16.51	20.39
TSS (mg/L) Average Monthly	< 83.75	< 8.80	< 5.00	< 6.20	< 5.50	7.00	< 7.60	< 9.00	< 7.75	< 6.80	9.00	< 7.80
TSS (mg/L) Raw Sewage Influent Ave. Monthly	208	483	500	349	302	281	251	263	387	301	276	156
TSS (mg/L) Weekly Average	316.00	18.00	< 5.00	11.00	7.00	10.00	12.00	13.00	11.00	10.00	12.00	15.00
Fecal Coliform (CFU/100 ml) Geometric Mean	538	253	176	87	44	61	108	162	43	21	26	62
Fecal Coliform (CFU/100 ml) Instant Maximum	12600	5400	10300	240	55	79	260	627	122	54	69	883
Nitrate-Nitrite (mg/L) Average Monthly	22.65	32.04	38.68	35.14	43.88	40.48	41.04	35.25	41.23	29.36	33.63	35.20
Total Nitrogen (mg/L) Average Monthly	< 32.17	< 33.04	< 39.68	< 36.14	< 44.88	< 41.48	< 42.14	< 37.90	< 42.23	< 30.50	< 34.75	< 36.20
Total Nitrogen (lbs) Total Monthly	< 1243.20	< 1639.59	< 1798.00	< 1393.80	< 1703.76	< 1776.00	< 1981.21	< 1481.80	< 1642.80	< 1338.27	< 1389.00	< 1589.37
Ammonia (lbs/day) Average Monthly	< 7.329	0.296	0.294	< 0.171	< 0.137	0.223	< 0.665	4.360	< 0.340	1.568	0.649	< 0.210
Ammonia (mg/L) Average Monthly	< 4.891	0.176	0.199	< 0.133	< 0.112	0.158	< 0.466	2.730	< 0.261	1.133	0.481	< 0.145
Ammonia (lbs) Total Monthly	< 205.212	9.176	9.114	< 5.130	< 4.247	6.690	< 20.62	135.052	< 10.200	48.608	19.470	< 6.510
TKN (mg/L) Average Monthly	< 9.53	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.10	< 2.65	< 1.00	< 1.14	< 1.13	< 1.00
TKN (lbs) Total Monthly	< 395.36	< 50.22	< 45.57	< 38.70	< 37.82	< 42.90	< 52.39	< 126.17	< 39.00	< 49.91	< 45.00	< 44.33
Total Phosphorus (lbs/day)Ave. Monthly	1.89	< 0.55	1.04	0.75	0.62	< 1.41	1.07	1.30	0.62	1.46	1.07	0.48
Total Phosphorus (mg/L) Ave. Monthly	1.29	< 0.31	0.72	0.59	0.51	< 0.99	0.69	0.92	0.48	1.03	0.79	0.35
Total Phosphorus (lbs) Total Monthly	52.92	< 17.05	32.24	22.50	19.22	< 42.30	33.17	40.30	18.60	45.26	32.10	14.88
Total Phosphorus (lbs) Effluent Total Annual						< 366.66						

3.2 Effluent Violations for Outfall 001, from: April 1, 2018 To: February 28, 2019

Parameter	Date	SBC	DMR Value	Units	Limit Value	Units
DO	08/31/18	Min	4.99	mg/L	5.0	mg/L
DO	07/31/18	Min	4.36	mg/L	5.0	mg/L
CBOD5	02/28/19	Wkly Avg	126.00	lbs/day	70	lbs/day
CBOD5	02/28/19	Wkly Avg	84.20	mg/L	40	mg/L
TSS	02/28/19	Avg Mo	< 124.80	lbs/day	52	lbs/day
TSS	02/28/19	Wkly Avg	474.00	lbs/day	78	lbs/day
TSS	02/28/19	Avg Mo	< 83.75	mg/L	30	mg/L
TSS	02/28/19	Wkly Avg	316.00	mg/L	45	mg/L
Fecal Coliform	02/28/19	IMAX	12600	CFU/100 ml	10000	CFU/100 ml
Fecal Coliform	12/31/18	IMAX	10300	CFU/100 ml	10000	CFU/100 ml
Ammonia	07/31/18	Avg Mo	2.730	mg/L	2.5	mg/L

Eleven effluent violations were noted on DMR during the past 12 months of operations as shown on the table above. CBOD5, TSS and Fecal Coliform violation that occurred in February 2019 was attributed to electrical fuse blowing which cut off power to the blowers. No reason was given for the Ammonia, DO and Fecal Coliform violations which occurred in 2018. The four violations noted in 2018 appear to be operation related. The facility's compliance record is satisfactory.

3.3 Summary of Inspections:

The facility has been inspected 7 times during the past permit cycle. Two effluent violations were noted during plant inspections. A notice of violation was sent on… No major issues noted during facility inspections.

4.0 Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** .21
Latitude 40º 17' 18.85" **Longitude** -76º 33' 43.25"
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)

4.2 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

4.3 Water Quality-Based Limitations

4.3.1 Receiving Stream

The receiving stream is the Killinger Creek. According to 25 PA § 93.9o, this stream is protected for Trout Stocking Fishery (TSF). It is located in Drainage List o and State Watershed 7-D. It has been assigned stream code 09705. According to the Department's Integrated Water Quality Monitoring and Assessment Report, Killinger Creek is impaired for pathogens and nutrients. Source is unknown and agriculture, respectively. TMDL is completed and approved by EPA in 2001. See 303d listed streams section of the report for further discussion.

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_{7-10}) for chronic criteria and the lowest one-day average flow rate expected to occur once every ten years (Q_{1-10}) 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_{30-10} for the chronic ammonia criterion instead of the Q_{7-10}. The Q_{30-10} 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_{7-10} 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 the point of discharge calculated using StreamStats = 2.01 mi^2.

The summer Q_{7-10} at discharge = 2.01 mi^2 x 0.14 ft^3/s/mi^2 = 0.28 ft^3/s.

4.3.2 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 = 6.6 (July to Sep. DMR median)
- Discharge Temperature = 25 ^{o} C (Default)
- Stream pH = 7.8 (WQN Station on Quittapahilla Creek)
- Stream Temperature = 19 ^{o}C (WQN Station on Quittapahilla Creek)
- Background NH_3-N = 0.0 (default)
- Discharge flow = 0.02MGD

4.3.3 $CBOD_5$ & NH_3-N

Due to their proximities, Campbelltown East STP and Vanderhomes STP discharges were modeled together as two reaches. The attached WQM 7.0 stream model results presented in attachment B indicates a limit of 25 mg/l for $CBOD_5$ for Campbelltown East STP discharge is adequate to protect the water quality of the stream. This limit is consistent with the existing permit and the STP has been consistently achieving below this limitation. Therefore, a limit of 25 mg/l AML, 40mg/l average weekly limit (AWL) and 50 mg/l IMAX are recommended for this permit cycle.

Mass limits are calculated as follows:

Mass based AML (lb/day) = 25 (mg/L) × 0.21(mgd) × 8.34 = 43

Mass based AWL (lb/day) = 40 (mg/L) × 0.21 (mgd) × 8.34 = 70

The attached WQM 7.0 stream model results (attachment B) also indicates that, for the Campbelltown East STP discharge, a summer limit of 2.5 mg/l for NH_3-N is necessary to protect aquatic life from toxicity effects. The limit for winter months is 3 times the summer limit (7.5 mg/l NH_3-N).

Mass based AML (lb/day) for summer months = 2.5 (mg/L) × 0.21(mgd) × 8.34 = 4.4

Mass based AML (lb/day) for winter months = 7.5 (mg/L) × 0.21 (mgd) × 8.34 = 13.1

4.3.4 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 as well, this limit will be continued in the renewed permit with a daily monitoring requirement per DEP guidance.

4.3.5 Total Suspended Solids(TSS):

There is no water quality criterion for TSS. The existing limit of 30 mg/l AML based on the minimum level of effluent quality attainable by secondary treatment as defined in 40 CFR 133.102b(1), 40 CFR 133.102b(1), 25 PA § 92a.47(a)(1) and 92a.47(a)(2) will remain in the permit.

Mass based AML (lb/day) = 30 (mg/L) × 0.21(mgd) × 8.34 = 52

Mass based AWL (lb/day) = 45 (mg/L) × 0.21 (mgd) × 8.34 = 78

4.3.6 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. 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 at a monitoring frequency following Table 6-3 of DEP's Technical Guidance for Development and Specification of effluent Limitations (No. 362-0400-001). Any facility in Phases 4 and 5 that undergoes expansion is subjected to cap load right away.

EPA published the Chesapeake Bay Total Maximum Daily Load (TMDL) in December of 2010. Despite extensive restoration efforts during the past 25 years, the TMDL was prompted by insufficient progress and continued poor water quality in the Chesapeake Bay and its tidal tributaries.

In order to address the TMDL, Pennsylvania developed in addition to the Bay Strategy, a Chesapeake Watershed Implementation Plan (WIP) Phase 1 in January 2011 and Phase 2 in March 2012. In accordance with the Phase 2 WIP and its supplement, re-issuing permits for significant dischargers follow the same phased approach formulated in the original Bay strategy, whilst Phase 4 and Phase 5 will be required to monitor and report TN and TP during permit renewal. This facility is, classified as a phase 4, and had been monitoring and reporting Nitrate-Nitrite as N, Total Kjeldahl Nitrogen and Total Nitrogen monthly and will continue during this permit cycle. There is limitation on Total Phosphorus in the permit, no monitoring is required.

4.3.7 Phosphorus

The average monthly limit of 2mg/l phosphorus in the existing permit was required due to nutrient impairment of the stream prior to TMDL development for the Quittapahilla Creek watershed. The TMDL allocated a wasteload of 1,128.5lbs/year of Total Phosphorus to Killinger Creek. A Total Phosphorus wasteload of 974lbs/year was allocated from a total wasteload of 1,128.5lbs/yr to this facility and the rest of the wasteload of 154.5lbs/yr. was allocated to Vanderhomes STP downstream of the facility.

4.3.8 Total Residual Chlorine:

The attached computer printout presented in attachment C utilizes the equations and calculations as presented in the Department's 2003 Implementation Guidance for Residual Chlorine (TRC) (ID # 391-2000-015) for developing chlorine limitations. The results presented in attachment C indicates that a water quality limit of 0.13 mg/l monthly average and IMAX of 0.44 mg/l would be needed to prevent toxicity concerns. However, the existing limits of 0.12mg/l monthly average and IMAX of 0.40mg/l will remain in the permit due to anti-backsliding restrictions. DMR and inspection reports indicate the facility is meeting the permit requirement.

4.3.9 Toxics

A reasonable potential (RP) analysis was done for pollutants submitted with the application. All pollutants were entered into a Toxics Screening Analysis spreadsheet to determine if any pollutants are parameters of concern that require PENTOXSD modeling. All pollutants above the most stringent Chapter 93 criteria are considered parameters of concern. This also includes samples that resulted in non-detect, but the method detection limit that was used is higher than DEP's target quantitation limit (QL). All pollutants that were determined to be candidates for PENTOXSD modeling were entered into the PENTOXSD model. The most stringent WQBELs recommended by the PENTOXSD model were then entered into the

same Toxics Screening Analysis spreadsheet in order to determine which parameters of concern needs limitation or monitoring. Total Copper was determined to be parameter of concern and was analyzed with the PENTOXSD Model. The permit was amended during previous permit cycle and Total Copper limitation was dropped based on two WER tests conducted on June 5th and July 31 in 2013 using Ceriodaphnia dubia as test species. The tests were conducted using 55% effluent and 45% stream water. In addition, laboratory water was constituted with various spiked copper concentration to complete the tests. The study covers Dissolved Copper as well as Total Copper. The summary of the final results approved by the Department and EPA is shown on the tables A. and B. below.

Table A: Total Copper

Test1 June 2013	EC 50	EC 50 (Normalized	Normalized Table SMAV	WER
Lab water	9.22	9.98ppb	24.0ppb	NA
Effluent	157.37	98.18	NA	4.09
Test 2 July/August 2013				
Lab water	20.01ppb	23.16ppb	24.41	NA
Effluent	129.05ppb	84.88ppb	NA	3.54
Final Site WER				3.80*

Table B: Dissolved Copper

Test 1 June 2013	EC 50	EC 50 (Normalized	Normalized Table SMAV	WER
Lab water	9.04	9.79ppb	22.11ppb	NA
Effluent	137.17	84.33	NA	3.81
Test 2 July/August 2013				
Lab water	19.36ppb	22.41ppb	22.11ppb	NA
Effluent	107.21ppb	70.51ppb	NA	3.15
Final Site WER				3.46*

*Final site WER is the geometric mean of the two WER results

PENTOXSD modeling was conducted with the approved WER for Total Copper entered into PENTOXSD model under the criterion modifier tab. The most stringent WQBELs recommended by the PENTOXSD model presented in attachment C was then entered into the same Toxics Screening Analysis spreadsheet in order to determine if limitation or monitoring was necessary. Monitoring of Total Copper was recommended. See the Toxic screenings spreadsheet presented in attachment E for details.

The recommended monitoring follows 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

4.3.10 TDS, Sulfate, Chloride, Bromide & 1,4-Dioxane

Under the authority of §92a.61, DEP has determined it should implement increased monitoring in NPDES permits for TDS, sulfate, chloride, bromide, and 1,4-dioxane. The following approach will be implemented for point source discharges upon issuance or reissuance of an individual NPDES permit:

- Where the concentration of TDS in the discharge exceeds 1,000 mg/L, or the net TDS load from a discharge exceeds 20,000 lbs/day, and the discharge flow exceeds 0.1 MGD, Part A of the permit should include monitor and report for TDS, sulfate, chloride, and bromide. Discharges of 0.1 MGD or less should monitor and report for TDS, sulfate, chloride, and bromide if the concentration of TDS in the discharge exceeds 5,000 mg/L.

- Where the concentration of bromide in a discharge exceeds 1 mg/L and the discharge flow exceeds 0.1 MGD, Part A of the permit should include monitor and report for bromide. Discharges of 0.1 MGD or less should monitor and report for bromide if the concentration of bromide in the discharge exceeds 10 mg/L.

- Where the concentration of 1,4-dioxane (CAS 123-91-1) in a discharge exceeds 10 µg/L and the discharge flow exceeds 0.1 MGD, Part A of the permit should include monitor and report for 1,4-dioxane. Discharges of 0.1 MGD or less should monitor and report for 1,4-dioxane if the concentration of 1,4-dioxane in the discharge exceeds 100 µg/L.

The maximum daily TDS discharge submitted with the application is 540 mg/L which is equivalent to 946lbs/day based on the permitted flow of 0.21 MGD. The discharge level for TDS is below the minimum 1000 mg/l and 20,000lbs/day, to require monitoring, therefore no monitoring of TDS, Chloride, Sulfate, and Bromide will be required in the permit. There is no data for 1,4-dioxane, therefore no monitoring is required for 1,4-dioxane

4.3.11 Influent BOD and TSS Monitoring

The permit will include 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.

4.3.12 Pretreatment Requirements

The design annual average flow of the treatment plant is 0.21 MGD and the facility receives flow from no significant Industrial users. There is no approved pretreatment program for the facility, however, the permit contains standard conditions requiring the permittee to monitor and control industrial users if applicable.

5.0 Other Requirements

5.1 Anti-backsliding

Not applicable to this permit

5.2 Stormwater:

No storm water outfall is associated with this facility

5.3 Special Permit Conditions

The permit will contain 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.

5.4 Biosolids Management

Digested sludge is land applied under biosolid permit number PAG083520 or hauled to North Londonderry Township STP during winter months.

5.5 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.

5.6 Class A Wild Trout Fisheries

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

5.7 303d Listed Streams:

The discharge is located on a stream segment that is designated on the 303(d) list as impaired, and the impairment is due to nutrients from agricultural activities in the watershed. TMDL for Quittapahilla Creek Watershed was approved in 2001 The wasteload allocation (WLA) for phosphorus in the Killinger creek watershed was set at 1128.5lbs/year based on Campbelltown East plant discharge. The document explained that average monthly discharge of 2mg/l at waste flow of 0.21mgd will account for less than1% total phosphorus loading to Killinger Creek and limits Campbelltown East plant discharge to the existing NPDES permit limit of 2mg/l at 0.21mgd, however Vanderhomes formerly Palm City Mobile Home Park was not included in the WLA. The WLA was divided between this facility and Vanderhomes STP downstream of the this discharge. A Total Phosphorus wasteload of 974lbs/year was allocated from a total load of 1,128.5lbs/yr to this facility and the rest of the wasteload of 154.5lbs/yr was allocated to Vanderhomes downstream of the facility.

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

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 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
TRC	XXX	XXX	XXX	0.12	XXX	0.40	1/day	Grab
CBOD5	43	70	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	52	78	XXX	30	45	60	1/week	24-Hr Composite
TSS Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	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 Nov 1 - Apr 30	13.1	XXX	XXX	7.5	XXX	15	1/week	24-Hr Composite
Ammonia May 1 - Oct 31	4.4	XXX	XXX	2.5	XXX	5	1/week	24-Hr Composite
Total Phosphorus	3.5	XXX	XXX	2.0	XXX	4	1/week	24-Hr Composite

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

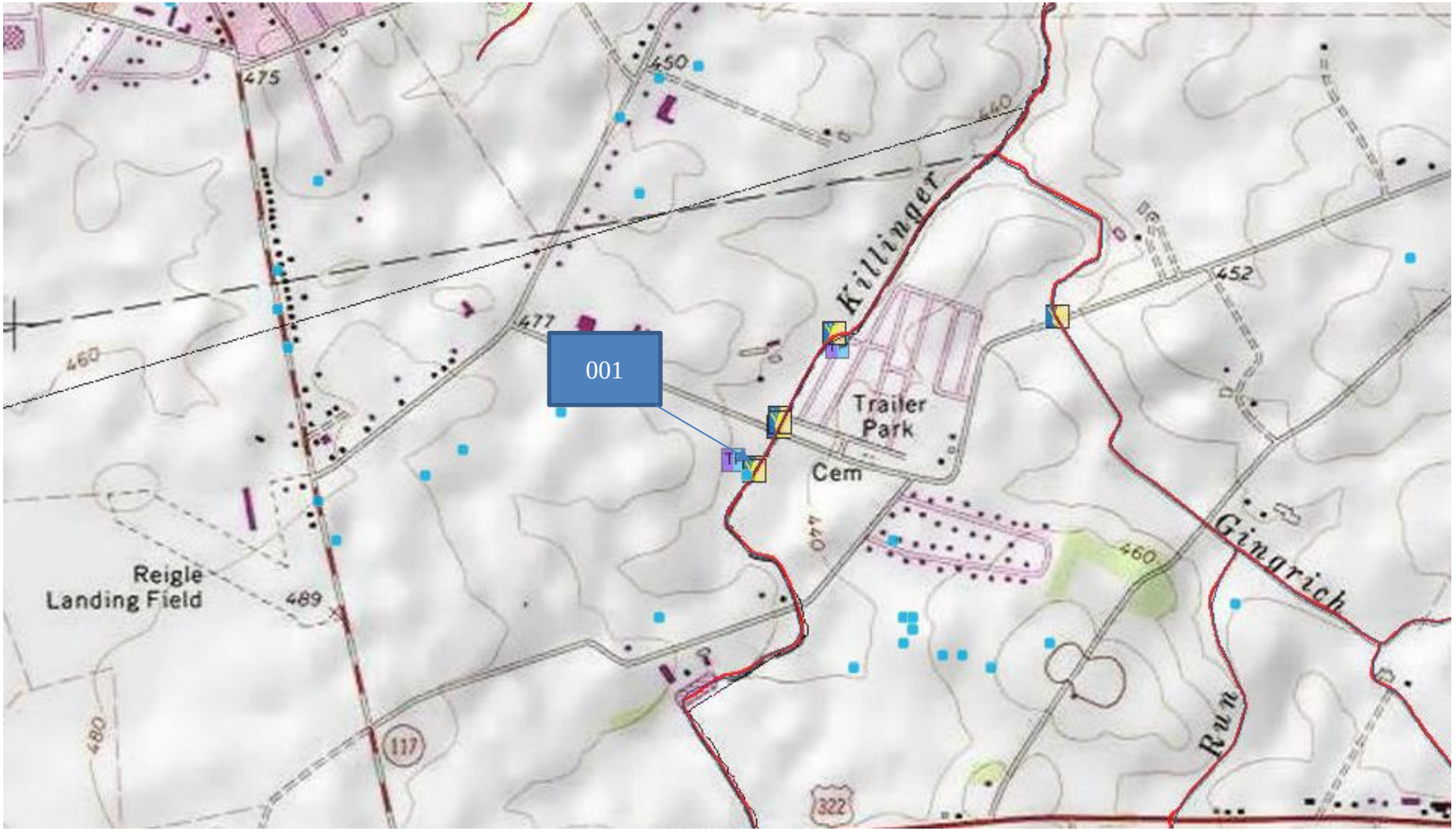
Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Total Copper	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Nitrate-Nitrite	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Total Nitrogen	XXX	XXX	XXX	Report	XXX	XXX	1/month	Calculation
TKN	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Total Phosphorus (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Total Phosphorus (lbs)	XXX	974 Total Annual	XXX	XXX	XXX	XXX	1/year	Calculation

Compliance Sampling Location: At Outfall 001

7.0 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 **D**)
☐	Temperature Model Spreadsheet (see Attachment)
☒	Toxics Screening Analysis Spreadsheet (see Attachment **E**)
☒	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: 1. Establishing effluent limitation for individual sewage permit,
☒	Other: WIP 2 Supplement

8.0 Attachments

A. Topographical Map



B. WQM Model Results

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
07D	9705	KILLINGER 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)
4.050	Camp. East Plt	PA0087700	0.210	CBOD5	25		
				NH3-N	2.88	5.76	
				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)
3.800	Vanderhomes MHP	PA0033065	0.036	CBOD5	25		
				NH3-N	8.51	17.02	
				Dissolved Oxygen			5

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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	9705	KILLINGER CREEK	**4.050**	423.00	2.01	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	19.00	7.80	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
Camp. East Plt	PA0087700	0.2100	0.2100	0.2100	0.000	25.00	6.60

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	5.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

Permit No. PA0087700

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	9705	KILLINGER CREEK	**3.800**	420.00	2.20	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	0.140	0.00	0.00	0.000	0.000	0.0	0.00	0.00	19.00	7.80	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
Vanderhomes MHP	PA0033065	0.0360	0.0360	0.0360	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	5.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

Permit No. PA0087700

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	9705	KILLINGER CREEK	**3.420**	415.00	2.21	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	19.00	7.80	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	5.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

Permit No. PA0087700

WQM 7.0 Hydrodynamic Outputs

SWP Basin	Stream Code	Stream Name
07D	9705	KILLINGER 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												
4.050	0.28	0.00	0.28	.3249	0.00227	.476	9.98	20.95	0.13	0.120	22.22	6.85
3.800	0.31	0.00	0.31	.3806	0.00249	.484	10.52	21.73	0.14	0.172	22.32	6.87
Q1-10 Flow												
4.050	0.25	0.00	0.25	.3249	0.00227	NA	NA	NA	0.12	0.123	22.39	6.83
3.800	0.27	0.00	0.27	.3806	0.00249	NA	NA	NA	0.13	0.177	22.49	6.85
Q30-10 Flow												
4.050	0.35	0.00	0.35	.3249	0.00227	NA	NA	NA	0.13	0.113	21.90	6.89
3.800	0.38	0.00	0.38	.3806	0.00249	NA	NA	NA	0.14	0.163	22.01	6.91

Permit No. PA0087700

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	6		

Permit No. PA0087700

WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
07D	9705	KILLINGER 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
4.050	Camp. East Plt	8.99	15.93	8.99	14.06	2	12
3.800	Vanderhomes M	5.68	33.62	8.81	29.67	2	12

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
4.050	Camp. East Plt	1.79	3.69	1.79	2.88	2	22
3.800	Vanderhomes M	1.4	10.9	1.75	8.51	2	22

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)		
4.05	Camp. East Plt	25	25	2.88	2.88	5	5	0	0
3.80	Vanderhomes MHP	25	25	8.51	8.51	5	5	0	0

Permit No. PA0087700

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
07D	9705	KILLINGER CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
4.050	0.210	22.215	6.848
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
9.981	0.476	20.953	0.128
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
14.32	1.393	1.54	0.830
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
6.505	22.691	Owens	6
Reach Travel Time (days)			
0.120			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.012	14.06	1.53	6.64
0.024	13.80	1.51	6.76
0.036	13.55	1.50	6.85
0.048	13.30	1.48	6.93
0.060	13.06	1.47	6.99
0.072	12.82	1.45	7.05
0.084	12.59	1.44	7.10
0.096	12.36	1.42	7.14
0.108	12.13	1.41	7.18
0.120	11.91	1.40	7.22

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
3.800	0.246	22.316	6.874
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
10.518	0.484	21.735	0.135
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
12.58	1.378	1.92	0.837
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
7.080	22.982	Owens	6
Reach Travel Time (days)			
0.172			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.017	12.26	1.89	7.13
0.034	11.94	1.86	7.17
0.051	11.63	1.84	7.21
0.069	11.33	1.81	7.25
0.086	11.03	1.78	7.29
0.103	10.75	1.76	7.32
0.120	10.47	1.73	7.36
0.137	10.20	1.71	7.39
0.154	9.93	1.69	7.42
0.172	9.67	1.66	7.45

Permit No. PA0087700

C. PENTOXSD Model Results

PENTOXSD Analysis Results

Recommended Effluent Limitations

SWP Basin	Stream Code:	Stream Name:
07D	9705	KILLINGER CREEK

RMI	Name	Permit Number	Disc Flow (mgd)
4.05	Camp. East Plt	PA0087700	0.2100

Parameter	Effluent Limit (µg/L)	Governing Criterion	Max. Daily Limit (µg/L)	Most Stringent WQBEL (µg/L)	Most Stringent WQBEL Criterion
COPPER	97.445	CFC	152.03	97.445	CFC

RMI	Name	Permit Number	Disc Flow (mgd)
3.80	Vanderhomes MHP	PA0033065	0.0360

Permit No. PA0087700

PENTOXSD

Modeling Input Data

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
9705	4.05	423.00	2.01	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	0.14	0	0	0	0	0	0	0	100	7.8	100	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
Camp. East Plt	PA0087700	0.21	0.21	0.21	0	0	0	0	0	207	6.6

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	1000000	0	0.5	0.5	0	0	0	0	3.8	0

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
9705	3.80	420.00	2.20	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	0.14	0	0	0	0	0	0	0	100	7.8	100	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
Vanderhomes MHP	PA0033065	0.036	0.036	0.036	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

Permit No. PA0087700

PENTOXSD Analysis Results

Hydrodynamics

SWP Basin	Stream Code:	Stream Name:
07D	9705	KILLINGER 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											
4.050	0.2814	0	0.2814	0.32486	0.0023	0.4763	9.9807	20.953	0.1275	0.1198	1.876
3.800	0.308	0	0.308	0.05569	0	0	0	0	0	0	0
Qh Hydrodynamics											
4.050	2.4530	0	2.4530	0.32486	0.0023	0.9306	9.9807	10.725	0.2991	0.0511	2.487
3.800	2.6545	0	2.6545	0.05569	0	0	0	0	0	0	0

Permit No. PA0087700

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number
4.05	Camp. East Pit	PA0087700

AFC

Q7-10: **CCT (min)** 1.876 **PMF** 1 **Analysis pH** 6.847 **Analysis Hardness** 157.335

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	78.272	81.533	152.157

Criteria Modifier of 3.8 applied. Dissolved WQC. Chemical translator of 0.96 applied.

CFC

Q7-10: **CCT (min)** 1.876 **PMF** 1 **Analysis pH** 6.847 **Analysis Hardness** 157.335

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	50.127	52.216	97.445

Criteria Modifier of 3.8 applied. Dissolved WQC. Chemical translator of 0.96 applied.

THH

Q7-10: **CCT (min)** 1.876 **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

CRL

Qh: **CCT (min)** 2.487 **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

Permit No. PA0087700

D. Total Residual Chlorine Calculations

Copy of TRC_CALC1

TRC EVALUATION

Input appropriate values in A3:A9 and D3:D9

0.28	= Q stream (cfs)	0.5	= CV Daily
0.21	= 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 = 0.294	1.3.2.iii	WLA cfc = 0.279
PENTOXSD TRG	5.1a	LTAMULT afc = 0.373	5.1c	LTAMULT cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc= 0.110	5.1d	LTA_cfc = 0.162

Source		Effluent Limit Calculations	
PENTOXSD TRG	5.1f	AML MULT = 1.231	
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.135	AFC
		INST MAX LIMIT (mg/l) = 0.441	

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)**

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Permit No. PA0087700

E. Toxic Screening Analysis Spreadsheet

WATER QUALITY POLLUTANTS OF CONCERN
VERSION 2.5

Facility: **Cambelltown East STP** NPDES Permit No.: **PA0087700** Outfall: **001**

Analysis Hardness (mg/L): **100** Discharge Flow (MGD): **0.21** Analysis pH (SU): **7**

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
Total Dissolved Solids		5400000	500000	Yes		Monitor
Chloride		164000	250000	No		Monitor
Bromide		0.5	N/A	No		Monitor
Sulfate		64500	250000	No		Monitor
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		18	9.3	Yes	97	Monitor
Free Available Cyanide			5.2			
Total Cyanide			N/A			
Dissolved Iron			300			
Total Iron			1500			
Total Lead			3.2			
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		91	119.8	No		
Total Molybdenum			N/A			