



Application Type Renewal  
Facility Type Sewage  
Major / Minor Major

**NPDES PERMIT FACT SHEET  
ADDENDUM**

Application No. PA0024716  
APS ID 842656  
Authorization ID 1349191

**Applicant and Facility Information**

Applicant Name	<b>Borough of Freeland Municipal Authority</b>	Facility Name	<b>Borough of Freeland Municipal Authority Wastewater Treatment Plant (WWTP) and CSO</b>
Applicant Address	711 Birkbeck Street Freeland, PA 18224-1501	Facility Address	1300 Birkbeck Street Foster Twp, PA 18224
Applicant Contact	David Kavitski, Chairman	Facility Contact	Kavitski David, Chairman
Applicant Phone	(570) 636-1733	Facility Phone	(570) 636-1733
Client ID	62666	Site ID	241670
SIC Code	4952	Municipality	Foster Township
SIC Description	Trans. & Utilities - Sewerage Systems	County	Luzerne
Date Published in PA Bulletin	July 26, 2025	EPA Waived?	No
Comment Period End Date	August 26, 2025	If No, Reason	Major Facility
Purpose of Application	Renewal of NPDES permit for discharge of treated sewage.		

**Internal Review and Recommendations**

The first draft of this permit appeared in the PA Bulletin on July 26, 2025.

A second draft is being issued to address comments received from the permittee via email on July 29, 2025. The comments and responses are provided below.

1. *Parts A.I.A and A.I.B of the Draft indicate a minimum measurement frequency for TRC of '1/day', while PDF page 2/21 of the Fact Sheet, as well as Part C.VII.D of the Draft indicate 'daily when discharging' or 'on each day in which chlorine is used', respectively. FMA desires that 'daily when discharging' be shown on the Final NPDES Permit reporting table(s) with respect to TRC. FMA further wishes to document that chlorine is not typically used in its WWTP operations.*

**Response** – Tables A.I.A and A.I.B have been revised to state “Daily when Discharging” as the sampling frequency for TRC. Part C.VII. has also been revised in the permit to state that the wastewater treatment plant utilizes UV disinfection. The Department acknowledges that chlorine is not typically used in the WWTP operations.

2. *Parts A.I.A and A.I.B of the Draft further indicate more stringent effluent limits and more frequent sampling for Ammonia-Nitrogen than the previously approved and issued permit. FMA understands that the receiving waters and downstream waterways are currently impaired by Acid Mine Drainage (AMD). Ammonia-Nitrogen and common soluble nitrogen compounds are widely known to actively react with AMD impaired waters, precipitating dissolved metals and buffering pH. FMA desires additional clarification on the technical basis as to why Ammonia-Nitrogen effluent limits were adapted in the Draft.*

**Response** – The Ammonia-Nitrogen limitations were generated by utilizing WQM 7.0. The full WQM 7.0 modeling has been provided on pages 3-6 of this fact sheet for your reference. The modeling is mainly based on the effluent discharge quantity,

Approve	Return	Deny	Signatures	Date
X			 Allison Seyfried Zukosky / Project Manager	September 3, 2025
X			 Edward Dudick, P.E. / Engineer Manager	September 5, 2025

### Internal Review and Recommendations

the low flow of the receiving river/stream, and drainage area of the receiving stream/river at the outfall location. The mass loads were added/required because the facility is a publicly owned treatment plant. The inputs for the modeling were obtained from eMapPA and USGS StreamStats. The monitoring frequencies were updated to the recommended frequencies found in Table 6-3 of DEP's Technical Guidance for the Development and Specification of Effluent Limitations (Document No. 362-0400-001).

The WQM 7.0 model and the technical reference guide/supplemental information can be found at the following address - <https://www.pa.gov/agencies/dep/programs-and-services/water/clean-water/wastewater-management/water-quality-models-and-tools>. The permittee/ consultant is welcome to utilize the model.

3. *Parts A.I.A and A.I.B of the Draft also include Cyanide, Free (ug/L) and Zinc, Total monitoring requirements each at '1/week' as '24-Hr Composite' samples. FMA currently samples its WWTP effluent quarterly for Total Cyanide as well as Total Zinc, per its EPA-approved Industrial Pretreatment Program (IPP) pollutant monitoring requirements. Subsequent to its 2021 NPDES Pre-Draft Survey response submitted to PADEP, FMA conducted additional testing (to include Free Cyanide and Total Zinc), which FMA understands that PADEP has incorporated into its analysis/output within the Draft. FMA understands that, while Free Cyanide can differ in terms of the analytical laboratory methods utilized; the Authority also generally understands that analysis of Total Cyanide is typically encompassing of the Free Cyanide form. Based upon its 2024 IPP monitoring data spreadsheet submission to EPA, FMA notes that (within its WWTP effluent), Total Cyanide was not detected in each of FMA's four (4) quarterly samples at a detection limit of 5 ug/L, which is consistently below PADEP's proposed WQBELs for Free Cyanide in the Draft. Correspondingly, Total Zinc ranged from a minimum of 0.027 mg/L to a maximum of non-detect (0.05 mg/L) via the 2024 IPP data for the WWTP effluent, which is also consistently below PADEP's proposed WQBELs for Total Zinc. As such, FMA challenges the '1/week' minimum measurement frequency for each of Free Cyanide and Total Zinc, recommending that the frequency instead be reduced to '1/quarter' across the entire renewed NPDES effective period (due to the expectation that the Authority will continue to see trends in Free Cyanide and Total Zinc WWTP effluent data which are in complete compliance with PADEP's proposed WQBELs). FMA otherwise takes no exception to such final WQBELs to become effective Four Years After Permit Effective Date. FMA solely wishes to further point out a potential DEP WQM 7.0 Effluent Limits modeling input discrepancy, whereby PADEP appeared to utilize a Qstream value = 0.0683 cfs versus 0.683 cfs (reported elsewhere by PADEP). The Authority simply wants to ensure that this was not an error or oversight on the part of PADEP, which could have impacted the computational foundation of proposed numerical WQBELs.*

**Response** – All modeling and input data was reviewed in response to this comment. A summary of the 10 additional samples for Free Cyanide, Total Zinc, and Total Cadmium that were provided by the permittee is shown on page 7 of this second fact sheet. The First Draft Toxic Modeling Spreadsheet (TMS) and Recommended Modeling/Results can be observed on pages 8-9 of this second fact sheet. The Total Zinc average concentration from the 10 additional samples was mistakenly entered as 31.92 mg/L instead of ug/L. The units were corrected in the Second Draft TMS, which can be observed on page 10 of this fact sheet. Monitoring and reporting was recommended instead of limitations for Total Zinc. A quarterly monitoring/reporting requirement has been added to the permit and the limitations have been removed.

The Free Cyanide average concentration from the 10 additional samples can be seen in the Second Draft TMS on page 10 as well. Modeling still recommends limitations due to the discharge concentration being greater than or equal to 50% of the governing WQBEL, which creates reasonable potential. The monitoring/reporting frequency for Free Cyanide for the first 4 years has been reduced to monthly instead of weekly. The limitations will still come into effect 4 years after the permit effective date. The permittee may also elect to take 10 additional effluent samples, as 24-hour composites each collected at least one week apart, for Free Cyanide since the provided sample results were from 2021. Please inform the Department via email during the comment period if the additional samples will be collected.

The comment also discusses a typo of 0.0683 cfs vs 0.683 cfs for the Q<sub>7-10</sub>. This typo appears in the Total Residual Chlorine (TRC) Spreadsheet. This error can be observed on page 17 of the first fact sheet and has also been provided on page 10 of this second fact sheet for reference. The TRC Spreadsheet was updated to accurately use 0.683 cfs. This correction generates a less stringent IMAX limitation of 0.205 mg/L. The TRC IMAX limitation has been updated in Table A.I.B. in the second draft permit. All other modeling was reviewed and the correct LFY and Q<sub>7-10</sub> values were used.

4. *FMA acknowledges the Draft's Part C.I.C requirements of the current Long-Term Control Plan (LTCP) and the requirement to submit a Post Construction Monitoring Plan (PCMP). At the present time, FMA believes that they are sufficiently implementing all controls and procedures that would be concluded in a PCMP, as outlined in the previously approved LTCP. FMA can complete a PCMP (with the assistance of HRG) yet desires to hold a meeting with PADEP representatives to discuss the scope of the PCMP along with current controls and sampling conducted at Outfall 002.*

**Internal Review and Recommendations**

*FMA intends to continue evaluation and control utilizing the Presumptive Approach Criterion II, accordingly, as outlined in the previously approved LTCP.*

**Response** – The consultant had previously reached out to the Department regarding information for the Post Construction Monitoring Plan. The Department informed the consultant to reference the EPA's Guidance for Post Construction Compliance Monitoring (EPA-833-K-11-001, May 2012) and provided a link. The document can be found at the following address - [epa.gov/sites/default/files/2015-10/documents/final\\_cso\\_pccm\\_guidance.pdf](http://epa.gov/sites/default/files/2015-10/documents/final_cso_pccm_guidance.pdf). This document is also referenced in the table under Part C.I.C.3 of the draft NPDES Permit (page 25). This document should provide all the information needed to complete the Post Construction Monitoring Plan (PCMP). If the consultant still desires a meeting, please reach out to the Engineer Manager, Edward Dudick, at the following email address or phone number ([edudick@pa.gov](mailto:edudick@pa.gov) or 570-826-2470).

**WQM 7.0 Effluent Limits**

SWP Basin	Stream Code	Stream Name					
		02A	4216	POND 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)
5.827	Freeland Boro	PA0024716	1.200	CBOD5	25		
				NH3-N	2.26	4.52	
				Dissolved Oxygen			4

**WQM 7.0 Wasteload Allocations**

SWP Basin	Stream Code	Stream Name					
		02A	4216	POND 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
5.827	Freeland Boro	7.23	8.94	7.23	8.94	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
5.827	Freeland Boro	1.51	2.26	1.51	2.26	0	0

**Dissolved Oxygen Allocations**

RMI	Discharge Name	CBOD5		NH3-N		Dissolved Oxygen		Critical Reach	Percent Reduction
		Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)		
5.83	Freeland Boro	25	25	2.26	2.26	4	4	0	0

Internal Review and Recommendations

WQM 7.0 D.O.Simulation

<u>SWP Basin</u>	<u>Stream Code</u>	<u>Stream Name</u>		
02A	4216	POND CREEK		
<u>RMI</u>	<u>Total Discharge Flow (mgd)</u>	<u>Analysis Temperature (°C)</u>	<u>Analysis pH</u>	
5.827	1.200	23.655	7.000	
<u>Reach Width (ft)</u>	<u>Reach Depth (ft)</u>	<u>Reach WDRatio</u>	<u>Reach Velocity (fps)</u>	
15.506	0.596	26.025	0.275	
<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>	
18.81	1.426	1.65	0.927	
<u>Reach DO (mg/L)</u>	<u>Reach Kr (1/days)</u>	<u>Kr Equation</u>	<u>Reach DO Goal (mg/L)</u>	
5.141	59.508	Tsivoglou	5	
<u>Reach Travel Time (days)</u>	<u>Subreach Results</u>			
0.589	TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
	0.059	17.04	1.57	7.64
	0.118	15.43	1.48	7.72
	0.177	13.97	1.40	7.72
	0.235	12.65	1.33	7.72
	0.294	11.45	1.26	7.72
	0.353	10.37	1.19	7.72
	0.412	9.39	1.13	7.72
	0.471	8.50	1.07	7.72
	0.530	7.70	1.01	7.72
	0.589	6.97	0.96	7.72

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	0.64	Use Inputted Reach Travel Times	<input type="checkbox"/>
Q30-10/Q7-10 Ratio	1.36	Temperature Adjust Kr	<input checked="" type="checkbox"/>
D.O. Saturation	90.00%	Use Balanced Technology	<input checked="" type="checkbox"/>
D.O. Goal	5		

Internal Review and Recommendations

WQM 7.0 Hydrodynamic Outputs

SWP Basin			Stream Code			Stream Name						
02A			4216			POND 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)	
<b>Q7-10 Flow</b>												
5.827	0.68	0.00	0.68	1.8564	0.02089	.596	15.51	26.03	0.27	0.589	23.66	7.00
<b>Q1-10 Flow</b>												
5.827	0.44	0.00	0.44	1.8564	0.02089	NA	NA	NA	0.26	0.623	24.05	7.00
<b>Q30-10 Flow</b>												
5.827	0.93	0.00	0.93	1.8564	0.02089	NA	NA	NA	0.29	0.559	23.33	7.00

**Input Data WQM 7.0**

SWP Basin	Stream Code	Stream Name	RMI	Elevation	Drainage Area	Slope	PWS Withdrawal	Apply FC
02A	4216	POND CREEK	5.827	1609.00	5.42	0.00000	0.00	<input checked="" type="checkbox"/>

Design Cond.	Stream Data									
	LFY	Trib Flow	Stream Flow	Rch Trav Time	Rch Velocity	WD Ratio	Rch Width	Rch Depth	Tributary Temp	Stream pH
	(cfsm)	(cfs)	(cfs)	(days)	(fps)		(ft)	(ft)	(°C)	(°C)
Q7-10	0.126	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.00
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
Freeland Boro	PA0024716	1.2000	1.2000	1.2000	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			

Internal Review and Recommendations

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
02A	4216 POND CREEK		3.180	1317.00	7.51	0.00000	0.00	<input checked="" type="checkbox"/>

Stream Data

Design Cond.	LFY (cfs/m)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	pH	Stream Temp (°C)	pH
Q7-10	0.126	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		

Internal Review and Recommendations

Additional Sample Results Summary

	Free Cyanide (mg/L)	Total Zinc (mg/L)	Total Cadmium (mg/L)
10/11/2021	0.006	0.034	0.00008
10/13/2021	0.003	0.037	0.00008
10/15/2021	0.005	0.035	0.00008
10/18/2021	0.012	0.037	0.00008
10/20/2021	0.010	0.040	0.00008
10/22/2021	0.006	0.037	0.00008
10/25/2021	0.0005	0.039	0.00008
10/27/2021	0.0005	0.03	0.00008
10/29/2021	0.0005	0.022	0.00008
11/1/2021	0.0005	0.024	0.00008
11/3/2021	0.0005	0.025	0.00008
11/5/2021	0.001	0.023	0.00008
Average:	0.00379 3.79	0.032 31.92	0.00008 0.08
			mg/L μg/L

Internal Review and Recommendations

First Draft TMS



Toxics Management Spreadsheet  
Version 1.4, May 2025

Discharge Information

Instructions Discharge Stream

Facility: Borough of Freeland WWTP      NPDES Permit No.: PA0024716      Outfall No.: 001

Evaluation Type: Major Sewage / Industrial Waste      Wastewater Description: Treated Sewage

Design Flow (MGD)*	Hardness (mg/l)*	pH (SU)*	Discharge Characteristics				Partial Mix Factors (PMFs)		Complete Mix Times (min)	
			AFC	CFC	THH	CRL	Q <sub>7-10</sub>	Q <sub>h</sub>		
1.2	101	6.44								

	Discharge Pollutant	Units	Max Discharge Conc	0 if left blank		0.5 if left blank		0 if left blank		1 if left blank	
				Trib Conc	Stream Conc	Daily CV	Hourly CV	Stream CV	Fate Coeff	FOS	Criteria Mod
Group 1	Total Dissolved Solids (PWS)	mg/L	786								
	Chloride (PWS)	mg/L	266								
	Bromide	mg/L	< 0.2								
	Sulfate (PWS)	mg/L	22.1								
	Fluoride (PWS)	mg/L									
	Total Aluminum	µg/L	23								
Group 2	Total Antimony	µg/L	0.4								
	Total Arsenic	µg/L	< 1								
	Total Barium	µg/L	54								
	Total Beryllium	µg/L	< 2								
	Total Boron	µg/L	158								
	Total Cadmium	µg/L	< 0.08								
	Total Chromium (III)	µg/L	< 5								
	Hexavalent Chromium	µg/L	< 0.1								
	Total Cobalt	µg/L	2								
	Total Copper	µg/L	6								
	Free Cyanide	µg/L	3								
	Total Cyanide	µg/L	3.79								
	Dissolved Iron	µg/L	38								
	Total Iron	µg/L	41								
	Total Lead	µg/L	< 1								
	Total Manganese	µg/L	177								
	Total Mercury	µg/L	< 0.2								
	Total Nickel	µg/L	< 4								
	Total Phenols (Phenolics) (PWS)	µg/L	< 4.85								
	Total Selenium	µg/L	< 2								
	Total Silver	µg/L	0.07								
	Total Thallium	µg/L	< 2								
	Total Zinc	mg/L	31.92								
	Total Molybdenum	µg/L	< 5								
	Acrolein	µg/L	< 1								
	Acrylamide	µg/L	<								
	Acrylonitrile	µg/L	< 0.5								
	Benzene	µg/L	< 0.5								
	Bromoform	µg/L	< 0.5								

Internal Review and Recommendations

First Draft TMS Recommended WQBELs

Recommended WQBELs & Monitoring Requirements

No. Samples/Month:

4

Pollutants	Mass Limits		Concentration Limits				Governing WQBEL	WQBEL Basis	Comments
	AML (lbs/day)	MDL (lbs/day)	AML	MDL	IMAX	Units			
Total Copper	Report	Report	Report	Report	Report	µg/L	12.8	CFC	Discharge Conc > 10% WQBEL (no RP)

Model Results

7/2/2025

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Free Cyanide	0.055	0.085	5.47	8.54	13.7	µg/L	5.47	THH	Discharge Conc ≥ 50% WQBEL (RP)
Total Manganese	Report	Report	Report	Report	Report	µg/L	1,368	THH	Discharge Conc > 10% WQBEL (no RP)
Total Zinc	1.21	1.65	0.12	0.16	0.16	mg/L	0.12	AFC	Discharge Conc ≥ 50% WQBEL (RP)

Internal Review and Recommendations

Second Draft TMS



Toxics Management Spreadsheet  
Version 1.4, May 2023

Discharge Information

Instructions **Discharge** Stream

Facility: Borough of Freeland WWTP NPDES Permit No.: PA0024716 Outfall No.: 001

Evaluation Type: Major Sewage / Industrial Waste Wastewater Description: Treated Sewage

Design Flow (MGD)*	Hardness (mg/l)*	pH (SU)*	Discharge Characteristics					
			Partial Mix Factors (PMFs)				Complete Mix Times (min)	
			AFC	CFC	THH	CRL	Q <sub>7-10</sub>	Q <sub>h</sub>
1.2	102	6.44						

		Discharge Pollutant	Units	Max Discharge Conc	Trib Conc	Stream Conc	Daily CV	Hourly CV	Stream CV	Fate Coeff	FOS	Criteri a Mod	Chem Transl
Group 1	Total Dissolved Solids (PWS)	mg/L		786									
	Chloride (PWS)	mg/L		266									
	Bromide	mg/L	<	0.2									
	Sulfate (PWS)	mg/L		22.1									
	Fluoride (PWS)	mg/L											
Group 2	Total Aluminum	µg/L		23									
	Total Antimony	µg/L		0.4									
	Total Arsenic	µg/L	<	1									
	Total Barium	µg/L		54									
	Total Beryllium	µg/L	<	2									
	Total Boron	µg/L		158									
	Total Cadmium	µg/L	<	0.08									
	Total Chromium (III)	µg/L	<	5									
	Hexavalent Chromium	µg/L	<	0.1									
	Total Cobalt	µg/L		2									
	Total Copper	µg/L		6									
	Free Cyanide	µg/L		3.79									
	Total Cyanide	µg/L		7									
	Dissolved Iron	µg/L		38									
	Total Iron	µg/L		41									
	Total Lead	µg/L	<	1									
	Total Manganese	µg/L		177									
	Total Mercury	µg/L	<	0.2									
	Total Nickel	µg/L	<	4									
	Total Phenols (Phenolics) (PWS)	µg/L	<	4.85									
	Total Selenium	µg/L	<	2									
	Total Silver	µg/L		0.07									
	Total Thallium	µg/L	<	2									
	Total Zinc	µg/L		31.92									
	Total Molybdenum	µg/L	<	5									
	Acrolein	µg/L	<	1									
	Acrylamide	µg/L	<										
	Acrylonitrile	µg/L	<	0.5									
	Benzene	µg/L	<	0.5									
	Bromoform	µg/L	<	0.5									

Internal Review and Recommendations

Second Draft TMS Recommended WQBELs

Recommended WQBELs & Monitoring Requirements

No. Samples/Month:

4

Pollutants	Mass Limits		Concentration Limits				Governing WQBEL	WQBEL Basis	Comments
	AML (lbs/day)	MDL (lbs/day)	AML	MDL	IMAX	Units			
Total Copper	Report	Report	Report	Report	Report	µg/L	12.9	CFC	Discharge Conc > 10% WQBEL (no RP)

Model Results

9/3/2025

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Free Cyanide	0.055	0.085	5.47	8.54	13.7	µg/L	5.47	THH	Discharge Conc ≥ 50% WQBEL (RP)
Total Manganese	Report	Report	Report	Report	Report	µg/L	1,368	THH	Discharge Conc > 10% WQBEL (no RP)
Total Zinc	Report	Report	Report	Report	Report	µg/L	121	AFC	Discharge Conc > 10% WQBEL (no RP)

**TRC EVALUATION**

Input appropriate values in A3:A9 and D3:D9

0.0683 = Q stream (cfs)	0.5 = CV Daily			
1.2 = 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)	=Decay Coefficient (K)			
Source	Reference	AFC Calculations	Reference	CFC Calculations
TRC	1.3.2.iii	WLA_afc = 0.031	1.3.2.iii	WLA_cfc = 0.022
PENTOXSD TRG	5.1a	LTAMULT_afc = 0.373	5.1c	LTAMULT_cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc = 0.011	5.1d	LTA_cfc = 0.013
Source		Effluent Limit Calculations		
PENTOXSD TRG	5.1f	AML MULT = 1.231		
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.014	AFC	INST MAX LIMIT (mg/l) = 0.046
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)		

Internal Review and Recommendations

TRC EVALUATION									
Input appropriate values in A3:A9 and D3:D9									
0.683 = Q stream (cfs)		0.5 = CV Daily							
1.2 = 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)		=Decay Coefficient (K)							
Source	Reference	AFC Calculations	Reference	CFC Calculations					
TRC	1.3.2.iii	WLA_afc = 0.136	1.3.2.iii	WLA_cfc = 0.125					
PENTOXSD TRG	5.1a	LTAMULT_afc = 0.373	5.1c	LTAMULT_cfc = 0.581					
PENTOXSD TRG	5.1b	LTA_afc = 0.051	5.1d	LTA_cfc = 0.073					
Source	Effluent Limit Calculations								
PENTOXSD TRG	5.1f	AML MULT = 1.231							
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.063							
		INST MAX LIMIT (mg/l) = 0.205							
WLA_afc	$(.019/e(-k* AFC_tc)) + [(AFC_Yc*Qs*.019/Qd*e(-k* AFC_tc))... + Xd + (AFC_Yc*Qs*Xs/Qd)]^4(1-FOS/100)$								
LTAMULT_afc	$EXP((0.5^4LN(cvh^2+1))-2.326^4LN(cvh^2+1)^0.5)$								
LTA_afc	wla_afc^4LTAMULT_afc								
WLA_cfc	$(.011/e(-k* CFC_tc)) + [(CFC_Yc*Qs*.011/Qd*e(-k* CFC_tc))... + Xd + (CFC_Yc*Qs*Xs/Qd)]^4(1-FOS/100)$								
LTAMULT_cfc	$EXP((0.5^4LN(cvd^2/no_samples+1))-2.326^4LN(cvd^2/no_samples+1)^0.5)$								
LTA_cfc	wla_cfc^4LTAMULT_cfc								
AML MULT	$EXP(2.326^4LN((cvd^2/no_samples+1)^0.5)-0.5^4LN((cvd^2/no_samples+1)^0.5))$								
AVG MON LIMIT	$MIN(BAT_BPJ,MIN(LTA_afc,LTA_cfc)^4*AML_MULT)$								
INST MAX LIMIT	$1.5^4((av_mon_limit/AML_MULT)/LTAMULT_afc)$								