pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Southcentral Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0008427**
Facility Type	**Industrial**	APS ID	**370982**
Major / Minor	**Minor**	Authorization ID	**1263783**

NPDES PERMIT FACT SHEET INDIVIDUAL INDUSTRIAL WASTE (IW) AND IW STORMWATER

Applicant and Facility Information

Applicant Name	**Energy Center Harrisburg LLC**	Facility Name	**Energy Center Harrisburg**
Applicant Address	100 N 10th Street	Facility Address	900 Walnut Street
	Harrisburg, PA 17101		Harrisburg, PA 17101-1900
Applicant Contact	David Fiebig	Facility Contact	David Fiebig
Applicant Phone	(717) 920-8273	Facility Phone	(717) 231-3884
Client ID	163235	Site ID	253439
SIC Code	4961	Municipality	Harrisburg City
SIC Description	Trans. & Utilities - Steam And Air Conditioning Supply	County	Dauphin
Date Application Received	January 14, 2019	EPA Waived?	Yes
Date Application Accepted	March 6, 2019	If No, Reason	

Purpose of Application: Permit renewal for discharge of treated industrial wastewater

Summary of Review

1.0 General Discussion

This factsheet supports the renewal of an existing NPDES permit for a discharge of treated industrial waste from a steam generating plant that serves some commercial, residential and institutions in the city of Harrisburg. Steam is generated in 3 natural gas fired package boilers. The boilers can be oil-fired as back-up. A 4th boiler is only oil fired is used as back-up. The cogeneration facility consists of 2 diesel powered generators. Plant water is obtained from Capital Region Water system and treatment in 6 water softeners at the site and used for boiler makeup. The cogeneration facility is run as a peaking plant mainly during the summer months. The sources of wastewater generated at the facility are: boiler blowdown, cooling tower blowdown, softener backwash and regeneration, non-contact cooling water, plant sumps and drains(through oil/water separators), tunnel groundwater and stormwater. All wastewater sources are collected in the wet well and neutralized by pH adjustment if needed and pumped to the settling basin for settling. There are 4 pumps that can pump from the wet well with capacities 75gpm, 56gpm, 600gpm and 300gpm. Effluent sometime gets disinfected prior to discharge to Paxton Creek which is classified for warm water fishes(WWF). Currently there is no sludge handling on site except from oil water separators as needed by outside contractor. The wet well can be aerated with compressed air via a regulated air supply header. The facility falls under SIC 4961.

There are 2 No. 6 oil tanks on site that store oil in a dyke area. Tank 1 was full and tank 2 was empty during a site visit for the permit renewal. The permittee indicated tank 2 will be retrofitted to code in 2021, and the oil in tank 1 will be pumped to tank 2, and tank 1 will be abandoned in place.

Approve	Deny	Signatures	Date
X		J. Pascal Kwedza, P.E. / Environmental Engineer	May 26, 2020
X		Daniel W. Martin, P.E. / Environmental Engineer Manager	July 1, 2020
X		Maria D. Bebenek, P.E./Program Manager	July 1, 2020

Summary of Review

The existing NPDES permit was issued on July 22, 2014 with an effective date of August 1, 2014 and expiration date of July 31, 2019. The applicant submitted a timely NPDES renewal application to the Department and is currently operating under the terms and conditions in the existing permit under administrative extension provisions pending Department action on the renewal application.

A topographical map showing discharge location is presented in attachment A.

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 Existing Permit

- Total Cadmium monitoring has been added to the permit.
- Monitoring of Bis(2-Ethylhexyl)Phthalate has been discontinued

1.3 Existing Permit Limits and Monitoring Requirements

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day)		Concentrations (mg/L)				Minimum Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	1/day	Calculated
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0	1/day	Grab
TRC	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
Temperature F	XXX	XXX	XXX	XXX	110	XXX	1/day	"I-S"
Oil and Grease	XXX	XXX	XXX	XXX	15	30	2/month	Grab
Bis(2-Ethylhexyl)Phthalate	XXX	XXX	XXX	XXX	Report	XXX	1/quarter	8-Hr Comp
Total Suspended Solids	21	42	XXX	30	60	75	2/month	24-Hr Comp
Total Copper	0.032	0.065	XXX	0.047	0.094	0.117	2/month	24-Hr Comp
Dissolved Iron	XXX	XXX	XXX	Report	XXX	XXX	2/month	24-Hr Comp
Total Kjeldahl Nitrogen	XXX	XXX	XXX	Report	XXX	XXX	1/year	24-Hr Comp
Nitrate-Nitrite	XXX	XXX	XXX	Report	XXX	XXX	1/year	24-Hr Comp
Total Nitrogen	XXX	XXX	XXX	Report	XXX	XXX	1/year	24-Hr Comp
Total Phosphorus	XXX	XXX	XXX	Report	XXX	XXX	1/year	24-Hr Comp

2.0 Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	.084
Latitude	40º 15' 58.36"	Longitude	-76º 52' 33.76"
Quad Name	Harrisburg West	Quad Code	1630
Wastewater Description:	Effluent		

Receiving Waters	Paxton Creek (WWF)	Stream Code	10139
NHD Com ID	133783630	RMI	1.8
Drainage Area	25.3 sq.mi	Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	2.5	Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	7-C	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	Biochemical Oxygen Demand (BOD), Flow Regime Modification, Habitat Alterations, Organic Enrichment, Pathogens, Total Suspended Solids(TSS) , Total Suspended Solids(TSS)		
Source(s) of Impairment	Agriculture, Combined Sewer Overflows, Combined Sewer Overflows, Source Unknown, Urban Runoff/Storm sewers , Urban Runoff/Storm sewers, Urban Runoff/Storm sewers, Urban Runoff/Storm sewers		
TMDL Status	Final	Name	Paxton Creek

Background/Ambient Data		Data Source
pH (SU)		
Temperature (°F)		
Hardness (mg/L)		
Other:		

Nearest Downstream Public Water Supply Intake	Steelton Borough Waterworks		
PWS Waters	Susquehanna River	Flow at Intake (cfs)	
PWS RMI		Distance from Outfall (mi)	2.1

Changes Since Last Permit Issuance: None

2.1 Water Supply Intake:

The closest water supply intake located downstream from the discharge is Steelton Borough Waterworks on Susquehanna River in Steelton Borough, Dauphin County. The distance downstream from the discharge to the intake is approximately 2.1 miles. No impact is expected on the intake as a result of this discharge

3.0 Compliance History

3.1 DMR Data for Outfall 001 (from April 1, 2019 to March 31, 2020)

Parameter	MAR-20	FEB-20	JAN-20	DEC-19	NOV-19	OCT-19	SEP-19	AUG-19	JUL-19	JUN-19	MAY-19	APR-19
Flow (MGD) Average Monthly	0.022	0.024	0.024	0.027	0.024	0.017	0.015	0.018	0.017	0.016	0.020	0.018
Flow (MGD) Daily Maximum	0.032	0.030	0.042	0.054	0.059	0.030	0.026	0.049	0.026	0.022	0.034	0.029
pH (S.U.) Minimum	7.4	7.4	7.3	7.3	7.4	6.8	6.6	6.8	6.2	6.5	6.9	7.0
pH (S.U.) Instantaneous Maximum	8.0	8.0	7.8	7.9	7.9	7.8	7.9	8.0	7.8	7.4	7.5	7.6
TRC (mg/L) Average Monthly	0.21	0.11	0.10	0.14	0.18	0.13	0.22	0.10	0.12	0.14	0.10	0.09
TRC (mg/L) Instantaneous Maximum	0.59	0.23	0.23	0.37	0.39	0.32	0.51	0.49	0.24	0.36	0.39	0.28
Temperature (ºF) Daily Maximum	74	73	74	73	79	85	86	96	94	89	85	76
TSS (lbs/day) Average Monthly	< 0.939	< 0.918	< 1.022	< 1.214	< 0.981	< 0.668	< 0.563	< 0.584	< 0.668	< 0.793	< 0.646	0.785
TSS (lbs/day) Daily Maximum	< 1.085	< 0.918	< 1.210	1.468	< 1.168	< 0.751	< 0.584	< 0.584	< 0.709	0.918	< 0.709	1.068
TSS (mg/L) Average Monthly	< 5	< 5	< 5	< 6.5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 6.5
TSS (mg/L) Daily Maximum	< 5	< 5	< 5	8	< 5	< 5	< 5	< 5	< 5	< 5	< 5	8
Oil and Grease (mg/L) Average Monthly	< 3.7	< 3.7	< 3.65	< 3.7	< 3.95	< 3.75	< 3.9	< 3.9	< 7.3	3.8	< 3.7	< 3.75
Oil and Grease (mg/L) Daily Maximum	< 3.7	< 3.7	< 3.7	< 3.7	< 4.0	< 3.8	< 4	< 4.0	10.7	< 3.9	< 3.7	< 3.9
Nitrate-Nitrite (lbs/day) Annual Average							0.170					
Nitrate-Nitrite (mg/L) Annual Average							1.2					
Total Nitrogen (lbs/day) Annual Average							< 0.312					
Total Nitrogen (mg/L) Annual Average							2.20					
TKN (lbs/day) Annual Average							< 0.142					

TKN (mg/L) Annual Average							< 1.0					
Total Phosphorus (lbs/day) Annual Aver.							0.125					
Total Phosphorus (mg/L) Annual Aver.							0.88					
Total Copper (lbs/day) Average Monthly	0.0012	< 0.0010	< 0.0015	< 0.0010	< 0.0009	< 0.0009	< 0.0006	< 0.0006	0.0009	0.0014	0.002	< 0.0006
Total Copper (lbs/day) Daily Maximum	0.0013	0.0011	0.0022	0.0010	< 0.0012	0.0012	< 0.0006	0.0007	0.0010	0.0020	0.003	< 0.0007
Total Copper (mg/L) Average Monthly	0.0064	< 0.0055	< 0.0070	< 0.0051	< 0.0050	< 0.0065	< 0.0050	< 0.0055	0.0069	0.0089	0.016	< 0.0050
Total Copper (mg/L) Daily Maximum	0.0067	0.0060	0.0089	0.0052	< 0.0050	0.0079	< 0.0050	0.0060	0.0081	0.011	0.024	< 0.0050
Dissolved Iron (lbs/day)Aver. Monthly	0.040	0.040	0.048	< 0.031	0.021	0.026	0.017	0.018	0.022	0.021	< 0.008	< 0.007
Dissolved Iron (lbs/day) Daily Maximum	0.050	0.042	0.063	0.050	0.027	0.045	0.017	0.020	0.025	0.022	< 0.009	< 0.008
Dissolved Iron (mg/L) Average Monthly	0.21	0.215	0.23	< 0.165	0.101	< 0.18	0.15	0.15	0.165	0.135	< 0.060	< 0.060
Dissolved Iron (mg/L) Daily Maximum	0.23	0.23	0.26	0.27	0.11	0.30	0.16	0.17	0.20	0.12	< 0.060	< 0.060
Bis(2-Ethyl-hexyl)Phthalate (mg/L) Daily Maximum	< 0.0028			< 0.0028			< 0.003			< 0.0028		

3.2 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 noted on DMRs during the period reviewed.

3.3 Summary of Inspections:

The facility was inspected five times during the past permit cycle. Inspection reports review for the facility during the period indicate permit limits have been met satisfactorily. The facility has good compliance record.

4.0 Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** .084
Latitude 40º 15' 58.00" **Longitude** -76º 52' 35.00"
Wastewater Description: 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(WQBEL) is designed to ensure that the water quality standards applicable to a waterbody are being met and may be more stringent than technology-based effluent limits

4.2 Technology-Based Limitations

The following technology-based limitations apply to the discharge subject to water quality analysis and BPJ where applicable.

Parameter	Limit (mg/l)	SBC	Federal Regulation	State Regulation
pH	6.0 – 9.0 S.U.	Min – Max	133.102(c)	95.2(1)
Oil and Grease	15	Daily Maximum		95.2(2)(ii)
	30	IMAX		95.2(2)(ii)
Total Suspended Solids	30	Average Monthly	125.3(d), 133.103(b)	BPJ
	60	Daily Maximum	125.3(d), 133.103(b)	BPJ
	75	IMAX	125.3(d), 133.103(b	BPJ

4.3 Water Quality-Based Limitations

4.3.1 Streamflow:

Streamflows for the water quality analysis were determined by correlating with the yield of USGS gauging station No. 01570500 on Susquehanna River in Harrisburg. The Q_{7-10} and drainage area at the gage is 2610 ft3/s and 24100mi^2 respectively. The resulting yields are as follows:

- Q_{7-10} = (2610 ft^3/s)/ 24100 mi^2 = 0.10 ft^3/s/ mi^2
- Q_{30-10} / Q_{7-10} = 1.17
- Q_{1-10} / Q_{7-10} = 0.95

The drainage area at discharge calculated from streamStats = 25.3mi^2
The Q_{7-10} at discharge = 25.3 mi^2 x 0.10 ft^3/s/mi^2 = 2.53 ft^3/s.

4.3.2 Toxics

A reasonable potential (RP) was done for pollutant Groups 1 to 5 submitted with the application. All pollutants that were detected in the application sampling were entered into a Toxics Screening Analysis spreadsheet (Attachments C) to determine if any pollutants were candidates for PENTOXSD modeling. Total Dissolved Solids, Total Chloride, Total Cadmium, Total Copper, Dissolved Iron, and Bis(2-Ethylhexyl)Phthalate were determined to be candidates for PENTOXSD modelling and were entered into the PENTOXSD model to calculate WQBELs for them. The most stringent WQBELs recommended by the PENTOXSD model presented in attachment B were then entered into the same Toxics Screening Analysis spreadsheet in order to determine which parameters of concern needs limitation or monitoring. Based on the results, monitoring was required for Total Copper, Total Cadmium and Dissolved Iron. No monitoring or limitation was required for Bis(2-Ethylhexyl)Phthalate. No WQBELs were recommended for Total Dissolved Solids and Total Chloride. The existing permit has limitation on Total Copper which will remain in the permit due to anti-backsliding restrictions. Monitoring of Total Cadmium and Dissolved Iron twice per month is recommended in the renewed permit. The monitoring requirement for Bis(2-Ethylhexyl)Phthalate in the existing permit has been discontinued since the current RP analysis results in no monitoring and there is some evidence Bis(2-Ethylhexyl)Phthalate maybe leaching from plastics bottles used in sampling.

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

where the maximum reported concentration is between 25% - 50% of the WQBEL, or to establish monitoring requirements for conservative pollutants where the maximum reported concentration is between 10% - 50% of the WQBEL.

4.3.3 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 reported in the application is 1,080 mg/l. The discharge level for TDS is below 5000mg/l, therefore no monitoring for TDS, Chloride Bromide and Sulfate is required. The maximum 1,4-dioxane reported is less than 10ug/l , therefore no monitoring is required at this time.

4.3.4 Total Residual Chlorine:

The attached TRC results presented in attachment D 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.

4.3.5 Chesapeake Bay Strategy:

In 2003, EPA established state-wide cap loads for Total Nitrogen and Total Phosphorus for Pennsylvania that are needed to ensure compliance with new water quality standards enacted to restore the water quality of the Chesapeake Bay. DEP released Pennsylvania's Chesapeake Bay Tributary Strategy (CBTS) in January of 2005 to guide Pennsylvania's efforts to meet those cap loads and made revisions to the Strategy in 2006-2007 following a stakeholder process. Industrial discharges have been prioritized by Central Office based on their delivered TN and TP loadings to the Bay. Significant industrial wastewater dischargers are facilities that discharge more than 75 lbs/day of TN or 25 lbs/day of TP on an average annual basis and the rest are classified as non-significant dischargers. DEP developed Chesapeake Bay IW monitoring plan for all industrial facilities that discharge to the Chesapeake Bay. This facility is classified as a non-significant discharger with little or no potential to introduce nutrients to the receiving stream but has been monitoring TP and the TN series (nitrate-nitrite, TKN) and will continue monitoring them annually to collect data for Chesapeake Bay modelling efforts.

4.3.6 Chemical Aditives

The application listed the following Chemical additives for approval in the re issued permit to be used at the site:
KR-152P to be used as a biocide in the cooling towers(CT) as needed. Ammonium Sulfite(25%) for corrosion protection in boilers. CS-90 corrosion control in CT. Brennsperse 6255 corrosion control in boilers, Sodium Sulfite(15%) corrosion control in offline boilers and sodium hypochlorite for algae control. All the chemical additives except KR-152P have already been approved and the permitte is not requesting increase in usage rates, therefore will not be reviewed. KR-152P is a new chemical additive that was requested. KR-152P is on the approved list and the chemical additive nofication request form and the associated PENTOXSD results submitted were reviewed for approval. The proposed maximum usage rate of KR-152P is acceptable and approved to be used at the site. The permit will be written with the new chemical additive usage and notification requirement.

4.3.7 Thermal Limits

Effluent limitations for temperature were calculated using the Case 2 Thermal Worksheet with updated wasteflow of 0.084 MGD and ambient temperature. The calculated recommended temperature limits are presented in attachment E. The recommended limits are consistent with the existing permit. Inspection reports and DMRs indicate the facility has been complying with the temperature limits. Therefore, a temperature limit of 110^0F monitored daily will remain in the permit. In addition, the facility's thermal discharge should not increase the temperature of the stream more than 2^0F in one 1 hour.

5.0 Other Requirements

5.1 Anti-backsliding

Not applicable to this permit

5.2 Anti-Degradation (93.4)

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

5.3 Class A wild Trout Fisheries

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

5.4 303d Listed Streams:

The receiving stream segment is listed as impaired for aquatic life and recreational uses due to agriculture, combined sewer overflows and urban runoff/storm sewers. The cause of the impairments are listed as Biochemical Oxygen Demand, flow regime modification, habitat alterations, organic enrichment, pathogens and Total Suspended Solids. A TMDL was approved in 2008 that recommended allocation for Total phosphorus, but in 2012 DEP identified BOD and organic enrichment as the main cause of the impairment and EPA delisted phosphorus from the TMDL on August 15, 2013. This discharge was not listed as contributing to the impairment, therefore, no further action is warranted from this facility as this time.

5.5 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).

5.6 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	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	1/day	Calculation
pH (S.U.)	XXX	XXX	6.0 Inst Min	XXX	XXX	9.0	1/day	Grab
TRC	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
Temperature (ºF)	XXX	XXX	XXX	XXX	110	XXX	1/day	I-S
TSS	21	42	XXX	30	60	75	2/month	24-Hr Composite
Oil and Grease	XXX	XXX	XXX	15	30	30	2/month	Grab
Total Copper	0.032	0.065	XXX	0.047	0.094	0.117	2/month	24-Hr Composite
Dissolved Iron	Report	Report	XXX	Report	Report	XXX	2/month	24-Hr Composite
Total Cadmium	Report	Report	XXX	Report	Report	XXX	2/month	24-Hr Composite
Nitrate-Nitrite	Report Annl Avg	XXX	XXX	Report Annl Avg	XXX	XXX	1/year	24-Hr Composite
Total Nitrogen	Report Annl Avg	XXX	XXX	Report Annl Avg	XXX	XXX	1/year	Calculation
TKN	Report Annl Avg	XXX	XXX	Report Annl Avg	XXX	XXX	1/year	24-Hr Composite
Total Phosphorus	Report Annl Avg	XXX	XXX	Report Annl Avg	XXX	XXX	1/year	24-Hr Composite

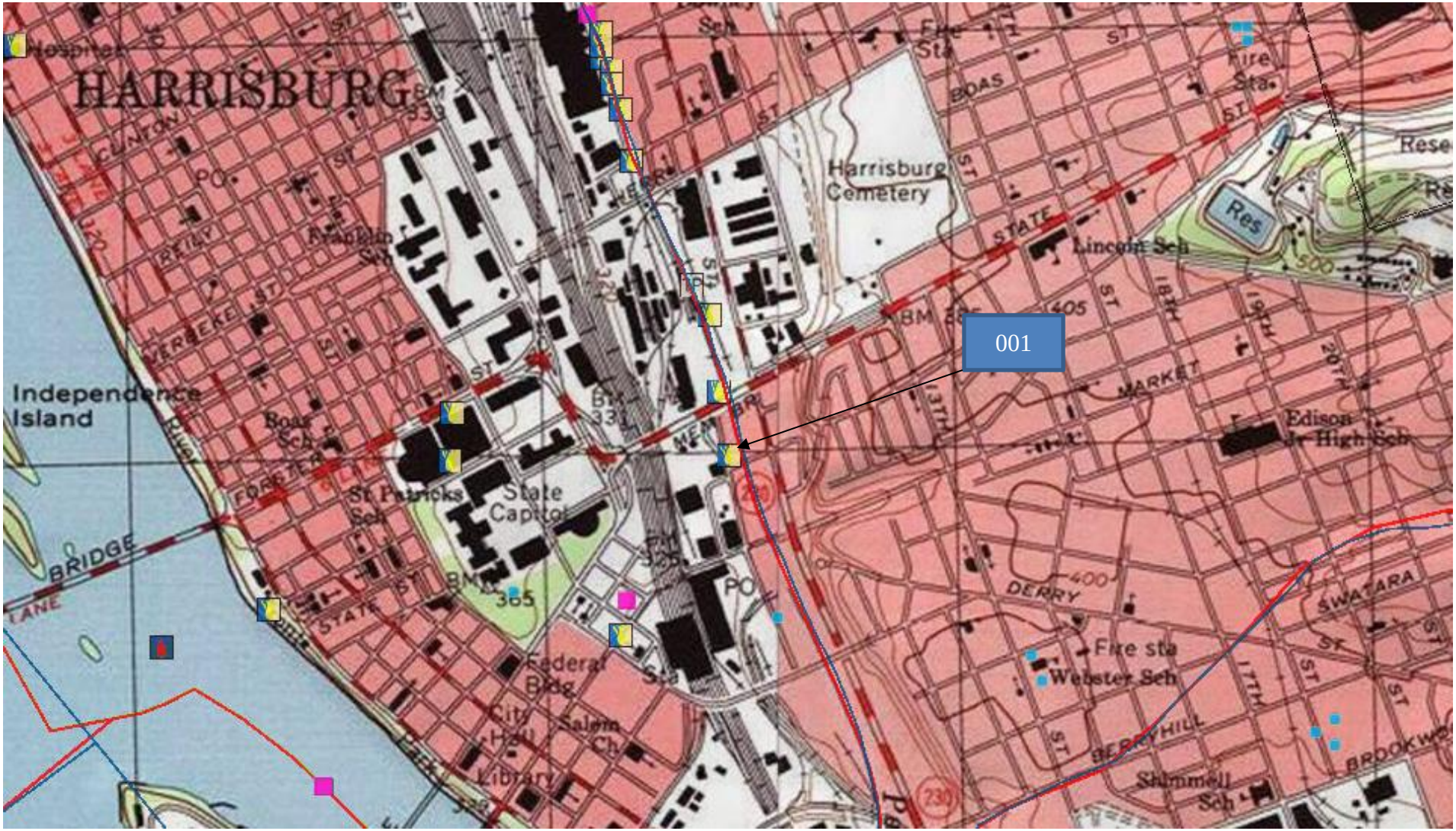
Compliance Sampling Location: At the guard shack

Other Comments: Outfall 001 is inaccessible.

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

8.0 Attachments

A. Topographical Map



B. PENTOXSD Model Results

PENTOXSD Analysis Results

Recommended Effluent Limitations

SWP Basin	Stream Code:	Stream Name:
07C	10139	PAXTON CREEK

RMI	Name	Permit Number	Disc Flow (mgd)
1.80	Energy Ctr Harr	PA0008427	0.0840

Parameter	Effluent Limit (µg/L)	Governing Criterion	Max. Daily Limit (µg/L)	Most Stringent WQBEL (µg/L)	Most Stringent WQBEL Criterion
BIS(2-ETHYLHEXYL) PHTHALATE	155.629	CRL	242.806	155.629	CRL
CADMIUM	5.776	CFC	9.012	5.776	CFC
CHLORIDE (PWS)	1.2E+08	INPUT	1.8721E+08	NA	NA
COPPER	104.581	AFC	163.163	104.581	AFC
DISSOLVED IRON	6140.797	THH	9580.631	6140.797	THH
TOTAL DISSOLVED SOLIDS (PWS	1.2E+08	INPUT	1.8721E+08	NA	NA

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PENTOXSD

Modeling Input Data

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS Wtth (mgd)	Apply FC
10139	1.80	304.80	25.30	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	0.1	0	0	0	0	0	0	0	100	7	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow	Permitted Disc Flow	Design Disc Flow	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard	Disc pH
		(mgd)	(mgd)	(mgd)						(mg/L)	
Energy Ctr Harr	PA0008427	0.084	0.084	0.084	0	0	0	0	0	219	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)
BIS(2-ETHYLHEXYL) PHTHALATE	1000000	0	0.5	0.5	0	0	0	0	1	0
CADMIUM	1.2E+08	0	0.5	0.5	0	0	0	0	1	0
CHLORIDE (PWS)	1.2E+08	0	0.5	0.5	0	0	0	0	1	0
COPPER	1000000	0	0.5	0.5	0	0	0	0	1	0
DISSOLVED IRON	1000000	0	0.5	0.5	0	0	0	0	1	0
TOTAL DISSOLVED SOLIDS (PWS)	1.2E+08	0	0.5	0.5	0	0	0	0	1	0

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS Wth (mgd)	Apply FC
10139	1.20	302.20	26.10	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	0.1	0	0	0	0	0	0	0	100	7	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

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

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
BIS(2-ETHYLHEXYL) PHTHALATE	0	0	0.5	0.5	0	0	0	0	1	0
CADMIUM	0	0	0.5	0.5	0	0	0	0	1	0
CHLORIDE (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
COPPER	0	0	0.5	0.5	0	0	0	0	1	0
DISSOLVED IRON	0	0	0.5	0.5	0	0	0	0	1	0
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0.5	0.5	0	0	0	0	1	0

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number
1.80	**Energy Ctr Harr**	**PA0008427**

AFC

Q7-10: **CCT (min)** 15 **PMF** 0.489 **Analysis pH** 6.941 **Analysis Hardness** 111.292

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CADMIUM	0	0	0	0	2.234	2.378	25.062
	Dissolved WQC. Chemical translator of 0.94 applied.						
COPPER	0	0	0	0	14.865	15.484	163.163
	Dissolved WQC. Chemical translator of 0.96 applied.						
BIS(2-ETHYLHEXYL) PHTHALATE	0	0	0	0	4500	4500	47419.07
CHLORIDE (PWS)	0	0	0	0	NA	NA	NA
DISSOLVED IRON	0	0	0	0	NA	NA	NA
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

CFC

Q7-10: **CCT (min)** 62.505 **PMF** 1 **Analysis pH** 6.969 **Analysis Hardness** 105.813

Parameter	Stream Conc. (µg/L)	Stream CV	Trib Conc. (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CADMIUM	0	0	0	0	0.256	0.282	5.776
	Dissolved WQC. Chemical translator of 0.907 applied.						
COPPER	0	0	0	0	9.399	9.79	200.403
	Dissolved WQC. Chemical translator of 0.96 applied.						
BIS(2-ETHYLHEXYL) PHTHALATE	0	0	0	0	910	910	18627.09
CHLORIDE (PWS)	0	0	0	0	NA	NA	NA
DISSOLVED IRON	0	0	0	0	NA	NA	NA
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

THH

Q7-10: **CCT (min)** 62.505 **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)
CADMIUM	0	0	0	0	NA	NA	NA
COPPER	0	0	0	0	NA	NA	NA

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number							
1.80	**Energy Ctr Harr**	**PA0008427**							
BIS(2-ETHYLHEXYL) PHTHALATE			0	0	0	0	NA	NA	NA
CHLORIDE (PWS)			0	0	0	0	250000	250000	NA
DISSOLVED IRON			0	0	0	0	300	300	6140.797
TOTAL DISSOLVED SOLIDS (PWS)			0	0	0	0	500000	500000	NA

CRL

Qh: **CCT (min)** 20.114 **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)
CADMIUM	0	0	0	0	NA	NA	NA
COPPER	0	0	0	0	NA	NA	NA
BIS(2-ETHYLHEXYL) PHTHALATE	0	0	0	0	1.2	1.2	155.629
CHLORIDE (PWS)	0	0	0	0	NA	NA	NA
DISSOLVED IRON	0	0	0	0	NA	NA	NA
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

PENTOXSD Analysis Results

Hydrodynamics

SWP Basin	Stream Code:	Stream Name:
07C	10139	PAXTON 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											
1.800	2.53	0	2.53	0.12994	0.0008	0.6381	27.131	42.518	0.1536	0.2386	62.505
1.200	2.61	0	2.61	NA	0	0	0	0	0	0	NA
Qh Hydrodynamics											
1.800	16.723	0	16.723	0.12994	0.0008	1.4378	27.131	18.870	0.4320	0.0849	20.114
1.200	17.184	0	17.184	NA	0	0	0	0	0	0	NA

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C. Toxics Screening Analysis Spreadsheet

TOXICS SCREENING ANALYSIS
WATER QUALITY POLLUTANTS OF CONCERN
VERSION 2.7

Facility: **Energy Center Harrisburg** NPDES Permit No.: **PA0008427** Outfall: **001**
Analysis Hardness (mg/L): **219** Discharge Flow (MGD): **0.084** Analysis pH (SU): **7**
Stream Flow, Q_{7-10} (cfs): **2.53**

	Parameter		Maximum Concentration in Application or DMRs (µg/L)	Most Stringent Criterion (µg/L)	Candidate for PENTOXSD Modeling?	Most Stringent WQBEL (µg/L)	Screening Recommendation
Group 1	Total Dissolved Solids		1080000	500000	Yes	120000000	No Limits/Monitoring
	Chloride		434000	250000	Yes		
	Bromide		30	N/A	No		
	Sulfate		192000	250000	No		
Group 2	Total Aluminum		76	750	No		
	Total Antimony		0.51	5.6	No		
	Total Arsenic		1.7	10	No		
	Total Barium		100	2400	No		
	Total Beryllium		0.1	N/A	No		
	Total Boron		120	1600	No		
	Total Cadmium		1.3	0.484	Yes	5.7	Monitor
	Total Chromium		3.4	N/A	No		
	Hexavalent Chromium		0.047	10.4	No		
	Total Cobalt		0.83	19	No		
	Total Copper		22	18.2	Yes	104	Monitor
	Free Available Cyanide		2.2	5.2	No		
	Total Cyanide			N/A			
	Dissolved Iron		660	300	Yes	6140	Monitor
	Total Iron		700	1500	No		
	Total Lead		0.89	8.6	No		
	Total Manganese		250	1000	No		
	Total Mercury		0.0059	0.05	No		
	Total Nickel		5.6	101.2	No		
	Total Phenols (Phenolics)		2	5	No		
	Total Selenium		1.3	5.0	No		
	Total Silver		0.33	14.6	No		
	Total Thallium		0.16	0.24	No		
	Total Zinc		120	232.8	No		
	Total Molybdenum		39	N/A	No		
Group 3	Acrolein	<	1.9	3	No (Value < QL)		
	Acrylonitrile	<	1.2	0.051	No (Value < QL)		
	Benzene	<	0.23	1.2	No (Value < QL)		
	Bromoform	<	0.4	4.3	No (Value < QL)		
	Carbon Tetrachloride	<	0.31	0.23	No (Value < QL)		
	Chlorobenzene	<	0.19	130	No (Value < QL)		
	Chlorodibromomethane	<	0.45	0.4	No (Value < QL)		
	Chloroethane	<	0.33	N/A	No		
	2-Chloroethyl Vinyl Ether	<	0.38	3500	No (Value < QL)		
	Chloroform	<	0.37	5.7	No (Value < QL)		
	Dichlorobromomethane	<	0.45	0.55	No (Value < QL)		
	1,1-Dichloroethane	<	0.28	N/A	No		
	1,2-Dichloroethane	<	0.32	0.38	No (Value < QL)		
	1,1-Dichloroethylene	<	0.29	33	No (Value < QL)		
	1,2-Dichloropropane	<	0.24	2200	No (Value < QL)		
	1,3-Dichloropropylene	<	0.47	0.34	No (Value < QL)		
	1,4-Dioxane	<	0.64	N/A	No		
	Ethylbenzene	<	0.34	530	No (Value < QL)		
	Methyl Bromide	<	0.39	47	No (Value < QL)		
	Methyl Chloride	<	0.31	5500	No (Value < QL)		
	Methylene Chloride	<	0.45	4.6	No (Value < QL)		
	1,1,2,2-Tetrachloroethane	<	0.34	0.17	No (Value < QL)		
	Tetrachloroethylene	<	0.35	0.69	No (Value < QL)		
	Toluene	<	0.23	330	No (Value < QL)		
	1,2-trans-Dichloroethylene	<	0.26	140	No (Value < QL)		
	1,1,1-Trichloroethane	<	0.22	610	No (Value < QL)		
	1,1,2-Trichloroethane	<	0.33	0.59	No (Value < QL)		
	Trichloroethylene	<	0.33	2.5	No (Value < QL)		
	Vinyl Chloride	<	0.3	0.025	No (Value < QL)		

Group 4	2-Chlorophenol	<	0.31	81	No (Value < QL)		
	2,4-Dichlorophenol	<	0.31	77	No (Value < QL)		
	2,4-Dimethylphenol	<	0.2	130	No (Value < QL)		
	4,6-Dinitro-o-Cresol	<	0.31	13	No (Value < QL)		
	2,4-Dinitrophenol	<	2.3	69	No (Value < QL)		
	2-Nitrophenol	<	0.42	1600	No (Value < QL)		
	4-Nitrophenol	<	0.98	470	No (Value < QL)		
	p-Chloro-m-Cresol	<	0.18	30	No (Value < QL)		
	Pentachlorophenol	<	1.1	0.27	No (Value < QL)		
	Phenol	<	0.21	10400	No (Value < QL)		
	2,4,6-Trichlorophenol	<	0.53	1.4	No (Value < QL)		
Group 5	Acenaphthene	<	0.14	17	No (Value < QL)		
	Acenaphthylene	<	0.18	N/A	No		
	Anthracene	<	0.14	8300	No (Value < QL)		
	Benzidine	<	2.9	0.000086	No (Value < QL)		
	Benzo(a)Anthracene	<	0.16	0.0038	No (Value < QL)		
	Benzo(a)Pyrene	<	0.2	0.0038	No (Value < QL)		
	3,4-Benzofluoranthene	<	0.12	0.0038	No (Value < QL)		
	Benzo(ghi)Perylene	<	0.45	N/A	No		
	Benzo(k)Fluoranthene	<	0.18	0.0038	No (Value < QL)		
	Bis(2-Chloroethoxy)Methane	<	0.2	N/A	No		
	Bis(2-Chloroethyl)Ether	<	0.18	0.03	No (Value < QL)		
	Bis(2-Chloroisopropyl)Ether	<	0.26	1400	No (Value < QL)		
	Bis(2-Ethylhexyl)Phthalate	<	16.6	1.2	Yes	155	No Limits/Monitoring
	4-Bromophenyl Phenyl Ether	<	0.16	54	No (Value < QL)		
	Butyl Benzyl Phthalate	<	0.11	35	No (Value < QL)		
	2-Chloronaphthalene	<	0.17	1000	No (Value < QL)		
	4-Chlorophenyl Phenyl Ether	<	0.13	N/A	No		
	Chrysene	<	0.14	0.0038	No (Value < QL)		
	Dibenzo(a,h)Anthrancene	<	0.2	0.0038	No (Value < QL)		
	1,2-Dichlorobenzene	<	0.38	160	No (Value < QL)		
	1,3-Dichlorobenzene	<	0.25	69	No (Value < QL)		
	1,4-Dichlorobenzene	<	0.27	150	No (Value < QL)		
	3,3-Dichlorobenzidine	<	0.45	0.021	No (Value < QL)		
	Diethyl Phthalate	<	0.17	800	No (Value < QL)		
	Dimethyl Phthalate	<	0.65	500	No (Value < QL)		
	Di-n-Butyl Phthalate	<	0.15	21	No (Value < QL)		
	2,4-Dinitrotoluene	<	0.12	0.05	No (Value < QL)		
	2,6-Dinitrotoluene	<	0.2	0.05	No (Value < QL)		
	Di-n-Octyl Phthalate	<	0.093	N/A	No		
	1,2-Diphenylhydrazine	<	0.24	0.036	No (Value < QL)		
	Fluoranthene	<	0.16	40	No (Value < QL)		
	Fluorene	<	0.19	1100	No (Value < QL)		
	Hexachlorobenzene	<	0.21	0.00028	No (Value < QL)		
	Hexachlorobutadiene	<	0.18	0.44	No (Value < QL)		
	Hexachlorocyclopentadiene	<	0.16	1	No (Value < QL)		
	Hexachloroethane	<	0.28	1.4	No (Value < QL)		
	Indeno(1,2,3-cd)Pyrene	<	0.11	0.0038	No (Value < QL)		
	Isophorone	<	0.14	35	No (Value < QL)		
	Naphthalene	<	0.17	43	No (Value < QL)		
	Nitrobenzene	<	0.26	17	No (Value < QL)		
	n-Nitrosodimethylamine	<	0.6	0.00069	No (Value < QL)		
	n-Nitrosodi-n-Propylamine	<	0.22	0.005	No (Value < QL)		
	n-Nitrosodiphenylamine	<	0.17	3.3	No (Value < QL)		
	Phenanthrene	<	0.12	1	No (Value < QL)		
	Pyrene	<	0.15	830	No (Value < QL)		
	1,2,4-Trichlorobenzene	<	0.15	26	No (Value < QL)		

D. Total Residual Chlorine

TRC EVALUATION

Input appropriate values in A3:A9 and D3:D9

2.53	= Qstream (cfs)	0.5	= CV Daily
0.084	= Qdischarge (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 = 6.230	1.3.2.iii	WLA cfc = 6.056
PENTOXSD TRG	5.1a	LTAMULT afc = 0.373	5.1c	LTAMULT cfc = 0.531
PENTOXSD TRG	5.1b	LTA_afc= 2.321	5.1d	LTA_cfc = 3.526

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

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

E. Thermal Limits Calculation Results

Facility:	**Energy Center Harrisburg**						
Permit Number:	PA0008427						
Stream Name:	Paxton Creek						
Analyst/Engineer:	J.P Kwedza						
Stream Q7-10 (cfs):	2.53						
	Facility Flows[1]					**Stream Flows**	
	Stream (Intake) (MGD)	External (Intake) (MGD)	Consumptive (Loss) (MGD)	Discharge (MGD)		Adj. Q7-10 Stream Flow (cfs)	Downstream[2] Stream Flow (cfs)
Jan 1-31	0	0.084	0	0.084		8.1	8.2
Feb 1-29	0	0.084	0	0.084		8.9	9.0
Mar 1-31	0	0.084	0	0.084		17.7	17.8
Apr 1-15	0	0.084	0	0.084		23.5	23.7
Apr 16-30	0	0.084	0	0.084		23.5	23.7
May 1-15	0	0.084	0	0.084		12.9	13.0
May 16-30	0	0.084	0	0.084		12.9	13.0
Jun 1-15	0	0.084	0	0.084		7.6	7.7
Jun 16-30	0	0.084	0	0.084		7.6	7.7
Jul 1-31	0	0.084	0	0.084		4.3	4.4
Aug 1-15	0	0.084	0	0.084		3.5	3.7
Aug 16-31	0	0.084	0	0.084		3.5	3.7
Sep 1-15	0	0.084	0	0.084		2.8	2.9
Sep 16-30	0	0.084	0	0.084		2.8	2.9
Oct 1-15	0	0.084	0	0.084		3.0	3.2
Oct 16-31	0	0.084	0	0.084		3.0	3.2
Nov 1-15	0	0.084	0	0.084		4.0	4.2
Nov 16-30	0	0.084	0	0.084		4.0	4.2
Dec 1-31	0	0.084	0	0.084		6.1	6.2
[1] Facility flows are not required (and will not affect the permit limits) if all intake flow is from the receiving stream (Case 1), consumptive losses are small, and permit limits will be expressed as Million BTUs/day.							
[2] Downstream Stream Flow includes the discharge flow.							
Please forward all comments to Tom Starosta at 717-787-4317, tstarosta@state.pa.us.							
Version 1.0 -- 08/01/2004 Reference: Implementation Guidance for Temperature Criteria, DEP-ID: 391-2000-017							
NOTE: The user can only edit fields that are blue.							
NOTE: MGD x 1.547 = cfs.							

Facility:	**Energy Center Harrisburg**						
Permit Number:	PA0008427						
Stream:	Paxton Creek						
	WWF			**WWF**		**WWF**	
	Ambient Stream	Ambient Stream	Target Maximum	Daily		Daily	
	Temperature (ºF)	Temperature (ºF)	Stream Temp.[1]	WLA[2]		WLA[3]	at Discharge
	(Default)	(Site-specific data)	(ºF)	(Million BTUs/day)		(ºF)	Flow (MGD)
Jan 1-31	35	0	40	N/A -- Case 2		110.0	0.084
Feb 1-29	35	0	40	N/A -- Case 2		110.0	0.084
Mar 1-31	40	0	46	N/A -- Case 2		110.0	0.084
Apr 1-15	47	0	52	N/A -- Case 2		110.0	0.084
Apr 16-30	53	0	58	N/A -- Case 2		110.0	0.084
May 1-15	58	0	64	N/A -- Case 2		110.0	0.084
May 16-30	62	0	72	N/A -- Case 2		110.0	0.084
Jun 1-15	67	0	80	N/A -- Case 2		110.0	0.084
Jun 16-30	71	0	84	N/A -- Case 2		110.0	0.084
Jul 1-31	75	0	87	N/A -- Case 2		110.0	0.084
Aug 1-15	74	0	87	N/A -- Case 2		110.0	0.084
Aug 16-31	74	0	87	N/A -- Case 2		110.0	0.084
Sep 1-15	71	0	84	N/A -- Case 2		110.0	0.084
Sep 16-30	65	0	78	N/A -- Case 2		110.0	0.084
Oct 1-15	60	0	72	N/A -- Case 2		110.0	0.084
Oct 16-31	54	0	66	N/A -- Case 2		110.0	0.084
Nov 1-15	48	0	58	N/A -- Case 2		110.0	0.084
Nov 16-30	42	0	50	N/A -- Case 2		110.0	0.084
Dec 1-31	37	0	42	N/A -- Case 2		110.0	0.084

[1] This is the maximum of the WWF WQ criterion or the ambient temperature. The ambient temperature may be either the design (median) temperature for WWF, or the ambient stream temperature based on site-specific data entered by the user. A minimum of 1ºF above ambient stream temperature is allocated.

[2] The WLA expressed in Million BTUs/day is valid for Case 1 scenarios, and disabled for Case 2 scenarios.

[3] The WLA expressed in ºF is valid only if the limit is tied to a daily discharge flow limit (may be used for Case 1 or Case 2). WLAs greater than 110ºF are displayed as 110ºF.

F. Process Flow Diagram