

Application Type Renewal
Facility Type Non-Municipal
Major / Minor Minor

**NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE**

Application No. PA0033065
APS ID 636204
Authorization ID 1233260

Applicant and Facility Information

Applicant Name	<u>Vanderhomes LLC</u>	Facility Name	<u>Palm City MHP</u>
Applicant Address	<u>2379 Brandt Road</u> <u>Annville, PA 17003-8849</u>	Facility Address	<u>2379 Brandt Road</u> <u>Annville, PA 17003-8849</u>
Applicant Contact	<u>John Vanderhoef</u>	Facility Contact	<u>John Vanderhoef</u>
Applicant Phone	<u>(717) 838-6375</u>	Facility Phone	<u>(717) 838-6375</u>
Client ID	<u>261466</u>	Site ID	<u>245307</u>
Ch 94 Load Status	<u>Not Overloaded</u>	Municipality	<u>South Annville Township</u>
Connection Status		County	<u>Lebanon</u>
Date Application Received	<u>June 14, 2018</u>	EPA Waived?	<u>Yes</u>
Date Application Accepted	<u>July 5, 2018</u>	If No, Reason	
Purpose of Application	<u>Permit Renewal for discharge of treated sewage</u>		

Summary of Review

1.0 General Discussion

This factsheet supports the renewal of an existing NPDES permit for discharge of treated domestic sewage from Vanderhomes wastewater treatment plant that serves Palm City Mobile Home Park. The facility is own and operated by Vanderhomes LLC. The facility has a design capacity of 0.036 mgd and discharges effluent to Killinger Creek which classified for trout stocking. The existing NPDES permit was issued on September 24, 2013 with an effective date of October 1, 2013 and expiration date of September 30, 2018. The applicant submitted a timely renewal application to the Department and is currently operating under the terms and conditions in the existing permit pending Department action on the renewal application. A topographic map showing the discharge location attachment

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.

Approve	Deny	Signatures	Date
X		J. Pascal Kwedza, P.E. / Environmental Engineer	October 17, 2019
		Daniel W. Martin, P.E. / Environmental Engineer Manager	
		Maria D. Bebenek, P.E., Program Manager	

Summary of Review

1.2 Changes to the existing Permit

- Semi-annual monitoring of Total Nitrogen, TKN and nitrate-Nitrite have been added

1.3 Existing Permit Limits and Monitoring Requirements

DISCHARGE LIMITATIONS							MONITORING REQUIREMENTS	
Discharge Parameter	Mass Units (lbs/day)		Concentrations (mg/l)				Monitoring Frequency	Sample Type
	Average Monthly	Maximum Daily	Inst. Minimum	Average Monthly	Maximum Daily	Inst. Maximum		
	Monitor & Report	Monitor & Report	XXX	XXX	XXX	XXX	continuous	Measured
Flow (mgd)	XXX	XXX	6.0	XXX	XXX	9.0	1/day	Grab
pH (S.U.)	XXX	XXX	5.0	XXX	XXX	XXX	1/day	Grab
D.O.	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
Total Residual Chlorine	XXX	XXX	XXX	30	XXX	60	2/month	8-hour comp
Total Suspended Solids	XXX	XXX	XXX	25	XXX	50	2/month	8-hour comp
CBOD ₅	XXX	XXX	XXX	3.0	XXX	6.0	2/month	8-hour comp
NH ₃ -N (5/1 to 10/31)	XXX	XXX	XXX	9.0	XXX	18	2/month	8-hour comp
NH ₃ -N (11/1 to 4/30)	XXX	XXX	XXX	200	XXX	1,000	2/month	Grab
Fecal Coliform (5/1 to 9/30)	XXX	XXX	XXX	2,000	XXX	10,000	2/month	Grab
Fecal Coliform (10/1 to 4/30)	XXX	XXX	XXX	Report	XXX	XXX	1/month	8-hour comp
Total Phosphorus	Report	154.5 Total Annual	XXX	Report	XXX	XXX	1/month	8-hour comp

1.40 Discharge, Receiving Waters and Water Supply Information			
Outfall No.	<u>001</u>	Design Flow (MGD)	<u>.036</u>
Latitude	<u>40° 17' 29.54"</u>	Longitude	<u>-76° 33' 35.08"</u>
Quad Name	<u>Palmyra</u>	Quad Code	<u>1633</u>
Wastewater Description: <u>Sewage Effluent</u>			
Receiving Waters	<u>Killinger Creek (TSF)</u>	Stream Code	<u>09705</u>
NHD Com ID	<u>56400711</u>	RMI	<u>3.8</u>
Drainage Area	<u>2.2sq mi.</u>	Yield (cfs/mi ²)	<u>0.14</u>
Q ₇₋₁₀ Flow (cfs)	<u>0.31</u>	Q ₇₋₁₀ Basis	<u>USGS Gage Station</u>
Elevation (ft)	<u></u>	Slope (ft/ft)	<u></u>
Watershed No.	<u>7-D</u>	Chapter 93 Class.	<u>TSF</u>
Existing Use	<u></u>	Existing Use Qualifier	<u></u>
Exceptions to Use	<u></u>	Exceptions to Criteria	<u></u>
Assessment Status	<u>Impaired</u>		
Cause(s) of Impairment	<u>Pathogens, Nutrients</u>		
Source(s) of Impairment	<u>Source Unknown, Agriculture</u>		
TMDL Status	<u>Final</u>	Name	<u>Quittapahilla Creek Watershed</u>
Background/Ambient Data		Data Source	
pH (SU)	<u></u>		<u></u>
Temperature (°F)	<u></u>		<u></u>
Hardness (mg/L)	<u></u>		<u></u>
Other:	<u></u>		<u></u>
Nearest Downstream Public Water Supply Intake	<u>PA American Water</u>		
PWS Waters	<u>Swatara Creek</u>	Flow at Intake (cfs)	<u></u>
PWS RMI	<u></u>	Distance from Outfall (mi)	<u>15.75</u>

Changes Since Last Permit Issuance:

Other Comments:

1.4.1 Water Supply Intake

The nearest downstream water supply intake is approximately 15.75 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.

2.0 Treatment Facility Summary				
Treatment Facility Name: Vanderhomes LLC - MHP				
WQM Permit No.		Issuance Date		
Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Secondary	Extended Aeration	Hypochlorite	0.036
Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
0.036		Not Overloaded	Aerobic Digestion	Combination of methods

Changes Since Last Permit Issuance: None

2.1 Treatment Facility

The treatment plant consists wet well with bar screen and 3 pumps, EQ tank, aeration tank, 2 clarifiers, clear well/dosing tank, 2 sand filters, chlorine contact tank and a digester.

2.2 Chemicals

- Sodium Hypochlorite for disinfection
- Aluminum Sulfate for phosphorus removal

3.0 Compliance History

3.1 DMR Data for Outfall 001 (from September 1, 2018 to August 31, 2019)

Parameter	AUG-19*	JUL-19	JUN-19	MAY-19	APR-19	MAR-19	FEB-19	JAN-19	DEC-18	NOV-18	OCT-18	SEP-18
Flow (MGD) Average Monthly		0.028	0.038	0.03	0.029	0.029	0.025	0.026	0.026	0.029	0.026	0.03
Flow (MGD) Daily Maximum		0.036	0.032	0.036	0.036	0.037	0.033	0.032	0.032	0.032	0.034	0.035
pH (S.U.) Minimum		6.7	6.97	7.04	7.0	7.07	7.22	7.13	6.99	6.99	6.95	6.96
pH (S.U.) Maximum		7.39	7.47	7.58	7.57	7.54	7.76	7.66	7.48	7.55	7.61	7.38
DO (mg/L) Minimum		6.0	7.0	7.0	8.0	8.0	8.0	8.0	7.0	7.0	7.0	6.0
TRC (mg/L) Average Monthly		0.09	0.09	0.04	0.13	0.17	0.24	0.25	0.24	0.2	0.12	0.18
TRC (mg/L) Instant. Maximum		0.36	0.3	0.54	0.44	0.44	0.57	0.49	0.62	0.39	0.34	0.45
CBOD5 (mg/L) Average Monthly		< 2	< 2	< 2	< 8.6	< 2	< 2.0	< 2.2	< 2	< 3.8	< 2.1	2.4
TSS (mg/L) Average Monthly		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 7	< 5.0	< 5.0	< 6
Fecal Coliform (CFU/100 ml) Geometric Mean		< 2	< 1	< 1	3.5	6	< 2.8	< 4.89	< 1	334	< 1	121
Fecal Coliform (CFU/100 ml) Inst. Maximum		4	< 1	< 1	4	31	8	24	< 1	430	< 1	540
Ammonia (mg/L) Average Monthly		0.1252	0.161	< 0.1	1.14	0.5	7.27	0.196	3.379	5.7	0.266	6.79
Total Phosphorus (lbs/day) Annual Ave.									0.32			
Total Phosphorus (mg/L) Ave. Monthly		2	2.3	2.6	1.9	1.9	1.6	1.33	0.77	1.4	1.6	1.8

- August DMR is not on eDMR yet

3.2 Compliance History	
Summary of DMRs:	Discharge Monitoring Reports (DMRs) review for the facility for the last 12 months of operation presented on the table above indicate permit limits have been met consistently. No permit violation was noted on DMRs during the period reviewed.
Summary of Inspections:	The facility was inspected 6 times during the past permit cycle. Inspection reports review for the facility during the period indicate permit limits have been met consistently. The reports made some recommendations to improve operation and maintenance of the facility. The facility was reminded to follow the Department's records keeping protocol and to submit DMR in a timely manner. The report also recommended installation of flow meter for accurate flow measurements.

4.0 Development of Effluent Limitations

Outfall No.	<u>001</u>	Design Flow (MGD)	<u>.036</u>
Latitude	<u>40° 17' 29.54"</u>	Longitude	<u>-76° 33' 35.09"</u>
Wastewater Description: <u>Sewage Effluent</u>			

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: Weekly averages are not applicable to this discharge

4.2 Water Quality-Based Limitations

4.1.1 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 (Q₇₋₁₀) for chronic criteria and the lowest one-day average flow rate expected to occur once every ten years (Q₁₋₁₀) 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 Q₃₀₋₁₀ for the chronic ammonia criterion instead of the Q₇₋₁₀. The Q₃₀₋₁₀ 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 Q₇₋

Q_{7-10} and drainage area at the gage is 67.7ft³/s and 483mi² respectively. The resulting yields are as follows:

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

The drainage area at the point of discharge calculated using StreamStats = 2.20 mi².

The summer Q_{7-10} at discharge = 2.20 mi² x 0.14 ft³/s/mi² = 0.31 ft³/s.

4.3.2 NH₃N Calculations

NH₃N 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 NH₃N criteria used in the attached computer model of the stream:

- Discharge pH = 7.0 (Default)
- Discharge Temperature = 25 ° C (Default)
- Stream pH = 7.8 (WQN Station on Quittapahilla Creek)
- Stream Temperature = 19 °C (WQN Station on Quittapahilla Creek)
- Background NH₃-N = 0.0 (default)
- Discharge flow = 0.036MGD

4.3.3 CBOD₅

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 CBOD₅ for Vanderhomes 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, and 50 mg/l IMAX are recommended for this permit cycle.

4.3.4 NH₃-N

The attached WQM 7.0 stream model results (attachment B) also indicates that, for the Vanderhomes STP discharge, a summer limit of 8.5 mg/l NH₃ as a monthly average is adequate to protect the aquatic life from toxicity effects. This is less stringent than the existing limit of 3.0mg/l which will remain in the permit due to anti-backsliding. The limit for winter months is 3 times the summer limit (9.0 mg/l NH₃-N).

4.3.5 Dissolved Oxygen

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

4.3.6 Toxics

No parameter of concern is associated with this discharge.

4.3.7 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 0.2mgd) 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 5, and had monitored Nitrate-Nitrite as N, Total Kjeldahl Nitrogen and Total Nitrogen in the past but will be required to resume monitoring them semi-annually during this permit cycle.

4.3.8 Phosphorus

Phosphorus load limitation based based on the TMDL approved for Quittapahilla Creek watershed in 2001. The WLA for phosphorus in the Killinger creek watershed was set at 1128.5lbs/year based on South Londonderry's plant. The document explained that average monthly discharge of 2mg/l at waste flow at 0.21mgd will account for less than1% total phosphorus loading to Killinger Creek and limits South Londonderry discharge to the existing NPDES permit limit of 2mg/l at 0.21mgd. However, since the approved TMDL did not include Vanderhomes STP, a TP load of 974lbs/year was allocated from a total load to Campbeltown East Plant and the rest of the load 154.5lbs/year is allocated to Vanderhomes STP. The facility has been monitoring Total phosphorus 2/month and has been complying with the Total Phosphorus load limitation.

4.3.9 Total Residual Chlorine

The attached TRC results presented in attachment C utilizes the equations and calculations presented in the Department's 2003 Implementation Guidance for Residual Chlorine (TRC) (ID # 391-2000-015) for developing chlorine limitations. The result indicates that a technology limit of 0.5 mg/l monthly average and 1.6 mg/l IMAX for the discharge would be needed to prevent toxicity concerns. This is consistent with the existing limit, and DMR and inspection data show facility is complying with this limitation.

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, and Chlorine minimization.

5.4 Biosolids Management

Digested sludge is hauled out periodically by a license hauler.

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 303d listed stream segment as impaired for phosphorus and TMDL was approved in 2001. Details on load allocation is presented under phosphorus section of the report (section 4.3.8).

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	Average Weekly	Minimum	Average Monthly	Maximum	Instant. Maximum		
Flow (MGD)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Inst Min	XXX	XXX	9.0	1/day	Grab
DO	XXX	XXX	5.0 Daily Min	XXX	XXX	XXX	1/day	Grab
TRC	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
CBOD5	XXX	XXX	XXX	25	XXX	50	2/month	8-Hr Composite
TSS	XXX	XXX	XXX	30	XXX	60	2/month	8-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2,000 Geo Mean	XXX	10,000	2/month	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1,000	2/month	Grab
Nitrate-Nitrite	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/6 months	8-Hr Composite
Total Nitrogen	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/6 months	Calculation
Ammonia Nov 1 - Apr 30	XXX	XXX	XXX	9.0	XXX	18	2/month	8-Hr Composite
Ammonia May 1 - Oct 31	XXX	XXX	XXX	3.0	XXX	6	2/month	8-Hr Composite
TKN	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/6 months	8-Hr Composite
Total Phosphorus	XXX	XXX	XXX	Report	XXX	XXX	2/month	8-Hr Composite

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

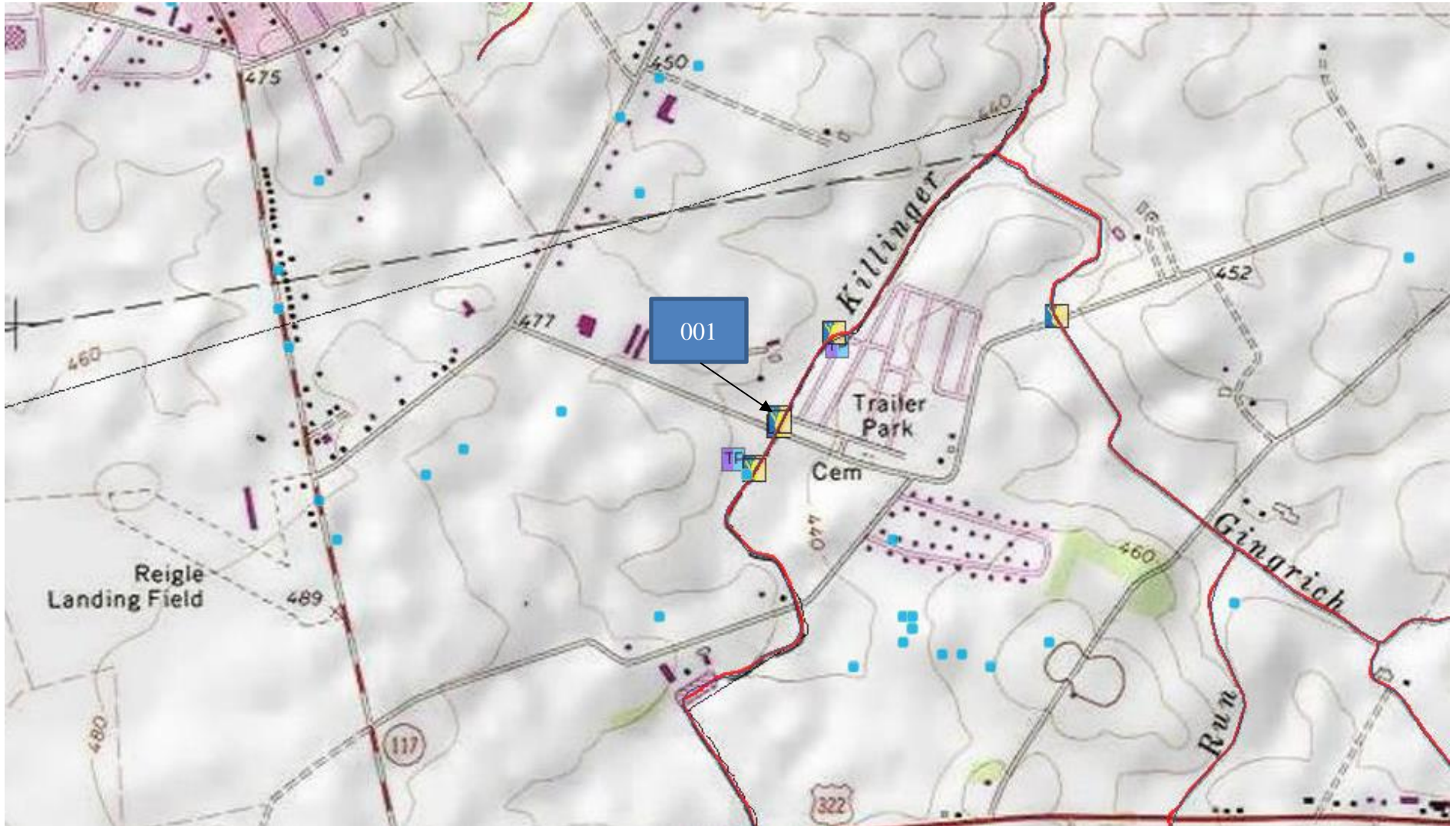
Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) ⁽¹⁾		Concentrations (mg/L)				Minimum ⁽²⁾ Measurement Frequency	Required Sample Type
	Average Monthly	Average Weekly	Minimum	Average Monthly	Maximum	Instant. Maximum		
Total Phosphorus	154.5 Annl Avg	XXX	XXX	XXX	XXX	XXX	1/year	Calculation

Compliance Sampling Location: At outfall 001

7.0 Tools and References Used to Develop Permit	
<input checked="" type="checkbox"/>	WQM for Windows Model (see Attachment B)
<input type="checkbox"/>	PENTOXSD for Windows Model (see Attachment)
<input checked="" type="checkbox"/>	TRC Model Spreadsheet (see Attachment C)
<input type="checkbox"/>	Temperature Model Spreadsheet (see Attachment)
<input type="checkbox"/>	Water Quality Toxics Management Strategy, 361-0100-003, 4/06.
<input checked="" type="checkbox"/>	Technical Guidance for the Development and Specification of Effluent Limitations, 362-0400-001, 10/97.
<input type="checkbox"/>	Policy for Permitting Surface Water Diversions, 362-2000-003, 3/98.
<input type="checkbox"/>	Policy for Conducting Technical Reviews of Minor NPDES Renewal Applications, 362-2000-008, 11/96.
<input type="checkbox"/>	Technology-Based Control Requirements for Water Treatment Plant Wastes, 362-2183-003, 10/97.
<input type="checkbox"/>	Technical Guidance for Development of NPDES Permit Requirements Steam Electric Industry, 362-2183-004, 12/97.
<input type="checkbox"/>	Pennsylvania CSO Policy, 385-2000-011, 9/08.
<input type="checkbox"/>	Water Quality Antidegradation Implementation Guidance, 391-0300-002, 11/03.
<input type="checkbox"/>	Implementation Guidance Evaluation & Process Thermal Discharge (316(a)) Federal Water Pollution Act, 391-2000-002, 4/97.
<input checked="" type="checkbox"/>	Determining Water Quality-Based Effluent Limits, 391-2000-003, 12/97.
<input type="checkbox"/>	Implementation Guidance Design Conditions, 391-2000-006, 9/97.
<input type="checkbox"/>	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.
<input type="checkbox"/>	Interim Method for the Sampling and Analysis of Osmotic Pressure on Streams, Brines, and Industrial Discharges, 391-2000-008, 10/1997.
<input type="checkbox"/>	Implementation Guidance for Section 95.6 Management of Point Source Phosphorus Discharges to Lakes, Ponds, and Impoundments, 391-2000-010, 3/99.
<input type="checkbox"/>	Technical Reference Guide (TRG) PENTOXSD for Windows, PA Single Discharge Wasteload Allocation Program for Toxics, Version 2.0, 391-2000-011, 5/2004.
<input checked="" type="checkbox"/>	Implementation Guidance for Section 93.7 Ammonia Criteria, 391-2000-013, 11/97.
<input type="checkbox"/>	Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers, 391-2000-014, 4/2008.
<input type="checkbox"/>	Implementation Guidance Total Residual Chlorine (TRC) Regulation, 391-2000-015, 11/1994.
<input type="checkbox"/>	Implementation Guidance for Temperature Criteria, 391-2000-017, 4/09.
<input type="checkbox"/>	Implementation Guidance for Section 95.9 Phosphorus Discharges to Free Flowing Streams, 391-2000-018, 10/97.
<input type="checkbox"/>	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.
<input type="checkbox"/>	Field Data Collection and Evaluation Protocol for Determining Stream and Point Source Discharge Design Hardness, 391-2000-021, 3/99.
<input type="checkbox"/>	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.
<input checked="" type="checkbox"/>	Design Stream Flows, 391-2000-023, 9/98.
<input type="checkbox"/>	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.
<input type="checkbox"/>	Evaluations of Phosphorus Discharges to Lakes, Ponds and Impoundments, 391-3200-013, 6/97.
<input checked="" type="checkbox"/>	Pennsylvania's Chesapeake Bay Tributary Strategy Implementation Plan for NPDES Permitting, 4/07.
<input type="checkbox"/>	Other: Quittapahilla Creek TMDL
<input type="checkbox"/>	Other:

8. Attachments

A. Topographical Map



B. WQM Model Results

WQM 7.0 Effluent Limits

<u>SWP Basin</u>		<u>Stream Code</u>		<u>Stream Name</u>			
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 Pit	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

Permit No. PA0033065

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	<input checked="" type="checkbox"/>

Stream Data

Design Cond.	LFY	Trib Flow	Stream Flow	Rch Trav Time	Rch Velocity	WD Ratio	Rch Width	Rch Depth	Tributary Temp	Tributary pH	Stream Temp	Stream pH
	(cfsm)	(cfs)	(cfs)	(days)	(fps)		(ft)	(ft)	(°C)		(°C)	
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. PA0033065

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	<input checked="" type="checkbox"/>

Stream Data

Design Cond.	LFY	Trib Flow	Stream Flow	Rch Trav Time	Rch Velocity	WD Ratio	Rch Width	Rch Depth	Tributary Temp	pH	Stream Temp	pH
	(cfs)	(cfs)	(cfs)	(days)	(fps)		(ft)	(ft)	(°C)		(°C)	
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. PA0033065

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	<input checked="" type="checkbox"/>

Stream Data

Design Cond.	LFY	Trib Flow	Stream Flow	Rch Trav Time	Rch Velocity	WD Ratio	Rch Width	Rch Depth	Tributary Temp	Tributary pH	Stream Temp	Stream pH
	(cfsm)	(cfs)	(cfs)	(days)	(fps)		(ft)	(ft)	(°C)		(°C)	
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. PA0033065

WQM 7.0 Hydrodynamic Outputs

<u>SWP Basin</u>		<u>Stream Code</u>				<u>Stream Name</u>						
07D		9705				KILLINGER CREEK						
RMI	Stream Flow	PWS With	Net Stream Flow	Disc Analysis Flow	Reach Slope	Depth	Width	W/D Ratio	Velocity	Reach Trav Time	Analysis Temp	Analysis pH
	(cfs)	(cfs)	(cfs)	(cfs)	(ft/ft)	(ft)	(ft)		(fps)	(days)	(°C)	
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

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WQM 7.0 Modeling Specifications

Parameters	Both	Use Inputted Q1-10 and Q30-10 Flows	<input checked="" type="checkbox"/>
WLA Method	EMPR	Use Inputted W/D Ratio	<input type="checkbox"/>
Q1-10/Q7-10 Ratio	0.89	Use Inputted Reach Travel Times	<input type="checkbox"/>
Q30-10/Q7-10 Ratio	1.23	Temperature Adjust Kr	<input checked="" type="checkbox"/>
D.O. Saturation	90.00%	Use Balanced Technology	<input checked="" type="checkbox"/>
D.O. Goal	6		

WQM 7.0 Wasteload Allocations

<u>SWP Basin</u>	<u>Stream Code</u>	<u>Stream Name</u>							
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 Pit	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 Pit	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	<u>CBOD5</u>		<u>NH3-N</u>		<u>Dissolved Oxygen</u>		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 Pit	25	25	2.88	2.88	5	5	0	0
	3.80 Vanderhomes MHP	25	25	8.51	8.51	5	5	0	0

WQM 7.0 D.O. Simulation

<u>SWP Basin</u>	<u>Stream Code</u>	<u>Stream Name</u>		
07D	9705	KILLINGER CREEK		
<hr/>				
<u>RMI</u>	<u>Total Discharge Flow (mgd)</u>	<u>Analysis Temperature (°C)</u>		<u>Analysis pH</u>
4.050	0.210	22.215		6.848
<u>Reach Width (ft)</u>	<u>Reach Depth (ft)</u>	<u>Reach WDRatio</u>		<u>Reach Velocity (fps)</u>
9.981	0.476	20.953		0.128
<u>Reach CBOD5 (mg/L)</u>	<u>Reach Kc (1/days)</u>	<u>Reach NH3-N (mg/L)</u>		<u>Reach Kn (1/days)</u>
14.32	1.393	1.54		0.830
<u>Reach DO (mg/L)</u>	<u>Reach Kr (1/days)</u>	<u>Kr Equation</u>		<u>Reach DO Goal (mg/L)</u>
6.505	22.691	Owens		6
<hr/>				
<u>Reach Travel Time (days)</u>	<u>Subreach Results</u>			
0.120	<u>TravTime (days)</u>	<u>CBOD5 (mg/L)</u>	<u>NH3-N (mg/L)</u>	<u>D.O. (mg/L)</u>
	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
<hr/>				
<u>RMI</u>	<u>Total Discharge Flow (mgd)</u>	<u>Analysis Temperature (°C)</u>		<u>Analysis pH</u>
3.800	0.246	22.316		6.874
<u>Reach Width (ft)</u>	<u>Reach Depth (ft)</u>	<u>Reach WDRatio</u>		<u>Reach Velocity (fps)</u>
10.518	0.484	21.735		0.135
<u>Reach CBOD5 (mg/L)</u>	<u>Reach Kc (1/days)</u>	<u>Reach NH3-N (mg/L)</u>		<u>Reach Kn (1/days)</u>
12.58	1.378	1.92		0.837
<u>Reach DO (mg/L)</u>	<u>Reach Kr (1/days)</u>	<u>Kr Equation</u>		<u>Reach DO Goal (mg/L)</u>
7.080	22.982	Owens		6
<hr/>				
<u>Reach Travel Time (days)</u>	<u>Subreach Results</u>			
0.172	<u>TravTime (days)</u>	<u>CBOD5 (mg/L)</u>	<u>NH3-N (mg/L)</u>	<u>D.O. (mg/L)</u>
	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
<hr/>				

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C. TRC Calculations

1A	B	C	D	E	F	G
2	TRC EVALUATION		Enter Facility Name in E3			
3	Input appropriate values in B4:B8 and E4:E7					
4	0.29	= Q stream (cfs)		0.5	= CV Daily	
5	0.036	= Q discharge (MGD)		0.5	= CV Hourly	
6	30	= no. samples		1	= AFC_Partial Mix Factor	
7	0.3	= Chlorine Demand of Stream		1	= CFC_Partial Mix Factor	
8	0	= Chlorine Demand of Discharge		15	= AFC_Criteria Compliance Time (min)	
9	0.5	= BAT/BPJ Value		720	= CFC_Criteria Compliance Time (min)	
		= % Factor of Safety (FOS)			=Decay Coefficient (K)	
10	Source	Reference	AFC Calculations		Reference	CFC Calculations
11	TRC	1.3.2.iii	WLA_afc = 1.680		1.3.2.iii	WLA_cfc = 1.630
12	PENTOXSD TRC	5.1a	LTAMULT_afc = 0.373		5.1c	LTAMULT_cfc = 0.581
13	PENTOXSD TRC	5.1b	LTA_afc = 0.626		5.1d	LTA_cfc = 0.948
14						
15	Source	Effluent Limit Calculations				
16	PENTOXSD TRC	5.1f	AML_MULT = 1.231			
17	PENTOXSD TRC	5.1g	AVG MON LIMIT (mg/l) = 0.500		BAT/BPJ	
18			INST MAX LIMIT (mg/l) = 1.635			
	WLA_afc	$(.019/e(-k*AFC_tc)) + [(AFC_Yc*Qs*.019/Qd*e(-k*AFC_tc))... \\ ...+ Xd + (AFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)$				
	LTAMULT_afc	$EXP((0.5*LN(cvh^2+1))-2.326*LN(cvh^2+1)^0.5)$				
	LTA_afc	wla_afc*LTAMULT_afc				
	WLA_cfc	$(.011/e(-k*CFC_tc)) + [(CFC_Yc*Qs*.011/Qd*e(-k*CFC_tc))... \\ ...+ Xd + (CFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)$				
	LTAMULT_cfc	$EXP((0.5*LN(cvd^2/no_samples+1))-2.326*LN(cvd^2/no_samples+1)^0.5)$				
	LTA_cfc	wla_cfc*LTAMULT_cfc				
	AML_MULT	$EXP(2.326*LN((cvd^2/no_samples+1)^0.5)-0.5*LN(cvd^2/no_samples+1))$				
	AVG MON LIMIT	MIN(BAT_BPJ,MIN(LTA_afc,LTA_cfc)*AML_MULT)				
	INST MAX LIMIT	1.5*((av_mon_limit/AML_MULT)/LTAMULT_afc)				