KPDES

KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

FACT SHEET

KPDES No.: KY0002038
AI No.: 704
Kentucky Utilities – Ghent Generating Station
9485 US Highway 42 East
P.O. Box 338
Ghent, Carroll County, Kentucky

Date: August 31, 2022

Public Notice Information

Public Notice Start Date: July 6, 2022

Comment Due Date: August 5, 2022

General information concerning the public notice process may be obtained on the Division of Water's Public Notice Webpage at the following address: http://water.ky.gov/Pages/PublicNotices.aspx.

Public Notice Comments
Comments must be received by the Division of Water no later than 4:30 PM on the closing date of the comment period. Comments may be submitted by e-mail at: DOWPublicNotice@ky.gov or written comments may be submitted to the Division of Water at 300 Sower Blvd, Frankfort, Kentucky 40601.

Reference Documents
A copy of this proposed fact sheet, proposed permit, the application, other supporting material and the current status of the application may be obtained from the Department for Environmental Protection's Pending Approvals Search Webpage:
http://dep.gateway.ky.gov/eSearch/Search_Pending_Approvals.aspx?Program=Wastewater&NumDaysDoc=30.

Open Records
Copies of publicly-available documents supporting this fact sheet and proposed permit may also be obtained from the Department for Environmental Protection Central Office. Information regarding these materials may be obtained from the Open Records Coordinator at (502) 782-6849 or by e-mail at EEC.KORA@ky.gov.

THIS KPDES FACT SHEET CONSISTS OF THE FOLLOWING SECTIONS:

SECTION 1

FACILITY SYNOPSIS

1. FACILITY SYNOPSIS

1.1. Name and Address of Applicant

Kentucky Utilities Company
P.O. Box 32010
Louisville, Kentucky 40232

1.2. Facility Location

Kentucky Utilities – Ghent Generating Station
9485 US Highway 42 East
P.O. Box 338
Ghent, Carroll County, Kentucky

1.3. Description of Applicant's Operation

The facility is a fossil fuel fired steam electric power plant for the generation, transmission and distribution of electricity. Generation of electric power is from four fossil fired units with the following nameplate generating capacity: Unit 1 – 557 MW, Unit 2 – 556 MW, Unit 3 – 557 MW, and Unit 4 – 556 MW.

1.4. Wastewaters Collected and Treatment

The following table lists the flow, wastewater types collected, and treatment type for each outfall:

TABLE 1.

Outfall No.	Average Flow	Wastewater Types Collected	Treatment Type
001	23.99	Process Wastewater Non-Contact Cooling Water Stormwater	Neutralization Mixing Settling Chemical Precipitation
002	15.07	Non-Contact Cooling Water Stormwater	Disinfection (Other)
003	24.50	Non-Contact Cooling Water Stormwater	Disinfection (Other)
005	0.0	Process Wastewater	Chemical Precipitation
0061	1.56	Non-Contact Cooling Water	Disinfection (Other)
0062	1.67	Non-Contact Cooling Water	Disinfection (Other)
0063	1.32	Non-Contact Cooling Water	Disinfection (Other)
0064	1.00	Non-Contact Cooling Water	Disinfection (Other)
007	72.95	Raw Water Intake	None
008	Not yet constructed	Process Wastewater	Chemical Precipitation Neutralization Mixing Settling
009	Not yet constructed	Stormwater	Settling
010	Not yet constructed	Stormwater	Settling
011	Not yet constructed	Stormwater	Settling
012	Not yet constructed	Stormwater	Settling
013	Not yet constructed	Stormwater	Settling

The design flow of the facility is 197 MGD. The average annual flow is 63.56 MGD.

1.5. Permitting Action

This is a modification of a major KPDES permit for an existing source Steam Electric Generating Station [SIC Code 4911].

This permit modification is in response to the 2020 EPA's revisions to Steam Electric Effluent Limitation Guidelines. The modification modifies the technology-based requirements for FGD and Bottom Ash Transport to comply with the revised guidelines. Outfalls 001 and 008 has been modified to reflect these changes.

SECTION 2

RECEIVING/INTAKE WATERS

2. RECEIVING / INTAKE WATERS

2.1. Receiving Waters

All surface waters of the Commonwealth have been assigned stream use designations consisting of one or more of the following designations: Warmwater Aquatic Habitat (WAH), Primary Contact Recreation (PCR), Secondary Contact Recreation (SCR), Domestic Water Supply (DWS), Coldwater Aquatic Habitat (CAH) or Outstanding State Resource Water (OSRW)[401 KAR 10:026].

All surface waters of the Commonwealth are assigned one of the following antidegradation categories: Outstanding National Resource Water (ONRW), Exceptional Water (EW), Impaired Water (IW) or High Quality Water (HQ)[401 KAR 10:030].

Surface waters categorized as an IW are listed in Kentucky's most recently approved Integrated Report to Congress on the Condition of Water Resources in Kentucky - Volume II. 303(d) List of Surface Waters.

The following table lists the stream use classifications associated with this permit.

TABLE 2.

Receiving Water Name	Use Designation	Antidegradation Category	7Q10 Low Flow (cfs)	Harmonic Mean Flow (cfs)
Ohio River[1]	WAH PCR SCR DWS	IW	10,600	45,300
Black Rock Creek	WAH PCR SCR DWS	HQ	0.0	0.0
Stephens Branch	WAH PCR SCR DWS	HQ	0.0	0.0
UT to Agniels Creek	WAH PCR SCR DWS	HQ	0.0	0.0

[1]This segment of Ohio River (mile point 531.5 to 593.4) is listed as impaired in the 2016 303(d) List of Waters for Kentucky. Impaired uses are Fish Consumption (Partial Support). The pollutants of concern are Dioxin and Polychlorinated biphenyls (PCBs). The suspected sources are unknown. Facility in compliance with KPDES permit will not contribute to impairment.

2.2. Intake Waters – Nearest Downstream Intake

TABLE 3.

Intake Water Name	Public Water Supply Name	Latitude (N) Decimal Degrees	Longitude (W) Decimal Degrees	Miles Downstream	7Q10 Low Flow (cfs)	Harmonic Mean Flow (cfs)
Ohio River	Louisville Water CO	38.348312°	85.637297°	59	10600	45300

SECTION 3

OUTFALL 001

3. OUTFALL 001

3.1. Outfall Description

The following table lists the outfall type, location, and description:

TABLE 4.					
Outfall Number	**Outfall Type**	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
001	External	38.755278°	85.023611°	Ohio River	Discharge to Ohio River from Ash Treatment Basin and new process pond that contains flows from the following: Cooling Tower Blow (Outfall 006), coal pile runoff, FGD Wastewater (Future Outfall 008), low volume waste, ash sluice water, landfill leachate, chemical (Outfall 005) and nonchemical metal cleaning wastewater, Ash Treatment Basin Dewatering Flows, and stormwater.
001A	External	38.755278°	85.023611°	Ohio River	Additional requirements when the facility is dewatering from ATB's

3.2. Reported Values

The following table summarizes the reported values for Outfall 001:

TABLE 5.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Flow	MGD	23.99	28.29	N/A	N/A	N/A	N/A
Total Suspended Solids	mg/l	N/A	N/A	N/A	16.93	19.92	N/A
Oil & Grease	mg/l	N/A	N/A	N/A	0.028	0.028	N/A
pH	SU	N/A	N/A	6.90	N/A	N/A	8.90
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	931	931	N/A
Total Recoverable Metals	mg/l	N/A	N/A	N/A	0.160	0.162	N/A
Acute WET[1]	TU_A	N/A	N/A	N/A	N/A	N/A	<1.00

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2013 to 10/31/2018.

3.3. Effluent Limitations and Monitoring Requirements

3.3.1. Outfall 001

The following table summarizes the effluent limitations and monitoring requirements for Outfall 001:

TABLE 6.

EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	2/Month	Instantaneous
Flow, process wastewater[1,4]	GPD	N/A	104,786[2]	N/A	N/A	N/A	N/A	Continuous	Metered[3]
Temperature	°F	N/A	N/A	N/A	Report	110	N/A	2/Month	Grab
Total Suspended Solids									
Tier 1	mg/l	N/A	N/A	N/A	30.0	74.1	N/A	2/Month	Grab
Tier 2[4]	mg/l	N/A	N/A	N/A	30.0	69.8	N/A	2/Month	Grab
Oil & Grease									
Tier 1	mg/l	N/A	N/A	N/A	9.9	12.4	N/A	2/Month	Grab
Tier 2[4]	mg/l	N/A	N/A	N/A	9.01	11.0	N/A	2/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	2/Month	Grab
Total Recoverable Mercury[5]	mg/l	N/A	N/A	N/A	0.000051	0.0014	N/A	1/Month	Grab
Total Recoverable Cadmium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Selenium	mg/l	N/A	N/A	N/A	0.386[6]	Report	N/A	1/Quarter	Grab
Total Recoverable Selenium (Fish Tissue)	mg/kg dry weight	N/A	N/A	N/A	N/A	N/A	8.6	([6])	([6])
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Acute WET[7]									
Tier 1	TU_A	N/A	N/A	N/A	N/A	N/A	1.00	1/Quarter	([8])
Tier 2[9]	TU_A	N/A	N/A	N/A	N/A	N/A	5.00	1/Quarter	([8])

[1]This represents discharge from the bottom ash transport system

[2]30 – Consecutive day rolling average

[3]Calculated Flow results can be used in events when the flow meter is out of service

TABLE 6.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
[4]These limits shall become effective on July 1, 2024 and are representative of the allowed 10% bottom ash purge.									
[5]These limitations shall apply on the date specified in the compliance schedule for this effluent (see Section 3.4.3) and continue in effect for the remainder of the permit. Until the limitations are effective, the permittee shall report monitored values for both the monthly average requirements and daily maximum requirements.									
[6]Should the monthly average concentration of Total Recoverable Selenium exceed 0.386 mg/l, see permit Section 5.10 for additional requirements.									
[7]WET – Whole Effluent Toxicity									
[8]Two (2) discrete grab samples shall be collected 12 hours apart									
[9]The tier 2 limits for this parameter are for once the facility has completed construction of the new high-rate, multiport diffuser. Tier 2 limits will become effective upon the receipt and acknowledgement by the Division of Water of written notification from KU Ghent that the conditions for that Tier has been met and maintained.									
The reported results from Outfall 001A "Additional Requirements during Ash Pond Dewatering" shall be used as compliance results for this outfall as well.									

3.3.2. Outfall 001A (Additional Requirements during Ash Pond Dewatering)

Tier 1: Prior to Construction of High-Rate Multiport Diffuser

This outfall is for the additional monitoring requirements if any dewatering takes place during the month. The facility shall give the DOW regional office notice prior to commencement of any dewatering activity. If the facility does not dewater during the month, they can report NODI Code 9 "Conditional Monitoring-Not Required This Period" on that month's DMR for this outfall. The following table summarizes the effluent limitations and monitoring requirements for Outfall 001A:

TABLE 7.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Total Recoverable Antimony[1]	mg/l	N/A	N/A	N/A	1.24	Report	N/A	1/Month	Grab
Total Recoverable Arsenic[1]	mg/l	N/A	N/A	N/A	0.305	0.305	N/A	1/Month	Grab
Total Recoverable Beryllium[1]	mg/l	N/A	N/A	N/A	0.884	Report	N/A	1/Month	Grab
Total Recoverable Cadmium[1]	mg/l	N/A	N/A	N/A	0.0079	0.0079	N/A	1/Month	Grab
Total Recoverable Chromium[1]	mg/l	N/A	N/A	N/A	22.1	Report	N/A	1/Month	Grab

TABLE 7.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Total Recoverable Copper[1]	mg/l	N/A	N/A	N/A	0.046	0.046	N/A	1/Month	Grab
Total Recoverable Lead[1]	mg/l	N/A	N/A	N/A	0.104	0.427	N/A	1/Month	Grab
Total Recoverable Nickel[1]	mg/l	N/A	N/A	N/A	1.36	1.36	N/A	1/Month	Grab
Total Recoverable Selenium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Total Recoverable Silver[1]	mg/l	N/A	N/A	N/A	Report	0.037	N/A	1/Month	Grab
Total Recoverable Thallium[1]	mg/l	N/A	N/A	N/A	0.053	Report	N/A	1/Month	Grab
Total Recoverable Zinc[1]	mg/l	N/A	N/A	N/A	0.338	0.338	N/A	1/Month	Grab
Acute WET[2]	TU_A	N/A	N/A	N/A	N/A	N/A	Report	1/Month	([3])
[1]The Monthly Average and Daily Maximum concentrations for these pollutants are not effluent limitations, but water quality triggers that, if exceeded for two (2) consecutive dewatering months (this includes even if the facility stops dewatering in-between the two months), require permittee action. See the Best Management Practices Plan Section - Additional BMP Conditions Subsection for additional requirements related to these triggers.									
[2]WET – Whole Effluent Toxicity									
[3]Two (2) discrete grab samples shall be collected 12 hours apart									

Tier 2: After Construction of High-Rate Multiport Diffuser is Complete

Once the High-Rate Multiport Diffuser installation is complete, the facility shall notify the DOW that the conditions for the Tier 2 BMP triggers have been met and comply with the requirements set out below. This outfall is for the additional monitoring requirements if any dewatering takes place during the month. The facility shall give the DOW regional office notice prior to commencement of any dewatering activity. If the facility does not dewater during the month, they can report NODI Code 9 “Conditional Monitoring-Not Required This Period” on that month’s DMR for this outfall. The following table summarizes the effluent limitations and monitoring requirements for Outfall 001A:

TABLE 8.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Total Recoverable Antimony[1]	mg/l	N/A	N/A	N/A	1.24	Report	N/A	1/Month	Grab

TABLE 8.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Total Recoverable Arsenic[1]	mg/l	N/A	N/A	N/A	5.1	5.1	N/A	1/Month	Grab
Total Recoverable Beryllium[1]	mg/l	N/A	N/A	N/A	0.884	Report	N/A	1/Month	Grab
Total Recoverable Cadmium[1]	mg/l	N/A	N/A	N/A	0.022	0.049	N/A	1/Month	Grab
Total Recoverable Chromium[1]	mg/l	N/A	N/A	N/A	22.1	Report	N/A	1/Month	Grab
Total Recoverable Copper[1]	mg/l	N/A	N/A	N/A	0.274	0.274	N/A	1/Month	Grab
Total Recoverable Lead[1]	mg/l	N/A	N/A	N/A	0.104	2.02	N/A	1/Month	Grab
Total Recoverable Nickel[1]	mg/l	N/A	N/A	N/A	3.9	9.8	N/A	1/Month	Grab
Total Recoverable Selenium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Total Recoverable Silver[1]	mg/l	N/A	N/A	N/A	Report	0.113	N/A	1/Month	Grab
Total Recoverable Thallium[1]	mg/l	N/A	N/A	N/A	0.053	Report	N/A	1/Month	Grab
Total Recoverable Zinc[1]	mg/l	N/A	N/A	N/A	2.4	2.4	N/A	1/Month	Grab
Acute WET[2]	TU_A	N/A	N/A	N/A	N/A	N/A	Report	1/Month	([3])

[1]The Monthly Average and Daily Maximum concentrations for these pollutants are not effluent limitations, but water quality triggers that, if exceeded for two (2) consecutive dewatering months (this includes even if the facility stops dewatering in-between the two months), require permittee action. See the Best Management Practices Plan Section - Additional BMP Conditions Subsection for additional requirements related to these triggers.

[2]WET – Whole Effluent Toxicity

[3]Two (2) discrete grab samples shall be collected 12 hours apart

3.4. Pertinent Factors

The effluent limitations for this outfall were developed in accordance with DOW's General Procedures for Limitations Development located on DOW's webpage at:

http://dep.ky.gov/formslibrary/Documents/General%20Procedures%20for%20Limitations%20Development.pdf

3.4.1. Facility Changes and Tiered Limits

This facility will continue to operate as a coal fired steam electric power generation and transmission facility. The facility will undergo major changes in response to the recently updated federal regulations concerning Coal Combustion Residuals (CCR) and Steam Electric Power Generating Effluent Limitation Guidelines (ELG). New treatment equipment, redirection of flows, cessation of ash sluicing flows, and impoundment construction will significantly change this site. A comprehensive discussion of all the facility changes can be found in the Cover Letters and in the KU's Ghent Generating Station KPDES application submitted.

The facility is in the process of closing out their ash treatment basins (ATB) 1 and 2. In order to do this the facility must redirect flows that are currently discharging to the ATBs to a process pond. In addition to the planned pond closures, construction of a FGD process water treatment system and wet-to-dry conversion of coal ash handling systems are planned. In order to capture these changes, it would affect the facilities TSS and Oil & Grease limits therefore it would be necessary to tier the permit for them. Section 3.5.1 reflects the current conditions at the effective date of the permit (Tier 1) and the future operation conditions once these changes are complete (Tier 2).

3.4.2. Legacy Wastewater

The facility converted to sending certain waste streams that were contributing to ATB 1 and 2 to the new process channel and process pond, so these sources will no longer be contributing to the ATB surface impoundments. The wastewater that these operations were contributing will still be in the impoundment until it has been closed. The overall volumes of legacy wastewater will continue to decrease dramatically over time as the facility closes out the pond, and the water redirected to process pond and legacy wastewater from the ATBs will be combined and discharged through outfall 001. Therefore, the Division will continue to apply the same limitations for TSS and Oil & Grease that applied before to outfall 001, since there is no change to the contributing operations to this outfall.

3.4.3. Dewatering of Ash Ponds

In order for the ash pond to be closed, it must be decanted and dewatered. During dewatering, mechanical equipment may be required to remove interstitial water from the ash in the Ash Pond. While dewatering occurs, the facility will be required to monitor for the metals listed in Outfall 001A at a frequency of once per month and toxicity testing at a frequency of once per month. All dewatering flows from ATB 1 & 2 will be combined with the treated wastewater from the new process pond, or directed to the new process pond, prior to discharge to the Ohio River. Also, the Ohio River can provide further dilution of effluent if necessary. The facility has installed their new multi-port diffuser. For these reasons, monthly toxicity testing and monitoring of metals, with baseline water quality triggers during dewatering, will be required in place of metals limitations.

3.4.4. Schedule of Compliance

The permittee shall comply with all Outfall 001 effluent limitations by the effective date of the permit except as noted below. At the permittee's request, the DOW has developed a compliance schedule consistent with 40 CFR 122.47 (as incorporated in 401 KAR 5:050, Section 3), for meeting the monthly

average requirements for Total Recoverable Mercury at Outfall 001. Outfall 001 consists of existing ash pond ATB-1 legacy wastewater including ash sluice flows and FGD dewatering flows. While the new process wastewater treatment system-FGD wastewater treatment system will operate by late 2019 to reduce mercury concentrations below the required limit for new flows, the large volume of legacy wastewater will require a significant amount of time to manage. The ash pond water adjacent to the ATB-1 discharge structure is estimated to be 50 million gallons and may require 6 months to 1 year to gradually comingle these legacy flows with treated wastewaters, while remaining in compliance with the limits for the blended flows. The compliance schedule request is contained within the information submitted by the permittee on November 30, 2018. The milestones and compliance dates in the following schedule of compliance are based on the request and timelines provided there in. The following table outlines each of the compliance schedule's milestones and the corresponding compliance duration:

Milestone	**Compliance Date**
Construction and optimization/testing new FDG Process Waters Treatment System complete. Additionally, the permittee shall submit to DOW Surface Water Permits Branch a status report on pond closures.	April 1, 2020
The permittee shall achieve compliance with the Total Recoverable Mercury limitation.	As soon as possible, but not later than January 1, 2021

3.4.5. No Discharge of Fly Ash Transport Water Compliance

Currently, all fly ash is dry-managed using the plant CCRT system where fly ash is pugmill-moistened and pipe-conveyor managed to the on-site landfill; therefore, Ghent no longer sluices fly ash.

3.4.6. No Discharge of Bottom Ash Transport Water Compliance

Ghent consists of four operating coal-fired units. Ghent's existing once-thru sluicing system is being converted to a BAT high recycle system which will utilize wet sluicing to transport bottom ash from each operating unit to a remote dewatering conveyor system and surge to dewater the bottom ash. The system cannot be operated as a closed loop without risk of scaling, corrosion, and maintenance challenges that could impact system operation. Thus, this system should be operated as a high recycle rate system with the allowed purge to alleviate these concerns.

The Ghent Station Units 1-4 coal-fired steam generating plant will comply with the Final ELG Rule for BATW by operating a high recycle rate management system including a purge rate of 10% to maintain the BATW management system equipment reliability and performance. The BATW management system includes three remote submerged flight conveyors to manage bottom ash, coal mill rejects/pyrites, and potentially, the boiler air-heater wash water flows. The existing system must be further modified to accommodate the high recycle rate and up to 10% purge flow consistent with the Final ELG Rule requirements. Generally, this requires installing new tanks/pumps/piping/controls to manage transport water flows to/from the remote mechanical drag system conveyors. Some conversion of existing bottom ash hoppers and related piping for sluice/wash/seal water flows system may also be required to properly manage associated flows. The treated effluent flows form the BATW system will continue to be directed to the plant's existing process ponds, then to Outfall 001 and ultimately discharged via a high-rate multiport diffuser to the Ohio River.

40 CFR 423.13(k)(1) requires that except for those discharges to which 40 CFR 423.13(k)(2) applies, or when bottom ash transport water is used in the FGD scrubber, there shall be no discharge of pollutants in bottom ash transport waters. The permittee must meet this requirement by a date determined by the permitting authority. For bottom ash transport water, the date has to be as soon as possible beginning October 13, 2021 but no later than December 31, 2025. The definition for the phrase "as soon as possible" can be found in 40 CFR 423.11(t). The permittee provided the Division of Water information to determine as soon as possible ELG compliance applicability dates.

KU awarded the Engineering, Procurement, and Construction agreement on March 15, 2021. Because the BATW treatment system activities are complex and highly integrated with existing plant systems, following transfer of care, custody, and control of the system to KU, as well as plant troubleshooting-optimization efforts, KU requests an applicability date for the BATW system of July 1, 2024. For the BATW – FGD wastewater projects, discreet steps of the engineering-procurement-installation contract include multiple overlapping phases which are not specifically sequential but highly interdependent. Delays of any step are likely to delay completing the entire project. For the FGD wastewater specific activities, these phases and general expected durations include:

- Detailed engineering: beginning May 2021
- Procurement: beginning Q2 2021
- Construction – multi – discipline and multi – trades: beginning Q3 2021
- Mechanical startup, troubleshooting and testing; beginning Q3 2023
- Commercial Completion and performance test: beginning Q4 2023
- Plant testing and optimization: beginning Q1-Q2 2024

The DOW grants KU's requested compliance date of July 1, 2024 to comply with the discharge BAT requirements for BATW by operating a high recycle rate management system with a purge rate not to exceed 10% on a 30-consecutive day rolling average.

3.4.7. Technology-Based Effluent Limitations

Technology-based effluent limitations and standards, based on federally promulgated standards, a case-by-case basis, or a combination of the two, shall be included in all KPDES permits, where applicable.

3.4.7.1. Federal Effluent Limitations Guidelines

EPA has established a minimum level of technology that must be applied to certain industries. Due to the operations at this facility, all applicable sections of 40 CFR 423 shall be applied to this outfall. The following is a list of those requirements:

40 CFR 423.12(b) (1)

The pH of all discharges, except once through cooling water, shall be within the range of 6.0-9.0.

40 CFR 423.12(b) (2)

There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

40 CFR 423.12(b) (3)

The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table:

TABLE 9.
BPT Effluent Requirements – Low Volume Waste

Effluent Characteristic	Maximum for any one day	Maximum for monthly average
TSS	100.0 mg/l	30.0 mg/l
Oil and Grease	20.0 mg/l	15.0 mg/l

40 CFR 423.12(b) (4)

The quantity of pollutants discharged in fly ash and bottom ash transport water shall not exceed the quantity determined by multiplying the flow of fly ash and bottom ash transport water times the concentration listed in the following table:

TABLE 10.		
BPT Effluent Requirements – Fly and Bottom Ash Transport Water		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
TSS	100.0 mg/l	30.0 mg/l
Oil and Grease	20.0 mg/l	15.0 mg/l

40 CFR 423.12(b)(5)

The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table:

TABLE 11.		
BPT Effluent Requirements – Metal Cleaning Wastes		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
TSS	100.0 mg/l	30.0 mg/l
Oil and Grease	20.0 mg/l	15.0 mg/l
Copper, Total	1.0 mg/l	1.0 mg/l
Iron, Total	1.0 mg/l	1.0 mg/l

40 CFR 423.12(b) (9)

Subject to the provisions of paragraph (b)(10) of this section, the following effluent limitations shall apply to the point source discharges of coal pile runoff:

TABLE 12.		
BPT Effluent Requirements – Coal Pile Runoff		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
TSS	50 mg/l	-

40 CFR 423.12(b) (10)

Any untreated overflow from facilities designed, constructed, and operated to treat the volume of coal pile runoff which is associated with a 10 year, 24 hour rainfall event shall not be subject to the limitations in paragraph (b)(9) of this section

40 CFR 423.12(b) (11)

The quantity of pollutants discharged in FGD wastewater, flue gas mercury control wastewater, combustion residual leachate, or gasification wastewater shall not exceed the quantity determined by multiplying the flow of the applicable wastewater times the concentration listed in the following table:

TABLE 13.		
BPT Effluent Requirements – combustion residual leachate		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
TSS	100.0 mg/l	30.0 mg/l
Oil and Grease	20.0 mg/l	15.0 mg/l

40 CFR 423.12(b) (12)

At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as concentration limitations instead of the mass-based limitations specified in paragraphs (b)(3) through (b)(7), and (b)(11), of this section concentration limitations shall be those concentrations specified in this section.

In accordance with Sections 423.12 (b) (12) the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The DOW has determined to apply the requirements of 40 CFR Part 423 in this manner.

40 CFR 423.12(b)(13)

In the event that waste streams from various sources are combined for treatment to be discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (b)(1) through (b)(12) of this section attributable to each controlled waste source shall not exceed the specified limitations for that waste source.

40 CFR 423.13(a)

There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

40 CFR 423.13(g)(ii)

For FGD wastewater generated before the date determined by the permitting authority, as specified in paragraph (g)(1)(i), the quantity of pollutants discharged in FGD wastewater shall not exceed the quantity determined by multiplying the flow of FGD wastewater times the concertation listed for TSS in 423.12(b)(11).

40 CFR 423.13(k)(1)(i)

Except for those discharges to which paragraph (k)(2) of this section applies, or when the bottom ash transport water is used in the FGD scrubber, there shall be no discharge of pollutants in bottom ash transport water. Dischargers must meet the discharge limitation in this paragraph by a date determined by the permitting authority that is as soon as possible beginning October 13, 2021, but no later than December 31, 2025. This limitation applies to the discharge of bottom ash transport water generated on and after the date determined by the permitting authority for meeting the discharge limitation, as specified in this paragraph. Except for those discharges to which paragraph (k)(2) of this section applies, whenever bottom ash transport water is used in any other plant process or is sent to a treatment system at the plant (except when it is used in the FGD scrubber), the resulting effluent must comply with the discharge limitation in this paragraph. When the bottom ash transport water is used in the FGD scrubber, it ceases to be bottom ash transport water, and instead is FGD wastewater, which must meet the requirements in paragraph (g) of this section.

40 CFR 423.13(k)(1)(ii)

For discharges of bottom ash transport water generated before the date determined by the permitting authority, as specified in paragraph (k)(1)(i) of this section, the quantity of pollutants discharged in bottom ash transport water shall not exceed the quantity determined by multiplying the flow of bottom ash transport water times the concentration listed for TSS in 423.12(b)(4).

40 CFR 423.13(k)(2)(i)

(A) The discharge of pollutants in bottom ash transport water from a properly installed, operated, and maintained bottom ash system is authorized under the following conditions:

(*1*) To maintain system water balance when precipitation-related inflows are generated from storm events exceeding a 10-year storm event of 24-hour or longer duration (e.g., 30-day storm event) and cannot be managed by installed spares, redundancies, maintenance tanks, and other secondary bottom ash system equipment; or

(*2*) To maintain system water balance when regular inflows from wastestreams other than bottom ash transport water exceed the ability of the bottom ash system to accept recycled water and segregating these other wastestreams is not feasible; or

(*3*) To maintain system water chemistry where installed equipment at the facility is unable to manage pH, corrosive substances, substances or conditions causing scaling, or fine particulates to below levels which impact system operation or maintenance; or

(*4*) To conduct maintenance not otherwise included in paragraphs (k)(2)(i)(A) (*1*), (*2*), or (*3*) of this section and not exempted from the definition of transport water in § 423.11(p), and when water volumes cannot be managed by installed spares, redundancies, maintenance tanks, and other secondary bottom ash system equipment.

(B) The total volume that may be discharged for the above activities shall be reduced or eliminated to the extent achievable using control measures (including best management practices) that are technologically available and economically achievable in light of best industry practice. The total volume of the discharge authorized in this subsection shall be determined on a case-by-case basis by the permitting authority and in no event shall such discharge exceed a 30-day rolling average of ten percent of the primary active wetted bottom ash system volume. The volume of daily discharges used to calculate the 30-day rolling average shall be calculated using measurements from flow monitors.

40 CFR 423.13(l)

Combustion residual leachate. The quantity of pollutants discharged in combustion residual leachate shall not exceed the quantity determined by multiplying the flow of combustion residual leachate times the concentration for TSS listed in 423.12(b)(11)

40 CFR 423.13(m)

At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as concentration limitations instead of the mass-based limitations specified in paragraphs (b) through (l) of this section concentration limitations shall be those concentrations specified in this section.

In accordance with Sections 423.13 (m) the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The DOW has determined to apply the requirements of 40 CFR Part 423 in this manner

40 CFR 423.13(n)

In the event that wastestreams from various sources are combined for treatment or discharged, the quantity of each pollutant or pollutant property controlled in paragraphs (a) through (m) of this section attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

3.4.7.2. Best Professional Judgment (BPJ)

Coal Pile Runoff

In accordance with 401 KAR 5:080, Section 2(3) – 40 CFR 125.3 in the absence of promulgated technology based standards, the cabinet may develop appropriate technology based standards utilizing its 'Best Professional Judgment" (BPJ). The previous permit established the following BPJ limits for coal pile runoff.

TABLE 14.		
BPJ Effluent Requirements – Coal Pile Runoff		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
TSS	N/A	30.0 mg/l
Oil and Grease	5.0 mg/l	5.0 mg/l

These limits have not been changed for this permit renewal in accordance with anti-backsliding [40 CFR 122.44(l)].

Cooling Tower Blowdown

In accordance with 401 KAR 5:080, Section 2(3) – 40 CFR 125.3 in the absence of promulgated technology based standards, the cabinet may develop appropriate technology based standards utilizing its 'Best Professional Judgment" (BPJ). The previous permit established the following BPJ limits for Cooling Tower Blow.

TABLE 15.		
BPJ Effluent Requirements – Cooling Tower Blowdown		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
TSS	50.0 mg/l	30.0 mg/l
Oil and Grease	5.0 mg/l	5.0 mg/l

These limits have not been changed for this permit renewal in accordance with anti-backsliding [40 CFR 122.44(l)].

Stormwater - Total Suspended Solids

The facility treats a portion of its storm water for this parameter before discharge in a holding pond. Sedimentation is a commonly used treatment technology for the removal of total suspended solids that is both efficient and cost effective. Although several factors may influence the final concentration of total suspended solids in the discharge, it has been the experience of the Division that ponds that retain wastewater for 6 hours or more can achieve a total suspended solids concentration of 30 mg/l as a monthly average and 60 mg/l as a daily maximum.

Stormwater -Oil & Grease

The facility treats a portion of its storm water for this parameter before discharge with an oil/water separator. Flotation or gravity separation of lighter petroleum based products from water is a common and cost effective method for the removal of oil & grease. It has been the experience of the Division that this treatment method can achieve an oil & grease concentration of 10 mg/l as a monthly average and 15 mg/l as a daily maximum.

3.4.8. Water Quality-Based Effluent Limitations

The following table lists those pollutants and/or pollutant characteristics of concern that DOW has determined exhibit reasonable potential to cause or contribute to an excursion of a water quality-based criterion, and the basis of DOW's determination. These determinations are consistent with the DOW's reasonable potential analysis (RPA) procedures outlined in *Permitting Procedures For Determining "Reasonable Potential"* Kentucky Division of Water May 1, 2000.

TABLE 16.	
Pollutant or Pollutant Characteristic	**Basis**
Whole Effluent Toxicity	The facility is rated as a "major discharger". The facility's discharge is a complex wastewater.

Total Recoverable Mercury	The discharge concentration of this pollutant exceeds 90% of the calculated chronic water quality-based effluent limitations (WQBELs) for this pollutant.
Total Recoverable Cadmium Total Recoverable Selenium	A Mixing Zone has granted for these parameters. Because a Mixing Zone has been granted there is no reasonable potential for this parameter to violate the State Water Quality Standard. However, since the facility would show reasonable potential if not for the Mixing Zone it's the Division of Waters Best Professional Judgement to continue monitoring for these parameters.
Temperature	Thermal pollution or heat loads are typically associated with industrial facilities where large volumes of cooling water are utilized. Therefore, DOW has determined that reasonable potential for this pollutant does exist.
Total Recoverable: Antimony, Arsenic, Beryllium, Chromium, Copper, Lead, Nickel, Silver, Thallium and Zinc	While the facility did not show reasonable potential to violate the State Water Quality Standards for these pollutants at this outfall, the facility is undergoing major changes during this permit cycle. The facility will be dewatering the ash pond through this outfall. Therefore, it is the Division of Waters Best Professional Judgement to continue monitoring for these parameters during dewatering.

3.4.9. Mixing Zone (MZ)

The Kentucky Water Quality Standards (KYWQS) allow the assignment of a MZ for chronic aquatic life (Chronic) and human health fish consumption (Fish) WQBELs and thermal discharges [401 KAR 10:029, Section 4]. The pollutants and/or the pollutant characteristics for which DOW has granted a MZ are listed as follows:

TABLE 17.

Pollutant or Pollutant Characteristic	Mixing Zone Factor (MZF)	Linear Distance (ft)	Surface Area (sq. ft)	Volume (cfs)
Whole Effluent Toxicity	0.200	346.8	94460	2120
Temperature	0.017	29.48	682	180.2
Cadmium	0.124	215	36310	1314.4
Selenium	0.333	577	261864	3530

3.4.10. Zone of Initial Dilution (ZID)

The Kentucky Water Quality Standards (KYWQS) allow the assignment of a ZID for acute aquatic life (Acute) WQBELs, for outfalls equipped with a submerged, high-rate multi-port diffuser structure [401 KAR 10:029, Section 4(3)]. The pollutants and/or pollutant characteristics for which DOW has granted a ZID are listed as follows:

TABLE 18.

Pollutant or Pollutant Characteristic	Dilutions	Linear Distance to ZID Edge (ft)
Whole Effluent Toxicity	16.66	37.7

3.5. Limitation Calculations

3.5.1. Calculations for Technology-Based Effluent Limitations

The following table represents the current operations at the facility at the time of the effective date of this permit:

Current Operations	Flow	TSS		TSS Cal		Oil & Grease		Oil & Grease Cal	
		Avg	MAX	Avg	MAX	Avg	Max	Avg	Max
Cooling Tower Blowdown Units 3/4	5.7588	30	50	172.764	287.94	5	5	28.794	28.794
Unit 3-4 Demin Sump	0.0624	30	100	1.872	6.24	15	20	0.936	1.248
Unit 1-2 Demin Sump	0.0735	30	100	2.205	7.35	15	20	1.1025	1.47
Unit 3-4 Auxillary Sump	2.5814	30	100	77.442	258.14	15	20	38.721	51.628
Unit 2 Auxillary Sump	1.3132	30	100	39.396	131.32	15	20	19.698	26.264
Unit 1 Boiler Room Sumps	1.1748	30	100	35.244	117.48	15	20	17.622	23.496
Cooling Tower Blowdown Units 1/2	5.9165	30	50	177.495	295.825	5	5	29.5825	29.5825
Bottom Ash Building Sump	3.3643	30	100	100.929	336.43	15	20	50.4645	67.286
CCRT Handling Dewatering Area Runoff Pond	0.0122	30	60	0.366	0.732	10	15	0.122	0.183
ATB-2 Stormwater	0.1599	30	60	4.797	9.594	10	15	1.599	2.3985
Landfill Stormwater	0.0179	30	60	0.537	1.074	10	15	0.179	0.2685
Landfill Leachate	0.195	30	100	5.85	19.5	15	20	2.925	3.9
Gypsum/Bottom Ash Pipe Rack Sump	0.1226	30	100	3.678	12.26	15	20	1.839	2.452
Gypsum DeWater Building Sump	1.0577	30	100	31.731	105.77	15	20	15.8655	21.154
Gypsum Inerts-Fines Purge	1.103	30	100	33.09	110.3	15	20	16.545	22.06
Process Pond Stormwater	0.2078	30	60	6.234	12.468	10	15	2.078	3.117
Secondary Pond -Basin Stormwater	0.0158	30	60	0.474	0.948	10	15	0.158	0.237
ATB Sand Filtration System Backwash	0.1392	30	100	4.176	13.92	15	20	2.088	2.784
East Basin Stormwater Runoff	0.0172	30	60	0.516	1.032	10	15	0.172	0.258
ATB-1 Stormwater	0.1303	30	60	3.909	7.818	10	15	1.303	1.9545
Coal Pile Stormwater Runoff	0.0735	30	50	2.205	3.675	5	5	0.3675	0.3675
Yard Reclaim Hopper sumps	0.0015	30	100	0.045	0.15	15	20	0.0225	0.03
Crusher Sample House Drains	0.003	30	100	0.09	0.3	15	20	0.045	0.06
Gypsum Tank Farm & Bldg Sump	0.0058	30	100	0.174	0.58	15	20	0.087	0.116
Transher House 1-4 & Coal Silo Drains & Sump	0.006	30	100	0.18	0.6	15	20	0.09	0.12
Ash Pond Tunnel Sump	0.0058	30	100	0.174	0.58	15	20	0.087	0.116
Unit 1 Condenser Room Sump	0.0058	30	100	0.174	0.58	15	20	0.087	0.116
Units 1&2 Turbine Room Misc. Flor Drains	0.0076	30	100	0.228	0.76	15	20	0.114	0.152
Units 3&4 Turbine Room Misc. Flor Drains	0.0076	30	100	0.228	0.76	15	20	0.114	0.152
Units 1-4 Abromine Bldgs Floor Drains	0.0058	30	100	0.174	0.58	15	20	0.087	0.116
Units 1-4 Fuel Oil-Gasoline Tanks Stormwater	0.0024	30	60	0.072	0.144	10	15	0.024	0.036
Total	23.5483			706.449	1744.85			232.919	291.9165
	Limits	30	74.09664			9.891117	12.3965		

The following table represents the future operations at the facility once all flows have been redirected to the new process pond, FGD wastewater is being treated through Outfall 008, and bottom ash high recycle rate system has been constructed:

Future Operations	Flow	TSS		TSS Cal		Oil & Grease		Oil & Grease Cal	
		Avg	MAX	Avg	MAX	Avg	Max	Avg	Max
Cooling Tower Blowdown Units 3/4	5.7588	30	50	172.764	287.94	5	5	28.794	28.794
Unit 3-4 Demin Sump	0.0624	30	100	1.872	6.24	15	20	0.936	1.248
Unit 1-2 Demin Sump	0.0735	30	100	2.205	7.35	15	20	1.1025	1.47
Unit 3-4 Auxillary Sump	2.5814	30	100	77.442	258.14	15	20	38.721	51.628
Unit 2 Auxillary Sump	1.3132	30	100	39.396	131.32	15	20	19.698	26.264
Unit 1 Boiler Room Sumps	1.1748	30	100	35.244	117.48	15	20	17.622	23.496
Cooling Tower Blowdown Units 1/2	5.9165	30	50	177.495	295.825	5	5	29.5825	29.5825
Bottom Ash Building Sump	0.104786	30	100	3.14358	10.4786	15	20	1.57179	2.09572
CCRT Handling Dewatering Area Runoff Pond	0.0122	30	60	0.366	0.732	10	15	0.122	0.183
Landfill Stormwater	0.0179	30	60	0.537	1.074	10	15	0.179	0.2685
Landfill Leachate	0.195	30	100	5.85	19.5	15	20	2.925	3.9
FGD PWTS Process Water	2.2638	30	100	67.914	226.38	15	20	33.957	45.276
East Basin Stormwater	0.0172	30	60	0.516	1.032	10	15	0.172	0.258
Process Pond Stormwater	0.2078	30	60	6.234	12.468	10	15	2.078	3.117
Capped ATB-1 Southern Areas Stormwater	0.0946	30	60	2.838	5.676	10	15	0.946	1.419

Coal Pile Stormwater Runoff	0.0735	30	50	2.205	3.675	5	5	0.3675	0.3675
Yard Reclaim Hopper sumps	0.0015	30	100	0.045	0.15	15	20	0.0225	0.03
Crusher Sample House Drains	0.003	30	100	0.09	0.3	15	20	0.045	0.06
Gypsum Tank Farm & Bldg Sump	0.0058	30	100	0.174	0.58	15	20	0.087	0.116
Transher House 1-4 & Coal Silo Drains & Sump	0.006	30	100	0.18	0.6	15	20	0.09	0.12
Ash Pond Tunnel Sump	0.0058	30	100	0.174	0.58	15	20	0.087	0.116
Unit 1 Condenser Room Sump	0.0058	30	100	0.174	0.58	15	20	0.087	0.116
Units 1&2 Turbine Room Misc. Flor Drains	0.0076	30	100	0.228	0.76	15	20	0.114	0.152
Units 3&4 Turbine Room Misc. Flor Drains	0.0076	30	100	0.228	0.76	15	20	0.114	0.152
Units 1-4 Abromine Bldgs Floor Drains	0.0058	30	100	0.174	0.58	15	20	0.087	0.116
Units 1-4 Fuel Oil-Gasoline Tanks Stormwater	0.0024	30	60	0.072	0.144	10	15	0.024	0.036
Total	19.918686			597.5606	1390.345			179.5318	220.3812
	Limits	30	69.80102			9.013235	11.06404		

Bottom Ash Transport Water Volume

For BA transport water, the final rule establishes Best Available Technology Economically Achievable (BAT) as a high recycle rate system with a site-specific volumetric purge (defined in the final rule as BA purge water) which cannot exceed a 30-day rolling average of 10 percent of the BA transport water system's primary active wetted volume. The purge volume and associated effluent limitations are to be established by the permitting authority. EPA selected a 95th percentile of total system volume as representative of a 30-day rolling average, which results in a limitation of 10 percent of total system volume and requires the NPDES permitting authority to develop a site-specific purge percentage that is capped at 10 percent. EPA recognizes that some plants may need to improve their equipment, process controls, and/or operations to consistently meet the limitations included in this final rule; however, this is consistent with the Clean Water Act, which requires that BAT discharge limitations and standards reflect the best available technology economically achievable.

Ghent consists of four operating coal-fired units: Unit 1 is 557 MW in service in 1973, Unit 2 is 556 MW in service in 1977, Unit 3 is 557 MW in service in 1981, and Unit 4 is 556 MW in service in 1984. Ghent's existing once-thru sluicing system is being converted to a BAT high recycle system which will utilize wet sluicing to transport bottom ash from each operating unit to a remote dewatering conveyor system and surge to dewater the bottom ash. The system cannot be operated as a closed loop without risk of scaling, corrosion, and maintenance challenges that could impact system operation. Thus, this system should be operated as a high recycle rate system with the allowed purge to alleviate these concerns. KU is requesting to purge up to 10 percent of the total system volume related to system water balance. Summary of the primary active wetted volume and summary of authorized discharges of pollutants in bottom ash transport water are shown below.

TABLE 19.
Ghent's Primary Active Wetted Volume Summary

Description	Total Component Volume (Gal)	Cumulative System Volume (Gal)
Unit 1 Bottom Ash Hopper	47,135	47,135
Unit 1 Pyrites Transfer Tank	2,977	50,112
Unit 2 Bottom Ash Hopper	46,963	97,075
Unit 2 Pyrites Transfer Tank	2,977	100,052
Unit 3 Bottom Ash Hopper	31,658	131,710
Unit 3 Pyrites Transfer Tank	3,740	135,450
Unit 4 Bottom Ash Hopper	31,658	167,108
Unit 4 Pyrites Transfer Tank	3,740	170,848
Dewatering Conveyors	323,000	493,848
Surge Tank	140,000	633,848
Dewater Building Sump	169,250	803,098

BATW Pump Building Sump	9,628	812,726
Unit 1 Sluice Line	20,891	833,617
Unit 2 Sluice Line	22,794	856,411
Unit 3 Sluice Line	26,554	882,965
Unit 4 Sluice Line	27,200	910,165
Common Recirculation Piping	137,699	1,047,864
	Total Nominal Volume	**1,047,864**
	10% gallons/day	**104,786**

TABLE 20.

Ghent's Purge Discharges

Discharge Stream	Flow/Volume	Description	Frequency
(A)(1) Stormwater	>1950	To maintain system water balance when precipitation-related inflows are generated from storm events exceeding a 10-year storm event of 24-hour or longer duration (e.g., 30-day storm event) and cannot be managed by installed spares, redundancies, maintenance tanks, and other secondary bottom ash system equipment	Following significant storm events. The system surge tanks are open top, should a 10-year/24-hour storm event equivalent to 4.13" of rainfall, or 1,950 gallons will be added to the system water balance. For stormwater in excess of this 1,950 gallons will be purged from the system to maintain water balance.
(A)(2) Process Waste Streams	73	To maintain system water balance when regular inflows from wastestreams other than bottom ash transport water exceed the ability of the bottom ash system to accept recycled water and segregating these other wastestreams is not feasible	Additional hopper, quench water is introduced into the BA system during normal sluice operation and comingled with the BA transport water. On a continuous basis, an average 226 gpm of this excess water will be forwarded to the FGD system as allowed by scrubber operations; however, the requested 73 gpm purge will provide the discharge needed to maintain the high recycle rate system water balance and reduce the potential for chemistry and water balance impact to the scrubber.
(A)(3) Water Chemistry Purge	N/A	To maintain system water chemistry where installed equipment at the facility is unable to manage pH, corrosive substances, substances or conditions causing scaling, or fine particulates to below levels which impact system operation or maintenance	Water within the bottom ash system will have slight to moderate corrosive tendencies. Additional pH adjustment may be needed to prevent corrosion by raising system pH.
(A)(4) Maintenance Flows	161,500 gallons upon dewatering conveyor equipment failure Up to 27,000 gallons per Unit outage	To conduct maintenance not otherwise included in paragraphs (k)(2)(i)(A) (*1*), (*2*), or (*3*) of this section and not exempted from the definition of transport water in § 423.11(p), and when water volumes cannot be managed by installed spares, redundancies, maintenance tanks, and other secondary bottom ash system equipment.	Though there is an installed spare flight conveyor, normal operating practice is that it remains full of water such that if an operating dewatering conveyor needs an outage for repair that volume (161,500 gallons) will need to be discharged as there is not a maintenance tank that volume can be directed to and held for future use. During outages the boiler backpass wash sequence utilizes the BATW sluice piping to direct wash wastes to the Knockout Box. At the end of these sequences, the sluice line for the Unit is left full of this wash water (up to 27,000 gallons for the largest unit).

			However, the flow listed under (A)(2) will be reduced during these outage conditions so additional purge should not be required.

The DOW grants KU's requested total volume discharge of ten percent of the primary active wetted bottom ash system volume as 30-day rolling average. This is to maintain system water balance when regular inflows from wastestreams other than bottom ash transport water exceed the ability of the bottom ash system to accept recycled water and segregating these other wastestreams is not feasible. Quench water is used in bottom ash systems primarily to free ash adhered to the hopper walls. Further, it provides a seal at the bottom of the boiler as well as cooling for the hopper walls and system piping. The facility plans to send approximately seventy-five percent (75%) of this flow to the FGD system, but to avoided causing issues with the FGD, steam is being allowed to discharge the remaining approximately twenty-five percent (25%). (which equates to ten percent of the primary active wetted bottom ash system volume) as purge flow. With possibility of additional flow needing to be discharge due to maintenance and stormwater it furthers the need to discharge ten percent of the primary active wetted bottom ash system volume as 30-day rolling average. Purge flow for the BATW management system will continue to be directed to the plant's knockout pond, then to Outfall 001 and ultimately discharged via the existing high-rate multiport diffuser.

Bottom Ash Transport Water BPJ

The Division has determined that no additional BPJ requirements are needed with this permit modification. This is largely due to the large amount of Bottom Ash Transport water that is already being planned on being sent to the FGD system for treatment and to maintain water balance. The wastewater sent to the FGD system as make up will help to reduce the overall amount of water withdrawn from the river and wastewater discharged from the system would have to comply with BAT requirements for FGD wastewater. Approximately seventy-five percent (75%) (226 gpm) of water discharge from the BATW system will be directed to the FGD system with remaining approximately twenty-five percent (25%) (73 gpm) needing to be purged. Additional water can not be sent to the FGD system without effecting the FGD system chemistry and water balance . Additionally, EPA plans to re-evaluate the ELG's for several waste streams from steam electric power plants. EPA is considering whether revisions to the 2020 Rule's requirements applicable to bottom ash transport water and the three subcategories, which are afforded less stringent limits than those otherwise applicable under the Rule, may be warranted. EPA will determine whether more stringent limitations than those in the 2020 Rule appropriately reflect ''best available technology economically achievable.'' EPA intends to sign the notice of proposed rulemaking for public comment in Fall of 2022. The facility has been granted till July 1, 2024, to comply with the discharge BAT requirements for BATW by operating a high recycle rate management system with a purge rate not to exceed 10% a 30-day rolling average. Ghent's KPDES will expire and should be renewed before this applicable July 1, 2024, date. At which point the Division will redetermine the BPJ requirements. This would allow time better to understand the characteristics of the wastewater that will be purged, as well know if EPA intent for this waste stream.

3.5.2. Calculations for Water Quality-Based Effluent Limitations

These calculations were performed using a Microsoft EXCEL based workbook developed by DOW. The workbook is designed to compare effluent data to the applicable water quality standards while also incorporating the characteristics of the receiving water and any regulatory ZID and/or MZ. The following table summarizes the results of these calculations for this outfall:

Hardness Dependent Metals Calculations	Units	Effluent Hardness	Stream Hardness	Mixing Zone Granted	MZF	Mixing Zone Mixed Hardne	ZID Granted	ZID Dilution	Acute Mixed Hardnes
Cadmium	mg/l	400	100	YES	0.124391243	104	NO	N/A	400
Hardness	mg/l	400	100	N/A	N/A	N/A	N/A	N/A	N/A

Effluent Characteristic	Units	Reported Av	Reported M	Average Limitation	Maximum Limitation	Average Discharge %	Maximum Discharge %	MZF	Data Sou
Antimony	µg/L	0.114	0.114	640	N/A	0.02	N/A	0	DMR
Arsenic	µg/L	3.17	3.17	150	338.86	2.11	0.94	0	DMR
Barium	µg/L	110	110	245557.1429	N/A	0.04	N/A	0	APP
Beryllium	µg/L	0.029	0.029	982.2285714	N/A	0.00	N/A	0	DMR
Cadmium	µg/L	1.29	1.29	8.731374985	8.731374985	14.77	14.77	0.1243912	DMR
Chloride	µg/L	150000	150000	600000	1200000	25.00	12.50	0	APP
Chromium	µg/L	11.45	11.45	24555.71429	N/A	0.05	N/A	0	DMR
Color	Platinum Cobalt Units	0	0	18416.78571	N/A	0.00	N/A	0	APP
Copper	µg/L	18.37	18.37	30.49938305	49.46449826	60.23	37.14	0	DMR
Cyanide, Free	µg/L	0	0	5.2	22	0.00	0.00	0	APP
Fluoride	µg/L	1800	1800	982228.5714	N/A	0.18	N/A	0	APP
Iron	µg/L	360	360	3500	4000	10.29	9.00	0	APP
Lead	µg/L	0.17	0.17	18.58090366	474.5977624	0.91	0.04	0	DMR
Mercury	µg/L	0.222	0.222	0.051	1.4	435.29	15.86	0	DMR
Nickel	µg/L	22.35	22.35	168.5409938	1512.031838	13.26	1.48	0	DMR
Nitrate (as N)	µg/L	1800	1800	2455571.429	N/A	0.07	N/A	0	APP
Phenol	µg/L	0	0	300	300	0.00	0.00	0	APP
Selenium	µg/L	18.04	18.04	386.942009	N/A	4.66	N/A	0.333	DMR
Silver	µg/L	0.24	0.24	N/A	41.07168773	N/A	0.58	0	DMR
Sulfate	µg/L	520000	520000	61389285.71	N/A	0.85	N/A	0	APP
Thallium	µg/L	0.22	0.22	0.47	N/A	46.81	N/A	0	DMR
Zinc	µg/L	17.5	17.5	376.4303147	376.4303147	4.65	4.65	0	DMR
Gross total alpha particle activity including radium-226 but excluding radon and uranium	pCi/L	11.9	11.9	15692.03571	N/A	0.08	N/A	0	APP
Combined radium-226 and radium-228	pCi/L	0.728	0.728	5230.678571	N/A	0.01	N/A	0	APP
Total gross beta particle activity	pCi/L	41.3	41.3	52306.78571	N/A	0.08	N/A	0	APP
Strontium-90	pCi/L	0	0	8369.085714	N/A	0.00	N/A	0	APP
Uranium	µg/L	14.6	14.6	31384.07143	N/A	0.05	N/A	0	APP
Toxicity	TUa	<1	<1	AcuteWET	5.00	%Effluent	20.01	0.2002804	DMR
Total Residual Chlorine	µg/L	0	0	11	19	0.00	0.00	0	APP
Ammonia (as N)	mg/l	0	0	1036.336556	N/A	0.00	N/A	0	APP
Nitrite-nitrogen Ohio River	mg/l	1.8	1.8	82.43752857	N/A	2.18	N/A	0.333	APP
Temperature	°F	80	80	0	110	72.73	72.73	0.0171739	APP

3.6. Justification of Requirements

Chapters 5 and 10 of Title 401 of the Kentucky Administrative Regulations (KARs), cited in the following, have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

At a minimum, all permits shall contain technology-based effluent limitations (TBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)]. When necessary to achieve water quality standards, all permits shall contain water quality-based effluent limitations (WQBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(d)]. Any WQBELs included in this permit are based upon the Kentucky Water Quality Standards (KYWQS) [401 KAR 10:031].

3.6.1. Flow

The monitoring requirements for this parameter are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065,

Section 2(4) – 40 CFR 122.44(i)(1)(ii)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

3.6.2. Temperature

The limitations for this parameter are consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 4(1)(d)]. A mixing zone has been granted, in accordance with 401 KAR 10:029 Section 4, for this parameter.

3.6.3. Total Suspended Solids and Oil & Grease

The limits for these parameters are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A], representative of the BPT requirements for low volume waste [40 CFR 423.12(b)(3)], representative of BPT and BAT requirements for bottom ash transport water [40 CFR 423.12(b)(4)] and [40 CFR 423.13(k)], representative of BPT requirements for coal pile runoff [40 CFR 423.12(b)(9)], representative of BPT and BAT requirements for FGD wastewater [40 CFR 423.12(b)(11)] and [40 CFR 423.13(g)], representative of BPT requirements for metal cleaning waste [40 CFR 423.12(b)(5)], representative of BAT requirements for combustion residual leachate [40 CFR 423.13(l)], and imposing Best Professional Judgement [401 KAR 5:080, Section 2(3) – 40 CFR 125.3].

3.6.4. pH

The limit for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A], representative of the BPT requirements for pH [40 CFR 423.12 (b)(1)], and state water quality standards [401 KAR 10:031, Sections 4(1)(b) and 7].

3.6.5. Total Recoverable Mercury

The limitations for these parameters are consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 6]. The schedule of compliance is consistent with the regulatory provisions for establishing a schedule of compliance [401 KAR 5:050, Section 3 and 40 CFR 122.47].

3.6.6. Total Recoverable Cadmium

The monitoring requirements for these pollutants are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(i)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48]. A mixing zone has been granted, in accordance with 401 KAR 10:029 Section 4, for this parameter.

3.6.7. Total Recoverable Selenium

A mixing zone has been granted for this pollutant that allows the chronic aquatic life criterion to be met at the edge of the mixing zone. The monthly average effluent limitation for this parameter is consistent with the requirements of 401 KAR 5:065, Section 2(4) [40 CFR 122.44(d)] and 401 KAR 10:031, Section 4. The monthly average concentration of 0.386 mg/l serves both as a trigger for the collection of adequate number of fish to conduct selenium residue in fish tissue testing and as a limitation in the event the permittee is unable to collect the required number of fish. These limitations are consistent with Kentucky's water quality standards for total recoverable selenium. The incorporation of Appendix A on the collection and handling requirements established in "Methods for Collection of Selenium Residue in Fish Tissue Used

to Determine KPDES Permit Compliance" is consistent with the requirements of 401 KAR 5:050, Section 4 [40 CFR 122.48(a)].

3.6.8. Hardness and Total Recoverable: Antimony, Arsenic, Beryllium, Chromium, Copper, Lead, Nickel, Silver, Thallium and Zinc

The monitoring requirements for these pollutants are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(i)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

3.6.9. BMP Triggers

Permits shall include BMPs to control or abate the discharge of pollutants when numeric effluent limitations are infeasible and/or when the practices are reasonably necessary to achieve effluent limitations and standards to carry out the purposes and intent of the Clean Water Act (CWA). To determine the effectiveness of the BMPs during dewatering triggers have been established that if exceeded require the permittee to evaluate the currently employed BMPs and make necessary modifications.

3.6.10. Whole Effluent Toxicity

The limitations for this parameter are consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Sections 4(1)(j)]. A mixing zone and zone of initial dilution has been granted, in accordance with 401 KAR 10:029 Section 4, for this parameter.

SECTION 4

OUTFALL 002

4. OUTFALL 002

4.1. Outfall Description

The following table lists the outfall type, location, and description:

TABLE 21.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.749722°	85.037500°	Ohio River	Non-recirculating house service water Uncontaminated Stormwater Runoff

4.2. Reported Values

The following table summarizes the reported values for Outfall 002:

TABLE 22.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Flow	MGD	15.07	22.45	N/A	N/A	N/A	N/A
Temperature	°C	N/A	N/A	N/A	19.62	22.80	N/A
Free Available Chlorine	mg/l	N/A	N/A	N/A	NR	NR	N/A
Total Residual Chlorine	mg/l	N/A	N/A	N/A	NR	NR	N/A
Total Residual Oxidants	mg/l	N/A	N/A	N/A	0.038	0.060	N/A
Time of Oxidant Addition	Min/day	N/A	N/A	N/A	N/A	30	N/A
pH	SU	N/A	N/A	6.40	N/A	N/A	8.20
The abbreviation NR means Not Required. There were no periods of chlorination during the last 5 years of the permit cycle.							

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2013 to 10/31/2018.

4.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 002:

TABLE 23.

EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Day	Calculated
Temperature	°F	N/A	N/A	N/A	Report	110	N/A	1/Day	Grab
Free Available Chlorine	mg/l	N/A	N/A	N/A	0.2	0.5	N/A	1/Occurrence[1]	Multiple Grab[2]
Total Residual Chlorine	mg/l	N/A	N/A	N/A	Report	0.019	N/A	1/Occurrence[1]	Multiple Grab[2]
Total Residual Oxidants[3]	mg/l	N/A	N/A	N/A	Report	0.2	N/A	1/Occurrence[1]	Multiple Grab[2]
Time of Oxidant Addition	Min/day	N/A	N/A	N/A	N/A	120	N/A	1/Occurrence[1]	Log
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab

[1]The measurement frequency "Occurrence" means during periods of chlorination or oxidation addition to cooling water, but no more frequent than once per week.

[2]The sample type 'Multiple Grab' means grab samples collected at the approximate beginning of oxidant discharge and once every fifteen (15) minutes thereafter until the end of the oxidant discharge.

[3]The term Total Residual Oxidants (TRO) means the value obtained by using the amperometric titration or DPD methods for Total Residual Chlorine described in 40 CFR Part 136. In the event of addition of an oxidant other than Chlorine, the permittee shall receive prior approval from the DOW permitting staff before the initial use. TRO monitoring and limits only apply if the applicant chooses to utilize an oxidant other than Chlorine.

4.4. Pertinent Factors

The effluent limitations for this outfall were developed in accordance with DOW's General Procedures for Limitations Development located on DOW's webpage at:

http://dep.ky.gov/formslibrary/Documents/General%20Procedures%20for%20Limitations%20Development.pdf

4.4.1. Non-Recirculating House Service Water

This outfall consist of non-recirculating house service water and a small amount of uncontaminated stormwater. The previous permits have treated this wastewater as once through cooling. While this wastewater does not pass through the main cooling condensers the pollutions of concern for this wastewater are the same as those required by the once through cooling ELG. Therefore, it is the Division Best Professional Judgement to continue to apply the once through cooling ELG to this wastestream as done in previous permit reissuances.

The listing of low volume waste sources specifically includes recirculating house service water systems and not non-recirculating house service water systems. This indicates that EPA did not intend for non-recirculating, or once-through, house service water systems, to be regulated as low volume waste.

The definition of low volume waste sources in the current rule is nearly identical to the definition presented in the 1974 Development Document. The description of service water system in the document includes auxiliary cooling and heat exchangers, among other things (pg. 172). The Development Document distinguishes between non-recirculating house service water and recirculating house service water in several places, including classifying non-recirculating house service water as an intermediate volume waste and recirculating house service water as a low volume waste (pg. 187).

The 1982 and 2015 Development Documents barely discuss house service water and auxiliary equipment cooling, and neither document presents anything to contradict the conclusion drawn from the 1974 Development Document, that EPA did not intend for once through auxiliary equipment cooling water to be regulated as low volume waste.

4.4.2. Technology-Based Effluent Limitations

Technology-based effluent limitations and standards, based on federally promulgated standards, a case-by-case basis, or a combination of the two, shall be included in all KPDES permits, where applicable.

4.4.2.1. Federal Effluent Limitations Guidelines

EPA has established a minimum level of technology that must be applied to certain industries. Due to the operations at this facility, all applicable sections of 40 CFR 423 shall be applied to this outfall. The following is a list of those requirements:

40 CFR 423.12(b) (2)

There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

40 CFR 423.12(b)(6)

The quantity of pollutants discharged in once through cooling water shall not exceed the quantity determined by multiplying the flow of once through cooling water sources times the concentration listed in the following table:

TABLE 24.
BPT Effluent Requirements – Once Through Cooling Water

Effluent Characteristic	Maximum for any one day	Maximum for monthly average
Free Available Chlorine	0.5 mg/l	0.2 mg/l

40 CFR 423.12(b) (8)

Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator or sate, if the state has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.

40 CFR 423.12(b) (12)

At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as concentration limitations instead of the mass-based limitations specified in paragraphs (b)(3) through (b)(7), and (b)(11), of this section concentration limitations shall be those concentrations specified in this section.

40 CFR 423.13(b)(1)

For any plant with a total rated electric generating capacity of 25 or more megawatts, the quantity of pollutants discharged in once through cooling water from each discharge point shall not exceed the quantity determined by multiplying the flow of once through cooling water from each discharge point times the concentration listed in the following table:

TABLE 25.		
BPT Effluent Requirements – Once Through Cooling Water		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
Total residual chlorine	0.20 mg/l	-

40 CFR 423.13(b)(2)

Total residual chlorine may not be discharged from any single generating unit for more than two hours per day unless the discharger demonstrates to the permitting authority that discharge for more than two hours is required for macroinvertebrate control. Simultaneous multi-unit chlorination is permitted.

40 CFR 423.13(m)

At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as concentration limitations instead of the mass-based limitations specified in paragraphs (b) through (l) of this section concentration limitations shall be those concentrations specified in this section.

In accordance with Sections 423.13 (m) the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The DOW has determined to apply the requirements of 40 CFR Part 423 in this manner

4.4.3. Best Professional Judgment "BPJ"

Time of Oxidants Discharge

The Division of Water will impose a limit of 120 minutes/day/unit of chlorination / oxidation discharge time. The limit is representative of the BAT requirements for the discharge of chlorine in cooling tower blowdown as specified in 40 CFR 423.13(d)(2) as incorporated in 401 KAR 5:065, Section 2(6). It is the "Best Professional Judgement" (BPJ) of the Division of Water that this requirement is also applicable to the addition of other oxidants as well as chlorine.

Total Residual Oxidants

The Division of Water will impose a daily maximum limit of 0.20 mg/l for this parameter. The limit is representative of the BAT requirements for total residual chlorine in once through cooling water as specified in 40 CFR 423.13(b)(1) as incorporated in 401 KAR 5:065, Section 2(6). It is the Division of Water's Best Professional Judgment (BPJ) determination to limit the addition of other oxidants as well as chlorine.

4.4.4. Water Quality-Based Effluent Limitations

The following table lists those pollutants and/or pollutant characteristics of concern that DOW has determined exhibit reasonable potential to cause or contribute to an excursion of a water quality-based criterion, and the basis of DOW's determination. These determinations are consistent with the DOW's reasonable potential analysis (RPA) procedures outlined in *Permitting Procedures For Determining "Reasonable Potential"* Kentucky Division of Water May 1, 2000.

TABLE 26.	
Pollutant or Pollutant Characteristic	**Basis**
Temperature	Thermal pollution or heat loads are typically associated with industrial facilities where large volumes of cooling water are utilized. Therefore, DOW has determined that reasonable potential for this pollutant does exist.
Total Residual Chlorine	The ELG establishes a limit for this pollutant in once through cooling water that is less stringent than Kentucky Water Quality Standard. Therefore, the facility show reasonable potential to violate WQS when chlorine is being added to the cooling water.

4.4.5. Mixing Zone (MZ)

The Kentucky Water Quality Standards (KYWQS) allow the assignment of a MZ for chronic aquatic life (Chronic) and human health fish consumption (Fish) WQBELs and thermal discharges [401 KAR 10:029, Section 4]. The pollutants and/or the pollutant characteristics for which DOW has granted a MZ are listed as follows:

TABLE 27.				
Pollutant or Pollutant Characteristic	**Mixing Zone Factor (MZF)**	**Linear Distance (ft)**	**Surface Area (sq. ft)**	**Volume (cfs)**
Temperature	0.009	15.61	191	95.4

4.5. Limitation Calculations

4.5.1. Calculations for Water Quality-Based Effluent Limitations

These calculations were performed using a Microsoft EXCEL based workbook developed by DOW. The workbook is designed to compare effluent data to the applicable water quality standards while also incorporating the characteristics of the receiving water and any regulatory ZID and/or MZ. The following table summarizes the results of these calculations for this outfall:

Effluent Characteristic	Units	Reported Av	Reported M	Average Limitation	Maximum Limitation	Average Discharge %	Maximum Discharge %	MZF	Data Sou
Antimony	µg/L	0.3	0.3	640	N/A	0.05	N/A	0	APP
Arsenic	µg/L	0	0	150	340	0.00	0.00	0	APP
Barium	µg/L	52	52	455386.1977	N/A	0.01	N/A	0	APP
Beryllium	µg/L	0	0	1821.544791	N/A	0.00	N/A	0	APP
Cadmium	µg/L	0	0	0.418307584	3.877381034	0.00	0.00	0	APP
Chloride	µg/L	31000	31000	600000	1200000	5.17	2.58	0	APP
Chromium	µg/L	0	0	45538.61977	N/A	0.00	N/A	0	APP
Chromium (III)	µg/L	0	0	139.4675086	2917.935606	0.00	0.00	0	APP
Chromium (VI)	µg/L	0	0	11	16	0.00	0.00	0	APP
Color	Platinum Cobalt Units	0	0	34153.96483	N/A	0.00	N/A	0	APP
Copper	µg/L	4.9	4.9	15.41562536	24.35662642	31.79	20.12	0	APP
Cyanide, Free	µg/L	0	0	5.2	22	0.00	0.00	0	APP
Iron	µg/L	230	230	3500	4000	6.57	5.75	0	APP
Lead	µg/L	0.38	0.38	6.723669561	172.5408588	5.65	0.22	0	APP
Mercury	µg/L	0	0	0.051	1.4	0.00	0.00	0	APP
Nickel	µg/L	2.2	2.2	85.7676157	771.4265752	2.57	0.29	0	APP
Nitrate (as N)	µg/L	0	0	4553861.977	N/A	0.00	N/A	0	APP
Phenol	µg/L	0	0	300	300	0.00	0.00	0	APP
Selenium	µg/L	0	0	5	N/A	0.00	N/A	0	APP
Silver	µg/L	0	0	N/A	10.4008318	N/A	0.00	0	APP
Sulfate	µg/L	86000	86000	113846549.4	N/A	0.08	N/A	0	APP
Thallium	µg/L	0	0	0.47	N/A	0.00	N/A	0	APP
Zinc	µg/L	0	0	197.1554176	197.1554176	0.00	0.00	0	APP
Gross total alpha particle activity including radium-226 but exculding radon and uranium	pCi/L	0	0	29142.86994	N/A	0.00	N/A	0	APP
Combined radium-226 and radium-228	pCi/L	0	0	9714.28998	N/A	0.00	N/A	0	APP
Total gross beta particle activity	pCi/L	5.49	5.49	97142.8998	N/A	0.01	N/A	0	APP
Strontium-90	pCi/L	0	0	15542.86397	N/A	0.00	N/A	0	APP
Uranium	µg/L	1.02	1.02	58285.73988	N/A	0.00	N/A	0	APP
Total Residual Chlorine	µg/L	0	0	11	19	0.00	0.00	0	APP
Ammonia (as N)	mg/l	0	0	1921.888153	N/A	0.00	N/A	0	APP
Nitrite-nitrogen Ohio River	mg/l	0	0	1	N/A	0.00	N/A	0	APP
Temperature	°F	67.32	73.04	0	110	61.20	66.40	0.0092432	DMR

4.6. Justification of Requirements

Chapters 5 and 10 of Title 401 of the Kentucky Administrative Regulations (KARs), cited in the following, have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

At a minimum, all permits shall contain technology-based effluent limitations (TBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)]. When necessary to achieve water quality standards, all permits shall contain water quality-based effluent limitations (WQBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(d)]. Any WQBELs included in this permit are based upon the Kentucky Water Quality Standards (KYWQS) [401 KAR 10:031].

4.6.1. Flow

The monitoring requirements for this parameter are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(ii)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

4.6.2. Free Available Chlorine

The limit for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A], and representative of the BPT requirements for once through cooling water in [40 CFR 423.12 (b)(6)].

4.6.3. Total Residual Chlorine

The limit for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A], representative of the BAT requirements for once through cooling water in [40 CFR 423.13 (b)(1)] and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Sections 4(1)(k)].

4.6.4. Time of Oxidants Discharge

The limit for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A], representative of the BAT requirements for chlorine addition in [40 CFR 423.13 (b)(1)(2)] and imposing Best Professional Judgement [401 KAR 5:080, Section 2(3) – 40 CFR 125.3].

4.6.5. Total Residual Oxidants

The limit for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing Best Professional Judgement [401 KAR 5:080, Section 2(3) – 40 CFR 125.3].

4.6.6. Temperature

The limitations for this parameter are consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 4(1)(d)]. A mixing zone has been granted, in accordance with 401 KAR 10:029 Section 4, for this parameter.

4.6.7. pH

The limitations for this parameter are consistent Kentucky's Water Quality Standards [401 KAR 10:031, Section 4(1)(b) and Section 7].

SECTION 5

OUTFALL 003

5. OUTFALL 003

5.1. Outfall Description

The following table lists the outfall type, location, and description:

TABLE 28.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.748889°	85.039722°	Ohio River	Non-recirculating house service water Uncontaminated Stormwater Runoff

5.2. Reported Values

The following table summarizes the reported values for Outfall 003:

TABLE 29.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Flow	MGD	24.50	36.72	N/A	N/A	N/A	N/A
Temperature	°C	N/A	N/A	N/A	19.14	22.19	N/A
Free Available Chlorine	mg/l	N/A	N/A	N/A	NR	NR	N/A
Total Residual Chlorine	mg/l	N/A	N/A	N/A	NR	NR	N/A
Total Residual Oxidants	mg/l	N/A	N/A	N/A	0.035	0.056	N/A
Time of Oxidant Addition	Min/day	N/A	N/A	N/A	N/A	41.64	N/A
pH	SU	N/A	N/A	6.30	N/A	N/A	8.80
The abbreviation NR means Not Required. There were no periods of chlorination during the last permit cycle.							

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2013 to 10/31/2018.

5.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 003:

TABLE 30.

EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Month	Calculated
Temperature	°F	N/A	N/A	N/A	Report	110	N/A	1/Month	Grab
Free Available Chlorine	mg/l	N/A	N/A	N/A	0.2	0.5	N/A	1/Occurrence[1]	Multiple Grab[2]
Total Residual Chlorine	mg/l	N/A	N/A	N/A	Report	0.019	N/A	1/Occurrence[1]	Multiple Grab[2]
Total Residual Oxidants[3]	mg/l	N/A	N/A	N/A	Report	0.2	N/A	1/Occurrence[1]	Multiple Grab[2]
Time of Oxidant Addition	Min/day	N/A	N/A	N/A	N/A	120	N/A	1/Occurrence[1]	Log
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab

[1]The measurement frequency "Occurrence" means during periods of chlorination or oxidation addition to cooling water, but no more frequent than once per week.

[2]The sample type 'Multiple Grab' means grab samples collected at the approximate beginning of oxidant discharge and once every fifteen (15) minutes thereafter until the end of the oxidant discharge.

[3]The term Total Residual Oxidants (TRO) means the value obtained by using the amperometric titration or DPD methods for Total Residual Chlorine described in 40 CFR Part 136. In the event of addition of an oxidant other than Chlorine, the permittee shall receive prior approval from the DOW permitting staff before the initial use. TRO monitoring and limits only apply if the applicant chooses to utilize an oxidant other than Chlorine.

5.4. Pertinent Factors

The effluent limitations for this outfall were developed in accordance with DOW's General Procedures for Limitations Development located on DOW's webpage at:

http://dep.ky.gov/formslibrary/Documents/General%20Procedures%20for%20Limitations%20Development.pdf

5.4.1. Non-Recirculating House Service Water

This outfall consist of non-recirculating house service water and a small amount of uncontaminated stormwater. The previous permits have treated this wastewater as once through cooling. While this wastewater does not pass through the main cooling condensers the pollutions of concern for this wastewater are the same as those required by the once through cooling ELG. Therefore, it is the Division Best Professional Judgement to continue to apply the once through cooling ELG to this wastestream as done in previous permit reissuances.

The listing of low volume waste sources specifically includes recirculating house service water systems and not non-recirculating house service water systems. This indicates that EPA did not intend for non-recirculating, or once-through, house service water systems, to be regulated as low volume waste.

The definition of low volume waste sources in the current rule is nearly identical to the definition presented in the 1974 Development Document. The description of service water system in the document includes auxiliary cooling and heat exchangers, among other things (pg. 172). The Development Document distinguishes between non-recirculating house service water and recirculating house service water in several places, including classifying non-recirculating house service water as an intermediate volume waste and recirculating house service water as a low volume waste (pg. 187).

The 1982 and 2015 Development Documents barely discuss house service water and auxiliary equipment cooling, and neither document presents anything to contradict the conclusion drawn from the 1974 Development Document, that EPA did not intend for once through auxiliary equipment cooling water to be regulated as low volume waste.

5.4.2. Technology-Based Effluent Limitations

Technology-based effluent limitations and standards, based on federally promulgated standards, a case-by-case basis, or a combination of the two, shall be included in all KPDES permits, where applicable.

5.4.2.1. Federal Effluent Limitations Guidelines

EPA has established a minimum level of technology that must be applied to certain industries. Due to the operations at this facility, all applicable sections of 40 CFR 423 shall be applied to this outfall. The following is a list of those requirements:

40 CFR 423.12(b) (2)

There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

40 CFR 423.12(b)(6)

The quantity of pollutants discharged in once through cooling water shall not exceed the quantity determined by multiplying the flow of once through cooling water sources times the concentration listed in the following table:

TABLE 31.
BPT Effluent Requirements – Once Through Cooling Water

Effluent Characteristic	Maximum for any one day	Maximum for monthly average
Free Available Chlorine	0.5 mg/l	0.2 mg/l

40 CFR 423.12(b) (8)

Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator or sate, if the state has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.

40 CFR 423.12(b) (12)

At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as concentration limitations instead of the mass-based limitations specified in paragraphs (b)(3) through (b)(7), and (b)(11), of this section concentration limitations shall be those concentrations specified in this section.

40 CFR 423.13(b)(1)

For any plant with a total rated electric generating capacity of 25 or more megawatts, the quantity of pollutants discharged in once through cooling water from each discharge point shall not exceed the quantity determined by multiplying the flow of once through cooling water from each discharge point times the concentration listed in the following table:

TABLE 32.		
BPT Effluent Requirements – Once Through Cooling Water		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
Total residual chlorine	0.20 mg/l	-

40 CFR 423.13(b)(2)

Total residual chlorine may not be discharged from any single generating unit for more than two hours per day unless the discharger demonstrates to the permitting authority that discharge for more than two hours is required for macroinvertebrate control. Simultaneous multi-unit chlorination is permitted.

40 CFR 423.13(m)

At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as concentration limitations instead of the mass-based limitations specified in paragraphs (b) through (l) of this section concentration limitations shall be those concentrations specified in this section.

In accordance with Sections 423.13 (m) the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The DOW has determined to apply the requirements of 40 CFR Part 423 in this manner

5.4.3. Best Professional Judgment "BPJ"

Time of Oxidants Discharge

The Division of Water will impose a limit of 120 minutes/day/unit of chlorination / oxidation discharge time. The limit is representative of the BAT requirements for the discharge of chlorine in cooling tower blowdown as specified in 40 CFR 423.13(d)(2) as incorporated in 401 KAR 5:065, Section 2(6). It is the "Best Professional Judgement" (BPJ) of the Division of Water that this requirement is also applicable to the addition of other oxidants as well as chlorine.

Total Residual Oxidants

The Division of Water will impose a daily maximum limit of 0.20 mg/l for this parameter. The limit is representative of the BAT requirements for total residual chlorine in once through cooling water as specified in 40 CFR 423.13(b)(1) as incorporated in 401 KAR 5:065, Section 2(6). It is the Division of Water's Best Professional Judgment (BPJ) determination to limit the addition of other oxidants as well as chlorine.

5.4.4. Water Quality-Based Effluent Limitations

The following table lists those pollutants and/or pollutant characteristics of concern that DOW has determined exhibit reasonable potential to cause or contribute to an excursion of a water quality-based criterion, and the basis of DOW's determination. These determinations are consistent with the DOW's reasonable potential analysis (RPA) procedures outlined in *Permitting Procedures For Determining "Reasonable Potential"* Kentucky Division of Water May 1, 2000.

TABLE 33.

Pollutant or Pollutant Characteristic	Basis
Temperature	Thermal pollution or heat loads are typically associated with industrial facilities where large volumes of cooling water are utilized. Therefore, DOW has determined that reasonable potential for this pollutant does exist.
Total Residual Chlorine	The ELG establishes a limit for this pollutant in once through cooling water that is less stringent than Kentucky Water Quality Standard. Therefore, the facility show reasonable potential to violate WQS when chlorine is being added to the cooling water.

5.4.5. Mixing Zone (MZ)

The Kentucky Water Quality Standards (KYWQS) allow the assignment of a MZ for chronic aquatic life (Chronic) and human health fish consumption (Fish) WQBELs and thermal discharges [401 KAR 10:029, Section 4]. The pollutants and/or the pollutant characteristics for which DOW has granted a MZ are listed as follows:

TABLE 34.

Pollutant or Pollutant Characteristic	Mixing Zone Factor (MZF)	Linear Distance (ft)	Surface Area (sq. ft)	Volume (cfs)
Temperature	0.015	26.01	531	159

5.5. Limitation Calculations

5.5.1. Calculations for Water Quality-Based Effluent Limitations

These calculations were performed using a Microsoft EXCEL based workbook developed by DOW. The workbook is designed to compare effluent data to the applicable water quality standards while also incorporating the characteristics of the receiving water and any regulatory ZID and/or MZ. The following table summarizes the results of these calculations for this outfall:

Effluent Characteristic	Units	Reported Av	Reported M	Average Limitation	Maximum Limitation	Average Discharge %	Maximum Discharge %	MZF	Data Sou
Antimony	µg/L	0.3	0.3	640	N/A	0.05	N/A	0	APP
Arsenic	µg/L	0	0	150	340	0.00	0.00	0	APP
Barium	µg/L	52	52	280493.8776	N/A	0.02	N/A	0	APP
Beryllium	µg/L	0	0	1121.97551	N/A	0.00	N/A	0	APP
Cadmium	µg/L	0	0	0.400962674	3.658498038	0.00	0.00	0	APP
Chloride	µg/L	30000	30000	600000	1200000	5.00	2.50	0	APP
Chromium	µg/L	0	0	28049.38776	N/A	0.00	N/A	0	APP
Chromium (III)	µg/L	0	0	133.0891121	2784.48696	0.00	0.00	0	APP
Chromium (VI)	µg/L	0	0	11	16	0.00	0.00	0	APP
Color	Platinum Cobalt Units	0	0	21037.04082	N/A	0.00	N/A	0	APP
Copper	µg/L	2.8	2.8	14.68078894	23.07960408	19.07	12.13	0	APP
Cyanide, Free	µg/L	0	0	5.2	22	0.00	0.00	0	APP
Iron	µg/L	200	200	3500	4000	5.71	5.00	0	APP
Isophorone	µg/L	0.45	0.45	960	N/A	0.05	N/A	0	APP
Mercury	µg/L	0	0	0.051	1.4	0.00	0.00	0	APP
Nickel	µg/L	1.8	1.8	81.71891377	735.0110093	2.20	0.24	0	APP
Nitrate (as N)	µg/L	0	0	2804938.776	N/A	0.00	N/A	0	APP
Phenol	µg/L	0	0	300	300	0.00	0.00	0	APP
Selenium	µg/L	0	0	5	N/A	0.00	N/A	0	APP
Silver	µg/L	0	0	N/A	9.426956629	N/A	0.00	0	APP
Sulfate	µg/L	77000	77000	70123469.39	N/A	0.11	N/A	0	APP
Thallium	µg/L	0	0	0.47	N/A	0.00	N/A	0	APP
Zinc	µg/L	6.9	6.9	187.8346427	187.8346427	3.67	3.67	0	APP
Gross total alpha particle activity including radium-226 but exculding radon and uranium	pCi/L	0	0	17931.61224	N/A	0.00	N/A	0	APP
Combined radium-226 and radium-228	pCi/L	0	0	5977.204082	N/A	0.00	N/A	0	APP
Total gross beta particle activity	pCi/L	2.34	2.34	59772.04082	N/A	0.00	N/A	0	APP
Strontium-90	pCi/L	0	0	9563.526531	N/A	0.00	N/A	0	APP
Uranium	µg/L	0.829	0.829	35863.22449	N/A	0.00	N/A	0	APP
Total Residual Chlorine	µg/L	0	0	11	19	0.00	0.00	0	APP
Ammonia (as N)	mg/l	0	0	1183.781728	N/A	0.00	N/A	0	APP
Nitrite-nitrogen Ohio River	mg/l	0	0	1	N/A	0.00	N/A	0	APP
Temperature	°F	76.1	98.1	0	110	69.18	89.18	0.0150272	DMR

5.6. Justification of Requirements

Chapters 5 and 10 of Title 401 of the Kentucky Administrative Regulations (KARs), cited in the following, have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

At a minimum, all permits shall contain technology-based effluent limitations (TBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)]. When necessary to achieve water quality standards, all permits shall contain water quality-based effluent limitations (WQBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(d)]. Any WQBELs included in this permit are based upon the Kentucky Water Quality Standards (KYWQS) [401 KAR 10:031].

5.6.1. Flow

The monitoring requirements for this parameter are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(ii)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

5.6.2. Free Available Chlorine

The limit for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A], and representative of the BPT requirements for once through cooling water in [40 CFR 423.12 (b)(6)].

5.6.3. Total Residual Chlorine

The limit for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A], representative of the BAT requirements for once through cooling water in [40 CFR 423.13 (b)(1)] and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Sections 4(1)(k)].

5.6.4. Time of Oxidants Discharge

The limit for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A], representative of the BAT requirements for chlorine addition in [40 CFR 423.13 (b)(1)(2)] and imposing Best Professional Judgement [401 KAR 5:080, Section 2(3) – 40 CFR 125.3].

5.6.5. Total Residual Oxidants

The limit for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing Best Professional Judgement [401 KAR 5:080, Section 2(3) – 40 CFR 125.3].

5.6.6. Temperature

The limitations for this parameter are consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 4(1)(d)]. A mixing zone has been granted, in accordance with 401 KAR 10:029 Section 4, for this parameter.

5.6.7. pH

The limitations for this parameter are consistent Kentucky's Water Quality Standards [401 KAR 10:031, Section 4(1)(b) and Section 7].

SECTION 6

OUTFALL 005

6. OUTFALL 005

6.1. Outfall Description

The following table lists the outfall type, location, and description:

TABLE 35.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
Internal	38.749528°	85.032961°	Outfall 001	Boiler Chemical cleaning Wastewater

6.2. Reported Values

The following table summarizes the reported values for Outfall 005:

TABLE 36.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Flow	MGD	ND	ND	N/A	N/A	N/A	N/A
Total Recoverable Copper	mg/l	N/A	N/A	N/A	ND	ND	N/A
Total Recoverable Iron	mg/l	N/A	N/A	N/A	ND	ND	N/A
pH	SU	N/A	N/A	N/A	ND	ND	N/A
The abbreviation ND means No Discharge. The facility has reported No Discharge on their DMR for the last 5 years.							

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2013 to 10/31/2018.

6.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 005:

TABLE 37.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Batch[1]	Calculated
Total Recoverable Copper	mg/l	N/A	N/A	N/A	1.0	1.0	N/A	1/Batch[1]	Grab
Total Recoverable Iron	mg/l	N/A	N/A	N/A	1.0	1.0	N/A	1/Batch[1]	Grab

TABLE 37.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
[1]Monitoring shall be conducted once per metal cleaning operation.									
Metal cleaning waste shall mean any wastewater resulting from cleaning (with or without chemical cleaning compounds) any metal process equipment including, but not limited to boiler tube cleaning, boiler fireside cleaning, and air preheater cleaning. In accordance with the conditions of the previous permits, the permittee is allowed to discharge air preheater wash water and boiler fireside cleaning directly to the ash pond or process pond without limitations or monitoring requirements, pursuant to the Jordan Memorandum. Monitoring is required only when chemical metal cleaning activities are being performed.									

6.4. Pertinent Factors

The effluent limitations for this outfall were developed in accordance with DOW's General Procedures for Limitations Development located on DOW's webpage at:

http://dep.ky.gov/formslibrary/Documents/General%20Procedures%20for%20Limitations%20Development.pdf

6.4.1. Jordan Memorandum

According to 40 CFR 423.11(c) the term chemical metal cleaning waste means any wastewater resulting from the cleaning of any metal process equipment with chemical compounds, including, but not limited to, boiler tube cleaning. According to 40 CFR 423.11(d) the term metal cleaning waste means any wastewater resulting from cleaning [with or without chemical compounds] any metal process equipment including, but not limited to, boiler tube cleaning, boiler fireside cleaning, and air preheater cleaning.

There are air heater wash waters and boiler fireside wash waters discharged to ATB-1/Process Pond Outfall 001. These waters are not a result of cleaning with chemical compounds and they do not flow through Outfall 005. In the past these wastewaters were permitted to discharge directly to the ash pond without limitations or monitoring requirements. That permitting action was done pursuant to the Jordan Memorandum. The memorandum is from J. William Jordan, US EPA Permit Assistance and Evaluation Division, to Bruce P. Smith, US EPA Enforcement Division Region III, concerning interpretation of the metal cleaning wastes guidelines in the federal effluent limitation guidelines for steam electric power generating point sources. In the memorandum, Mr. Jordan explains that "All water washing operations are 'low volume' while any discharge from an operation involving chemical cleaning should be included in the metal cleaning category." With that in mind, it makes sense that the limitations for chemical metal cleaning wastes do not apply to the air heater wash waters and boiler fireside wash waters at this facility.

It is the BPJ of the DOW to place low volume waste requirements on these wastewaters. The DOW has developed flow-weighted limitations at Outfall 001 to insure compliance with the federal effluent limitation guidelines for low volume wastes, chemical metal cleaning wastes, and other process wastewaters.

6.4.2. Technology-Based Effluent Limitations

Technology-based effluent limitations and standards, based on federally promulgated standards, a case-by-case basis, or a combination of the two, shall be included in all KPDES permits, where applicable.

6.4.2.1. Federal Effluent Limitations Guidelines

EPA has established a minimum level of technology that must be applied to certain industries. Due to the operations at this facility, all applicable sections of 40 CFR 423 shall be applied to this outfall. The following is a list of those requirements:

40 CFR 423.12(b)(5)

The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table:

TABLE 38.		
BPT Effluent Requirements – Metal Cleaning Wastes		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
TSS	100.0 mg/l	30.0 mg/l
Oil and Grease	20.0 mg/l	15.0 mg/l
Copper, Total	1.0 mg/l	1.0 mg/l

Iron, Total	1.0 mg/l	1.0 mg/l

40 CFR 423.12(b) (12)

At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as concentration limitations instead of the mass-based limitations specified in paragraphs (b)(3) through (b)(7), and (b)(11), of this section concentration limitations shall be those concentrations specified in this section.

In accordance with Sections 423.12 (b) (12) the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The DOW has determined to apply the requirements of 40 CFR Part 423 in this manner.

40 CFR 423.13(e)

The quantity of pollutants discharged in chemical metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of chemical metal cleaning wastes times the concentration listed in the following table:

TABLE 39.		
BAT Effluent Requirements – Chemical Metal Cleaning Wastes		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
Copper, Total	1.0 mg/l	1.0 mg/l
Iron, Total	1.0 mg/l	1.0 mg/l

40 CFR 423.13(m)

At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as concentration limitations instead of the mass-based limitations specified in paragraphs (b) through (l) of this section concentration limitations shall be those concentrations specified in this section.

In accordance with Sections 423.13 (m) the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The DOW has determined to apply the requirements of 40 CFR Part 423 in this manner

6.4.3. Total Suspended Solids, and Oil and Grease

Since Outfall 005 effluent is directed to Outfall 001 Process Pond (previously to ATB-1), the limitations for these pollutants has been applied at Outfall 001 after commingling with other waters. The DOW has developed flow-weighted limitations to insure compliance with the federal effluent limitation guidelines.

6.5. Justification of Requirements

Chapters 5 and 10 of Title 401 of the Kentucky Administrative Regulations (KARs), cited in the following, have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

At a minimum, all permits shall contain technology-based effluent limitations (TBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)]. When necessary to achieve water quality standards, all permits shall contain water quality-based effluent limitations (WQBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(d)]. Any WQBELs included in this permit are based upon the Kentucky Water Quality Standards (KYWQS) [401 KAR 10:031].

6.5.1. Internal Monitoring Point

The monitoring requirements for these parameters are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065,

Section 2(4) – 40 CFR 122.44(i)(1)(iii)], and the requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

6.5.2. Flow

The monitoring requirements for this parameter are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(ii)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

6.5.3. Total Copper and Total Iron

The limits for these parameters are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A], representative of the BPT and BAT requirements for metal cleaning wastes [40 CFR 423.12(b)(5)] and [40 CFR 423.13(e)].

SECTION 7

OUTFALL 006

7. OUTFALL 006

7.1. Outfall Description

The following table lists the outfall type, location, and description:

TABLE 40.					
Outfall Number	**Outfall Type**	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
0061	Internal	38.749960°	85.034796°	Outfall 001	Unit 1 Cooling Tower Blowdown
0062	Internal	38.749960°	85.034796°	Outfall 001	Unit 2 Cooling Tower Blowdown
0063	Internal	38.746387°	85.042949°	Outfall 001	Unit 3 Cooling Tower Blowdown
0064	Internal	38.746387°	85.042949°	Outfall 001	Unit 4 Cooling Tower Blowdown

7.2. Reported Values

7.2.1. Unit 1

The following table summarizes the reported values for Outfall 0061:

TABLE 41.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Flow	MGD	1.56	1.56	N/A	N/A	N/A	N/A
Free Available Chlorine	mg/l	N/A	N/A	N/A	NR	NR	N/A
Total Residual Chlorine	mg/l	N/A	N/A	N/A	NR	NR	N/A
Time of Chlorine Addition	min/day	N/A	N/A	N/A	N/A	NR	N/A
Total Residual Oxidants	mg/l	N/A	N/A	N/A	BDL	BDL	N/A
pH	SU	N/A	N/A	7.29	N/A	N/A	8.89
Total Recoverable Chromium	mg/l	N/A	N/A	N/A	0.003	0.003	N/A
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	0.016	0.016	N/A
Priority Pollutants	mg/l	N/A	N/A	N/A	BDL	BDL	N/A
The abbreviation BDL means Below Detection Level							
The abbreviation NR means Not Required. There were no periods of chlorination during the last 5 years of the permit cycle.							

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2013 to 10/31/2018.

7.2.2. Unit 2

The following table summarizes the reported values for Outfall 0062:

TABLE 42.							
Reported Parameters	Units	EFFLUENT					
		Loadings (lbs./day)		Concentrations			
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum
Flow	MGD	1.67	1.67	N/A	N/A	N/A	N/A
Free Available Chlorine	mg/l	N/A	N/A	N/A	NR	NR	N/A
Total Residual Chlorine	mg/l	N/A	N/A	N/A	NR	NR	N/A
Time of Chlorine Addition	min/day	N/A	N/A	N/A	N/A	NR	N/A
Total Residual Oxidants	mg/l	N/A	N/A	N/A	BDL	BDL	N/A
pH	SU	N/A	N/A	7.72	N/A	N/A	8.71
Total Recoverable Chromium	mg/l	N/A	N/A	N/A	0.002	0.002	N/A
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	0.017	0.017	N/A
Priority Pollutants	mg/l	N/A	N/A	N/A	BDL	BDL	N/A
The abbreviation BDL means Below Detection Level							
The abbreviation NR means Not Required. There were no periods of chlorination during the last 5 years of the permit cycle.							

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2013 to 10/31/2018.

7.2.3. Unit 3

The following table summarizes the reported values for Outfall 0063:

TABLE 43.							
Reported Parameters	Units	EFFLUENT					
		Loadings (lbs./day)		Concentrations			
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum
Flow	MGD	1.32	1.34	N/A	N/A	N/A	N/A
Free Available Chlorine	mg/l	N/A	N/A	N/A	NR	NR	N/A
Total Residual Chlorine	mg/l	N/A	N/A	N/A	NR	NR	N/A
Time of Chlorine Addition	min/day	N/A	N/A	N/A	N/A	NR	N/A

TABLE 43.							
Reported Parameters	Units	EFFLUENT					
		Loadings (lbs./day)		Concentrations			
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum
Total Residual Oxidants	mg/l	N/A	N/A	N/A	BDL	BDL	N/A
pH	SU	N/A	N/A	7.41	N/A	N/A	8.69
Total Recoverable Chromium	mg/l	N/A	N/A	N/A	0.004	0.004	N/A
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	0.029	0.029	N/A
Priority Pollutants	mg/l	N/A	N/A	N/A	BDL	BDL	N/A
The abbreviation BDL means Below Detection Level							
The abbreviation NR means Not Required. There were no periods of chlorination during the last 5 years of the permit cycle.							

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2013 to 10/31/2018.

7.2.4. Unit 4

The following table summarizes the reported values for Outfall 0064:

TABLE 44.							
Reported Parameters	Units	EFFLUENT					
		Loadings (lbs./day)		Concentrations			
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum
Flow	MGD	1.00	1.01	N/A	N/A	N/A	N/A
Free Available Chlorine	mg/l	N/A	N/A	N/A	NR	NR	N/A
Total Residual Chlorine	mg/l	N/A	N/A	N/A	NR	NR	N/A
Time of Chlorine Addition	min/day	N/A	N/A	N/A	N/A	NR	N/A
Total Residual Oxidants	mg/l	N/A	N/A	N/A	BDL	BDL	N/A
pH	SU	N/A	N/A	7.43	N/A	N/A	8.48
Total Recoverable Chromium	mg/l	N/A	N/A	N/A	0.004	0.004	N/A
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	0.032	0.032	N/A
Priority Pollutants	mg/l	N/A	N/A	N/A	BDL	BDL	N/A
The abbreviation BDL means Below Detection Level							
The abbreviation NR means Not Required. There were no periods of chlorination during the last 5 years of the permit cycle.							

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2013 to 10/31/2018.

7.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfalls 0061, 0062, 0063, and 0064:

TABLE 45.

EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Month	Calculated
Free Available Chlorine[1]	mg/l	N/A	N/A	N/A	0.2	0.5	N/A	1/Occurrence[2]	Multiple Grab[3]
Total Residual Oxidants[1,4]	mg/l	N/A	N/A	N/A	Report	0.2	N/A	1/Occurrence[2]	Multiple Grab[3]
Oxidant Discharge Time[1]	Min/unit/day	N/A	N/A	N/A	N/A	120	N/A	1/Occurrence[2]	Log
Total Chromium[1]	mg/l	N/A	N/A	N/A	0.2	0.2	N/A	1/Year	Grab
Total Zinc[1]	mg/l	N/A	N/A	N/A	1.0	1.0	N/A	1/Year	Grab
Priority Pollutants[1,5]	No Detectable Amount							1/Year	Calculated[6]

[1]Sampling of cooling tower blowdown must be taken at the nearest accessible point prior to discharge to or mixing with the receiving waters or wastestreams from other outfalls.

[2]The measurement frequency "Occurrence" means during periods of chlorination or oxidation addition to cooling water, but no more frequent than once per week.

[3]The sample type 'Multiple Grab' means grab samples collected at the approximate beginning of oxidant discharge and once every fifteen (15) minutes thereafter until the end of the oxidant discharge.

[4]The term Total Residual Oxidants (TRO) means the value obtained by using the amperometric titration or DPD methods for Total Residual Chlorine described in 40 CFR Part 136. In the event of addition of an oxidant other than Chlorine, the permittee shall receive prior approval from the DOW permitting staff before the initial use. TRO monitoring and limits only apply if the applicant chooses to utilize an oxidant other than Chlorine.

[5]Priority Pollutants are those contained in chemicals added for cooling tower maintenance and shall be monitored annually by grab sample or by engineering calculations. The results of the analyses/engineering calculations shall be totaled and reported as a single concentration on the DMR. The laboratory bench sheets/engineering or electronic equivalent calculations showing the results for each pollutant shall be attached to the DMR. The term priority pollutants means the 126 priority pollutants listed in 40 CFR Part 423 Appendix A except total chromium and total zinc.

[6]Complicance with the limitations, for the 126 priority pollutants, in paragraph (b)(10) of 40 CFR 423.15 may be determined by engineering calculations which demonstrate that the regulated pollutants are not detectable in the final discharge by the analytical methods in 40 CFR part 136.

Neither free available chlorine nor total residual chlorine or oxidants may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available chlorine or total residual chlorine or oxidants at any one time unless the utility can demonstrate to the DOW that the units in a particular location cannot operate at or below this level of chlorination or oxidant addition.

7.4. Pertinent Factors

The effluent limitations for this outfall were developed in accordance with DOW's General Procedures for Limitations Development located on DOW's webpage at:

http://dep.ky.gov/formslibrary/Documents/General%20Procedures%20for%20Limitations%20Development.pdf

7.4.1. Technology-Based Effluent Limitations

Technology-based effluent limitations and standards, based on federally promulgated standards, a case-by-case basis, or a combination of the two, shall be included in all KPDES permits, where applicable.

7.4.1.1. Federal Effluent Limitations Guidelines

EPA has established a minimum level of technology that must be applied to certain industries. Due to the operations at this facility, all applicable sections of 40 CFR 423 shall be applied to this outfall. The following is a list of those requirements:

40 CFR 423.12(b) (7)

The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown sources times the concentration listed in the following table:

TABLE 46.		
BPT Effluent Requirements – Cooling Tower Blowdown		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
Free Available Chlorine	0.5 mg/l	0.2 mg/l

40 CFR 423.12(b) (8)

Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator or sate, if the state has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.

40 CFR 423.12(b) (12)

At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as concentration limitations instead of the mass-based limitations specified in paragraphs (b)(3) through (b)(7), and (b)(11), of this section concentration limitations shall be those concentrations specified in this section.

In accordance with Sections 423.12 (b) (12) the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The DOW has determined to apply the requirements of 40 CFR Part 423 in this manner.

40 CFR 423.13(d) (1)

The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown time the concentration listed below:

TABLE 47.		
BAT Effluent Requirements – Cooling Tower Blowdown		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
Free Available Chlorine	0.5 mg/l	0.2 mg/l

The 126 priority pollutants (appendix A) contained in chemicals added for cooling tower maintenance, except:	([1])	([1])
Chromium, Total	0.2 mg/l	0.2 mg/l
Zinc, Total	1.0 mg/l	1.0 mg/l
[1]No detectable amount		

40 CFR 423.13(d) (2)

Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator or state, if the state has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.

40 CFR 423.13(d) (3)

At the permitting authority's discretion, instead of the monitoring in 40 CFR 122.11(b), compliance with the standards for the 126 priority pollutants in paragraph (d)(1) of this section may be determined by engineering calculations demonstrating that the regulated pollutants are not detectable in the final discharge by the analytical methods in 40 CFR part 136.

40 CFR 423.13(m)

At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as concentration limitations instead of the mass-based limitations specified in paragraphs (b) through (l) of this section concentration limitations shall be those concentrations specified in this section.

In accordance with Sections 423.13 (m) the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The DOW has determined to apply the requirements of 40 CFR Part 423 in this manner

7.4.2. Best Professional Judgment "BPJ"

Time of Oxidants Discharge

The Division of Water will impose a limit of 120 minutes/day/unit of chlorination / oxidation discharge time. The limit is representative of the BAT requirements for the discharge of chlorine in cooling tower blowdown as specified in 40 CFR 423.13(d)(2) as incorporated in 401 KAR 5:065, Section 2(6). It is the "Best Professional Judgement" (BPJ) of the Division of Water that this requirement is also applicable to the addition of other oxidants as well as chlorine.

Total Residual Oxidants

The Division of Water will impose a daily maximum limit of 0.20 mg/l for this parameter. The limit is representative of the BAT requirements for total residual chlorine in once through cooling water as specified in 40 CFR 423.13(b)(1) as incorporated in 401 KAR 5:065, Section 2(6). It is the Division of Water's Best Professional Judgment (BPJ) determination to limit the addition of other oxidants as well as chlorine.

7.5. Justification of Requirements

Chapters 5 and 10 of Title 401 of the Kentucky Administrative Regulations (KARs), cited in the following, have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

At a minimum, all permits shall contain technology-based effluent limitations (TBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)]. When necessary to achieve water quality standards, all permits shall contain water quality-based effluent limitations (WQBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(d)]. Any WQBELs included in this permit are based upon the Kentucky Water Quality Standards (KYWQS) [401 KAR 10:031].

7.5.1. Internal Monitoring Point

The monitoring requirements for these parameters are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(iii)], and the requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

7.5.2. Flow

The monitoring requirements for this parameter are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(ii)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

7.5.3. Free Available Chlorine

The limits for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A], and representative of the BPT and BAT requirements for cooling tower blowdown [40 CFR 423.12(b)(7)] and [40 CFR 423.13(d)(1)].

7.5.4. Total Chromium, Total Zinc, and Priority Pollutants

The limits for these parameters are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A], representative of the BAT requirements for cooling tower blowdown [40 CFR 423.13(d)(1)].

7.5.5. Time of Oxidants Discharge

The limit for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A], representative of the BAT requirements for chlorine addition in [40 CFR 423.13 (d)(1)(2)] and imposing Best Professional Judgement [401 KAR 5:080, Section 2(3) – 40 CFR 125.3].

7.5.6. Total Residual Oxidants

The limit for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing Best Professional Judgement [401 KAR 5:080, Section 2(3) – 40 CFR 125.3].

SECTION 8

OUTFALL 007

8. OUTFALL 007

8.1. Outfall Description

The following table lists the outfall type, location, and description:

TABLE 48.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.750556°	85.035833°	Plant Intake from Ohio River	Raw Water Intake

8.2. Reported Values

The following table summarizes the reported values for Outfall 007:

TABLE 49.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Flow	MGD	72.95	81.73	N/A	N/A	N/A	N/A
Temperature	°C	N/A	N/A	N/A	16.71	18.70	N/A
Total Suspended Solids	mg/l	N/A	N/A	N/A	54.64	120.31	N/A
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	149.0	166.4	N/A
pH	SU	N/A	N/A	6.40	N/A	N/A	8.27
Total Recoverable Metals	mg/l	N/A	N/A	N/A	0.044	0.044	N/A

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2013 to 10/31/2018.

8.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 007:

TABLE 50.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	Daily	Calculated
Temperature	°F	N/A	N/A	N/A	Report	Report	N/A	Daily	Grab
[1]Cooling Water Intake Inspection	Fail=1 Pass=0	N/A	N/A	N/A	N/A	N/A	Report[2]	1/Week	Inspection[3]
[1]Weekly monitoring of the cooling water intake system shall be performed, during the period the cooling water intake structure is in operation, to ensure that the design and construction technology required by §125.94 (i.e., intake flow commensurate with closed cycle cooling) is functioning as designed and is being appropriately maintained and operated.									
[2]If the intake flow through the screen is not commensurate with closed cycle cooling a "1" is to be reported. If intake flow is commensurate with closed cycle cooling "0" is to be reported.									
[3]This inspection may take the form of either visual inspections or the use of remote monitoring devices.									
An annual certification statement signed by the authorized representative shall be submitted to the DOW surface water permits branch no later than January 31st for the previous year. See Section 5.8.3.3. "Reporting Requirements for Cooling Water Intake" for additional details.									

8.4. Pertinent Factors

The effluent limitations for this outfall were developed in accordance with DOW's General Procedures for Limitations Development located on DOW's webpage at:

http://dep.ky.gov/formslibrary/Documents/General%20Procedures%20for%20Limitations%20Development.pdf

8.4.1. Cooling Water Intake

8.4.1.1. Cooling Water Intake Description

Ghent Generating Station has four generating units each withdrawing make-up cooling water from two Cooling Water Intake Structures (CWIS) on the Ohio River, which has a $7Q_{10}$ flow of 10,600 cfs. . Each CWIS has three traveling water screens located downstream of the trash racks. Units 1 &2 screens are 4 ft wide and Units 3 & 4 screens are 10 ft wide each with a 0.375 inch square stainless steel mesh with 12 gauge wire. Each screen has a high-pressure front wash system. Fish and debris collected from the screens wash into a return trough located in front of the screens that discharges into a removable trash basket that is disposed of when needed. The estimated intake velocities during design low water levels for Units 1 & 2 and Units 3 & 4 are 2.3 ft/sec and 0.8 ft/sec respectively. There are three service water pumps utilized in both Units 1 & 2 CWIS and Units 3 & 4 CWIS and are located downstream of the traveling water screens in both intakes. Units 1 & 2 service water pumps are each rated for 54.6 cfs. The three service water pumps for Units 3 & 4 have a rating of 46.8 cfs. This results in a combined plant total maximum design intake flow with all six service water pumps operating of 304.2 cfs, which is equivalent to 3% of the $7Q_{10}$. Only one of three pumps in each CWIS is normally operated during the winter and two are operated during the summer for both intakes. Based on the last five years of operating data (2013-2017) Ghent withdrew an average of 141.5 cfs from the Ohio River, which is equivalent to 1.33% of the 7Q10. All four units utilize full-wet mechanical draft cooling towers, Units 1 & 2 each have a twelve cell cooling tower, and Units 3 &4 each have a 14 cell cooling tower. All four units utilize wet-mechanical draft, double flow cooling towers are designed for 3 to 5 cycles of concentration to limit the dissolved solids concentration. Approximately 87% percent of all water withdrawn from the Ohio River is used for closed-cycle cooling system make-up water and other miscellaneous heat exchangers. There is no emergency intake at the facility.

8.4.1.2. Impingement Mortality BTA Determination

The permittee has selected to comply with the impingement mortality standard in 40 CFR 125.94(c)(1) by implementing a closed cycle recirculating system. This intake structure feeds into a cooling system that meets the definition of a closed-cycle recirculating system in 40 CFR 125.92(c), as demonstrated by the following: Ghent Generating Station has four coal-fired units all with a closed-cycle cooling system. The units utilize full-wet mechanical draft cooling towers, Units 1 & 2 each have a twelve cell cooling tower, and Units 3 &4 each have a 14 cell cooling tower. All four units utilize wet-mechanical draft, double flow cooling tower that are designed for 3 to 5 cycles of concentration to limit the dissolved solids concentration.

8.4.1.3. Entrainment BTA Determination

The current technology and operations for the cooling water intake structure have been identified by the Division as the best technology available for minimizing entrainment at this intake structure. Since the facility already operates with closed-cycle recirculating system the following additional technologies were also evaluated: (1) fine mesh screens with a mesh size of 2mm or smaller with a safe return mechanism, (2) variable speed pumps, and (3) water reuse or alternate sources of cooling water. Each technology was

evaluated using the criteria listed in 40 CFR 125.98(f)(2) and, where relevant, the criteria listed in 40 CFR 125.98(f)(3). See the tables below for analyses:

Cooling Towers	
Numbers and Types of organisms entrained	Optimized cooling towers in freshwater areas can reduce entrainment by 97.25%. Additionally, the 316(b) Rule Preamble makes the following statement: "Closed-cycle cooling is indisputably the most effective technology at reducing entrainment."
Particulate emissions or other pollutants	The facility is currently in compliance with their permit limitations and therefore this is not considered a critical factor.
Land availability	Cooling towers are not feasible if not land is available on or near the facility .The facility currently has cooling towers on all four of their units. Therefore, this is not considered a critical factor.
Remaining useful plant life	There are currently no plans to decommission or replace Units 1 through 4 at Ghent Generating Station. This was not considered a critical factor.
Quantified and qualitative social benefits	The permittee is not required to provide Cost Evaluation Study (40 CFR 122.21(r)(10)) or Benefits Evaluation (40 CFR 122.21(r)(11)) because AIF is less than 125 MGD. The permittee provided no estimate of cost. However, the facility already has cooling towers on all four of their units.
Conclusion	Division concludes that the closed-cycle recirculating systems already in place at the facility meets BTA requirements for entrainment. In agreement with EPA that closed-cycle cooling is indisputably the most effective technology at reducing entrainment due to the large reduction in flow.

Fine Mesh Screens with a Mesh Size of 2 mm or smaller	
Numbers and Types of organisms entrained	The facility does not have historical, relevant entrainment data that can be compared with data for this technology. In order for any entrainment reductions to be seen a screen with a mesh size of <2.0 mm should be used, as nearly 100% of eggs are still pass through a 2.0 mm mesh screen. Through EPA's review of control technologies, the Agency found that the survival of "converts" on fine mesh screen was very poor, and in some extreme cases comparable to the extremely low survival of entrained organisms that are allowed to pass entirely through the facility.
Particulate emissions or other pollutants	None expected other than increase in solids clogging the mesh slot size.
Land availability	The size of the screen face may need to be increased to maintain current flow rates. As EPA noted in the 316(b) existing facilities rule technical development document, in order to equip fine mesh screen and maintain a through-screen velocity of 0.5 fps, as many as 68% of facilities would need to expand their intake screen area by more than five times. Due to the large amount of make-up flow required at this facility the Impingement area of influence would be increased significantly. EPA

	estimated that 17% of existing intake screens in the U.S. could not be enlarged to accommodate a 2 mm screen.
Remaining useful plant life	There are currently no plans to decommission or replace Units 1 through 4 at Ghent Generating Station. This was not considered a critical factor.
Quantified and qualitative social benefits	The permittee is not required to provide Cost Evaluation Study (40 CFR 122.21(r)(10)) or Benefits Evaluation (40 CFR 122.21(r)(11)) because AIF is less than 125 MGD. The permittee provided no estimate of cost. The data that is available for this factor is not of sufficient rigor to allow the Division to preclude this technology.
Conclusion	The use of a fine mesh screen is not required, in part, because the main entrainment reduction expected from the use of fine mesh screens with a mesh size of 2 mm or smaller is early life stage organisms (i.e. nursery areas). Since the facilities CWIS screens are located approximately 80 feet off of the banks of the Ohio River the Division does not expect this technology to provide a significant reduction to entrainment. Additionally, the use of fine mesh screens would have the potential to clog more frequently thereby increasing the through screen velocity.

Variable Speed Pumps	
Numbers and Types of organisms entrained	Proper use of variable frequency drives can reduce entrainment mortality by decreasing the volume of water withdrawn. However, using less cooling water increases in-plant and discharge temperatures, lowering the survival rate of entrained. This technology is estimated to provide only minor reductions to entrainment. This is because the facility already cycles pumps to meet water demands. Also, opportunities for flow reduction are expected to be greater during cooler months because of ambient water temperatures. To the extent that this is true and entrainment impacts are less probable during conditions with cooler water temperatures, the reductions achieved will be low.
Particulate emissions or other pollutants	There would probably be both trivial increases and trivial decreases in pollution as part of slight energy penalties caused by increased temperature of condensers and slightly decreased pump energy use, respectively. Lower flow rates in cooling tubes may require use of more chemicals or energy to control scaling.
Land availability	Not typically an issue.
Remaining useful plant life	There are currently no plans to decommission or replace Units 1 through 4 at Ghent Generating Station. The pumps can pay for themselves within a few years. This was not considered a critical factor.
Quantified and qualitative social benefits	The permittee is not required to provide Cost Evaluation Study (40 CFR 122.21(r)(10)) or Benefits Evaluation (40 CFR 122.21(r)(11)) because AIF is less than 125 MGD. The permittee provided no estimate of cost. The data that is available for this factor is not of sufficient rigor to allow the Division to preclude this technology.
Thermal Discharge Impacts	The use of variable speed pumps would not reduce thermal loads but would probably increase temperature and decrease flow so temperature impacts would

	be variable and probably minimal. But the current thermal impact from the facility is not a concern. This was not considered a significant factor.
Conclusion	Use of variable speed pumps is not required, in part, because each CWIS already uses 3 pumps. One pump for each cooling water intake structure runs continuously and the other 2 are used as needed. This technology is estimated to provide only minor reductions to entrainment. This is because the facility already cycles pumps to meet water demands.

Water Reuse or Alternate Sources of Cooling Water
This is typically not an option for steam electric power plants due to the high volume of cooling water that is required. Recent cooling water withdraw flows average around 73 MGD.

8.4.2. Intake Structure Standard Requirements

8.4.2.1. Future BTA Determination

This is a Final BTA determination made in accordance with the requirements of the federal regulations in 40 CFR 125.90-98, based upon the materials submitted by the permittee through 40 CFR 122.21(r). Future BTA determinations will be re-confirmed under the same regulations, but the permittee may request that some application materials be waived under 40 CFR 125.95(c) and 40 CFR 125.98(g).

8.4.2.2. Visual or Remote Inspections

The permittee is required to conduct visual or remote inspections of the intake structure at least weekly during periods of operation, pursuant to 40 CFR 125.96(e).

8.4.2.3. Reporting Requirements

The permittee is required to submit an annual certification statement and report, pursuant to 40 CFR 125.97(c).

8.4.2.4. Endangered Species Act

Nothing in this permit authorizes take for the purpose of a facility's compliance with the Endangered Species Act. 40 CFR 125.98(b)(1) requires the inclusion of this provision in all permits subject to 316(b) requirements. Contact the state Natural Heritage Inventory (NHI) staff with inquiries regarding incidental take of state-listed threatened and endangered species and the US Fish and Wildlife Service with inquiries regarding incidental take of federally-listed threatened and endangered species.

8.5. Justification of Requirements

Chapters 5 and 10 of Title 401 of the Kentucky Administrative Regulations (KARs), cited in the following, have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

At a minimum, all permits shall contain technology-based effluent limitations (TBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)]. When necessary to achieve water quality standards, all permits shall contain water quality-based effluent limitations (WQBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(d)]. Any WQBELs included in this permit are based upon the Kentucky Water Quality Standards (KYWQS) [401 KAR 10:031].

8.5.1. Flow

The monitoring requirements for this parameter are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(ii)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

8.5.2. Temperature

The monitoring requirements for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(i)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

8.5.3. Cooling Water Intake Inspection

The monitoring requirements for this parameter is consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(ii)], requirements for visual or remote inspections [40 CFR 125.96 (e)], and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

SECTION 9

OUTFALL 008

9. OUTFALL 008

9.1. Outfall Description

The following table lists the outfall type, location, and description:

TABLE 51.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
Internal	38.753386°	85.023082°	Outfall 001	Treated FGD Wastewater

9.2. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 008:

TABLE 52.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Flow [1]	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Month	Instantaneous
Total Recoverable Arsenic[1]	µg/l	N/A	N/A	N/A	8	18	N/A	1/Month	Grab
Total Recoverable Mercury[1]	ng/l	N/A	N/A	N/A	34	103	N/A	1/Month	Grab
Total Recoverable Selenium[1]	µg/l	N/A	N/A	N/A	29	70	N/A	1/Month	Grab
Nitrate/nitrite as N[1]	mg/l	N/A	N/A	N/A	3	4	N/A	1/Month	Grab
[1]These limits do not become effective till April 1st, 2025									

9.3. Pertinent Factors

The effluent limitations for this outfall were developed in accordance with DOW's General Procedures for Limitations Development located on DOW's webpage at:

http://dep.ky.gov/formslibrary/Documents/General%20Procedures%20for%20Limitations%20Development.pdf

9.3.1. FGD Wastewater Compliance

Engineering and procurement activities, associated with changes or impacts of the finalized ELG Rule, are already underway for the Flue Gas Desulfurization Wastewater (FGDWW) treatment system.

The Ghent Station existing FGDWW treatment system will be modified by constructing a new selenium / biological treatment system (ELG System) to post-treat the existing physical-chemical equipment flows. Included in the ELG System are outdoor bioreactors, sump and new building housing additional process equipment, electrical switchgear, control panels, laboratory, and chemical storage tanks. The solids from the ELG system will integrated into the existing FGDWW solids management flows. The treated effluent flows form the FGDWW system will continue to be directed to the plant's existing process ponds, then to Outfall 001 and ultimately discharged via a high-rate multiport diffuser to the Ohio River.

40 CFR 423.13(g)(1)(i) require that the quantity of pollutants in FGD wastewater shall not exceed the quantity determined by 40 CFR 423.13(g)(1)(i). The permittee must meet this requirement by a date determined by the permitting authority. For FGD wastewater, the date must be as soon as possible beginning October 13, 2021, but no later than December 31, 2025.The definition for the phrase "as soon as possible" can be found in 40 CFR 423.11(t). The permittee provided the Division of Water information to determine as soon as possible ELG compliance applicability dates.

KU awarded the Engineering, Procurement, and Construction agreement on March 15, 2021. Because the FGDWW treatment system activities are complex and highly integrated with existing plant systems, following transfer of care, custody, and control of the system to KU, as well as plant troubleshooting-optimization efforts, KU requests an applicability date for the FGDWW system of April 1, 2025. For the BATW – FGD wastewater projects, discreet steps of the engineering-procurement-installation contract include multiple overlapping phases which are not specifically sequential but highly interdependent. Delays of any step are likely to delay completing the entire project. For the FGD wastewater specific activities, these phases and general expected durations include:

- Detailed engineering: beginning June 2021
- Procurement: beginning Q3 2021
- Construction – multi – discipline and multi – trades: beginning Q4 2021
- Mechanical startup, troubleshooting and testing; beginning Q2 2024
- Commercial Completion and performance test: beginning Q3 2024
- Plant testing and optimization: beginning Q4 2024 – Q1 2025

The DOW grants KU's requested compliance date. The discharge requirements for BAT FGD wastewater shall become effective on April 1, 2025. FGD wastewater generated prior to this date will discharge to Outfall 001 and the TSS and Oil & Grease limitations have been applied accordingly.

9.3.2. Technology-Based Effluent Limitations

Technology-based effluent limitations and standards, based on federally promulgated standards, a case-by-case basis, or a combination of the two, shall be included in all KPDES permits, where applicable.

9.3.2.1. Federal Effluent Limitations Guidelines

EPA has established a minimum level of technology that must be applied to certain industries. Due to the operations at this facility, all applicable sections of 40 CFR 423 shall be applied to this outfall. The following is a list of those requirements:

40 CFR 423.12(b) (11)

The quantity of pollutants discharged in FGD wastewater, flue gas mercury control wastewater, combustion residual leachate, or gasification wastewater shall not exceed the quantity determined by multiplying the flow of the applicable wastewater times the concentration listed in the following table:

TABLE 53.		
BPT Effluent Requirements – FGD wastewater		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
TSS	100.0 mg/l	30.0 mg/l
Oil and Grease	20.0 mg/l	15.0 mg/l

40 CFR 423.12(b) (12)

At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as concentration limitations instead of the mass-based limitations specified in paragraphs (b)(3) through (b)(7), and (b)(11), of this section concentration limitations shall be those concentrations specified in this section.

In accordance with Sections 423.12 (b) (12) the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The DOW has determined to apply the requirements of 40 CFR Part 423 in this manner.

40 CFR 423.13(g) (1)(i)

Except for those discharges to which paragraph (g)(2) or (g)(3) of this section applies, the quantity of pollutants in FGD wastewater shall not exceed the quantity determined by multiplying the flow of FGD wastewater times the concentration listed in the table following this paragraph (g)(1)(i). Discharges must meet the effluent limitations for FGD wastewater in this paragraph by a date determined by the permitting authority that is as soon as possible beginning October 13, 2021, but no later than December 31, 2025. These effluent limitations apply to the charge of FGD wastewater generated on and after the date determined by the permitting authority for meeting the effluent limitations, as specified in this paragraph.

TABLE 54.		
BAT Effluent Requirements – FGD wastewater		
Effluent Characteristic	**Maximum for any one day**	**Maximum for monthly average**
Arsenic, total	18 µg/l	8 µg/l
Mercury, total	103 ng/l	34 ng/l
Selenium, total	70 µg/l	29 µg/l
Nitrate/nitrite as N	4 mg/l	3 mg/l

40 CFR 423.13(g) (1)(ii)

For FGD wastewater generated before the date determined by the permitting authority, as specified in paragraph (g)(1)(i), the quantity of pollutants discharged in FGD wastewater shall not exceed the quantity determined by multiplying the flow of FGD wastewater times the concentration listed for TSS in 423.12(b)(11).

40 CFR 423.13(m)

At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as concentration limitations instead of the mass-based limitations specified in paragraphs (b) through (l) of this section concentration limitations shall be those concentrations specified in this section.

In accordance with Sections 423.13 (m) the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The DOW has determined to apply the requirements of 40 CFR Part 423 in this manner

9.3.3. Total Suspended Solids, and Oil and Grease

Since Outfall 008 effluent is directed to Outfall 001 Process Pond (previously to ATB-1), the limitations for these pollutants has been applied at Outfall 001 after commingling with other waters. The DOW has developed flow-weighted limitations to insure compliance with the federal effluent limitation guidelines.

9.4. Justification of Requirements

Chapters 5 and 10 of Title 401 of the Kentucky Administrative Regulations (KARs), cited in the following, have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

At a minimum, all permits shall contain technology-based effluent limitations (TBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)]. When necessary to achieve water quality standards, all permits shall contain water quality-based effluent limitations (WQBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(d)]. Any WQBELs included in this permit are based upon the Kentucky Water Quality Standards (KYWQS) [401 KAR 10:031].

9.4.1. Internal Monitoring Point

The monitoring requirements for these parameters are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(iii)], and the requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

9.4.2. Flow

The monitoring requirements for this parameter are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(ii)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

9.4.3. Total Arsenic, Total Mercury, Total Selenium, and Nitrate/nitrite

The limits for these parameters are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)(1) and 122.44(i)(1)], the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A], and representative of the BAT requirements for FGD wastewater [40 CFR 423.13(g)(1)(i)].

SECTION 10

OUTFALL 009

10. OUTFALL 009

10.1. Outfall Description

The following table lists the outfall type, location, and description:

TABLE 55.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.755528°	85.023611°	Ohio River	Stormwater Runoff from the Northern part of the ATB-1 closed/capped area.

10.2. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 009:

TABLE 56.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Quarter	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
pH	SU	N/A	N/A	Report	N/A	N/A	Report	1/Quarter	Grab
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Arsenic	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Cadmium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Chromium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Copper	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Lead	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Mercury	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Nickel	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Silver	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Until this outfall is constructed and stormwater for the closed/capped portions of the northern part of ATB-1 to start discharging through this outfall NODI Code 9 "Conditional Monitoring-Not Required This Period" can be used for the monitoring requirements at this outfall.									

10.3. Pertinent Factors

The effluent limitations for this outfall were developed in accordance with DOW's General Procedures for Limitations Development located on DOW's webpage at:

http://dep.ky.gov/formslibrary/Documents/General%20Procedures%20for%20Limitations%20Development.pdf

10.3.1. Water Quality-Based Effluent Limitations

The following table lists those pollutants and/or pollutant characteristics of concern that DOW has determined exhibit reasonable potential to cause or contribute to an excursion of a water quality-based criterion, and the basis of DOW's determination. These determinations are consistent with the DOW's reasonable potential analysis (RPA) procedures outlined in *Permitting Procedures For Determining "Reasonable Potential"* Kentucky Division of Water May 1, 2000.

TABLE 57.	
Pollutant or Pollutant Characteristic	**Basis**
Total Suspended solids, Hardness, pH and Total Recoverable: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Silver, and Zinc	Once construction to close the ATB-1 – Ash Treatment Basin 1 commences stormwater runoff from the closed/capped ATB-1 will discharge through this outfall. To insure there is no issues with the stormwater from the closed/capped portions of the ATB-1 it is the Divisions best professional judgement to monitor for these pollutants. Monitoring will allow us to know the concentrations within the effluent. In the future DOW will analyze the results for the potential to exceed water quality criteria.

10.4. Justification of Requirements

Chapters 5 and 10 of Title 401 of the Kentucky Administrative Regulations (KARs), cited in the following, have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

At a minimum, all permits shall contain technology-based effluent limitations (TBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)]. When necessary to achieve water quality standards, all permits shall contain water quality-based effluent limitations (WQBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(d)]. Any WQBELs included in this permit are based upon the Kentucky Water Quality Standards (KYWQS) [401 KAR 10:031].

10.4.1. Flow

The monitoring requirements for this parameter are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(ii)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

10.4.2. Total Suspended Solids, Hardness, pH, and Total Recoverable: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Silver, and Zinc

The monitoring requirements for these pollutants are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(i)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

SECTION 11

OUTFALL 010

11. OUTFALL 010

11.1. Outfall Description

The following table lists the outfall type, location, and description:

TABLE 58.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.742500°	85.031667°	Black Rock Creek	Stormwater runoff from the Northwestern half of the ATB-2 closed/capped area and Stormwater Runoff from portions of the west haul road as well.

11.2. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 010:

TABLE 59.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Quarter	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
pH	SU	N/A	N/A	Report	N/A	N/A	Report	1/Quarter	Grab
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Arsenic	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Cadmium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Chromium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Copper	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Lead	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Mercury	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Nickel	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Silver	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Until this outfall is constructed and stormwater for the closed/capped portions of the Northwestern half of ATB-2 start discharging through this outfall NODI Code 9 "Conditional Monitoring-Not Required This Period" can be used for the monitoring requirements at this outfall.									

11.3. Pertinent Factors

The effluent limitations for this outfall were developed in accordance with DOW's General Procedures for Limitations Development located on DOW's webpage at:

http://dep.ky.gov/formslibrary/Documents/General%20Procedures%20for%20Limitations%20Development.pdf

11.3.1. Water Quality-Based Effluent Limitations

The following table lists those pollutants and/or pollutant characteristics of concern that DOW has determined exhibit reasonable potential to cause or contribute to an excursion of a water quality-based criterion, and the basis of DOW's determination. These determinations are consistent with the DOW's reasonable potential analysis (RPA) procedures outlined in *Permitting Procedures For Determining "Reasonable Potential"* Kentucky Division of Water May 1, 2000.

TABLE 60.	
Pollutant or Pollutant Characteristic	**Basis**
Total Suspended solids, Hardness, pH and Total Recoverable: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Silver, and Zinc	Once construction to close the ATB-2 – Ash Treatment Basin 2 commences stormwater runoff from the closed/capped ATB-1 will discharge through this outfall. To insure there is no issues with the stormwater from the closed/capped portions of the ATB-2 it is the Divisions best professional judgement to monitor for these pollutants. Monitoring will allow us to know the concentrations within the effluent. In the future DOW will analyze the results for the potential to exceed water quality criteria.

11.4. Justification of Requirements

Chapters 5 and 10 of Title 401 of the Kentucky Administrative Regulations (KARs), cited in the following, have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

At a minimum, all permits shall contain technology-based effluent limitations (TBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)]. When necessary to achieve water quality standards, all permits shall contain water quality-based effluent limitations (WQBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(d)]. Any WQBELs included in this permit are based upon the Kentucky Water Quality Standards (KYWQS) [401 KAR 10:031].

11.4.1. Flow

The monitoring requirements for this parameter are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(ii)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

11.4.2. Total Suspended Solids, Hardness, pH, and Total Recoverable: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Silver, and Zinc

The monitoring requirements for these pollutants are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(i)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

SECTION 12

OUTFALL 011

12. OUTFALL 011

12.1. Outfall Description

The following table lists the outfall type, location, and description:

TABLE 61.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.736944°	85.011667°	UT to Agniels Creek	Stormwater Runoff from the Southeast part of the ATB-2 closed/capped area.

12.2. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 011:

TABLE 62.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Quarter	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
pH	SU	N/A	N/A	Report	N/A	N/A	Report	1/Quarter	Grab
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Arsenic	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Cadmium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Chromium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Copper	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Lead	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Mercury	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Nickel	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Silver	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Until this outfall is constructed and stormwater for the closed/capped portions of the Southeast part of ATB-2 start discharging through this outfall NODI Code 9 “Conditional Monitoring-Not Required This Period” can be used for the monitoring requirements at this outfall.									

12.3. Pertinent Factors

The effluent limitations for this outfall were developed in accordance with DOW's General Procedures for Limitations Development located on DOW's webpage at:

http://dep.ky.gov/formslibrary/Documents/General%20Procedures%20for%20Limitations%20Development.pdf

12.3.1. Water Quality-Based Effluent Limitations

The following table lists those pollutants and/or pollutant characteristics of concern that DOW has determined exhibit reasonable potential to cause or contribute to an excursion of a water quality-based criterion, and the basis of DOW's determination. These determinations are consistent with the DOW's reasonable potential analysis (RPA) procedures outlined in *Permitting Procedures For Determining "Reasonable Potential"* Kentucky Division of Water May 1, 2000.

TABLE 63.	
Pollutant or Pollutant Characteristic	**Basis**
Total Suspended solids, Hardness, pH and Total Recoverable: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Silver, and Zinc	Once construction to close the ATB-2 – Ash Treatment Basin 2 commences stormwater runoff from the closed/capped ATB-1 will discharge through this outfall. To insure there is no issues with the stormwater from the closed/capped portions of the ATB-2 it is the Divisions best professional judgement to monitor for these pollutants. Monitoring will allow us to know the concentrations within the effluent. In the future DOW will analyze the results for the potential to exceed water quality criteria.

12.4. Justification of Requirements

Chapters 5 and 10 of Title 401 of the Kentucky Administrative Regulations (KARs), cited in the following, have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

At a minimum, all permits shall contain technology-based effluent limitations (TBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)]. When necessary to achieve water quality standards, all permits shall contain water quality-based effluent limitations (WQBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(d)]. Any WQBELs included in this permit are based upon the Kentucky Water Quality Standards (KYWQS) [401 KAR 10:031].

12.4.1. Flow

The monitoring requirements for this parameter are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(ii)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

12.4.2. Total Suspended Solids, Hardness, pH, and Total Recoverable: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Silver, and Zinc

The monitoring requirements for these pollutants are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(i)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

SECTION 13

OUTFALL 012

13. OUTFALL 012

13.1. Outfall Description

The following table lists the outfall type, location, and description:

TABLE 64.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.723611°	84.990833°	Stephens Branch	Landfill Stormwater Runoff

13.2. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 012:

TABLE 65.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Quarter	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	100	N/A	1/Quarter	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Quarter	Grab
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Arsenic	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Cadmium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Chromium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Copper	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Iron	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Lead	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Mercury	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Nickel	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Silver	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab

13.3. Pertinent Factors

The effluent limitations for this outfall were developed in accordance with DOW's General Procedures for Limitations Development located on DOW's webpage at:

http://dep.ky.gov/formslibrary/Documents/General%20Procedures%20for%20Limitations%20Development.pdf

13.3.1. Technology-Based Effluent Limitations

Technology-based effluent limitations and standards, based on federally promulgated standards, a case-by-case basis, or a combination of the two, shall be included in all KPDES permits, where applicable.

13.3.1.1. Best Professional Judgment (BPJ)

Landfill – Stormwater Runoff

This facility utilizes a sedimentation basin it its operation which provides for the settling of suspended solids. Sedimentation is a commonly used treatment technology for the removal of total suspended solids from non-contaminated stormwater runoff associated with landfill operations. Sedimentation is both efficient and cost effective. Although several factors may influence the final concentration of total suspended solids in the discharge, it has been the experience of the Division that ponds that retain landfill-related stormwater for six hours or more can achieve a total suspended solids concentration of 100 mg/l as a daily maximum.

13.3.2. Water Quality-Based Effluent Limitations

The following table lists those pollutants and/or pollutant characteristics of concern that DOW has determined exhibit reasonable potential to cause or contribute to an excursion of a water quality-based criterion, and the basis of DOW's determination. These determinations are consistent with the DOW's reasonable potential analysis (RPA) procedures outlined in *Permitting Procedures For Determining "Reasonable Potential"* Kentucky Division of Water May 1, 2000.

TABLE 66.

Pollutant or Pollutant Characteristic	Basis
Total Recoverable: Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Mercury, Nickel, Silver, and Zinc	Since there is limited data for the stormwater runoff to insure there is no issues with the stormwater from the landfill it is the Divisions best professional judgement to monitor for these pollutants. Monitoring will allow us to know the concentrations within the effluent. In the future DOW will analyze the results for the potential to exceed water quality criteria.

13.4. Justification of Requirements

Chapters 5 and 10 of Title 401 of the Kentucky Administrative Regulations (KARs), cited in the following, have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

At a minimum, all permits shall contain technology-based effluent limitations (TBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)]. When necessary to achieve water quality standards, all permits shall contain water quality-based effluent limitations (WQBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(d)]. Any WQBELs included in this permit are based upon the Kentucky Water Quality Standards (KYWQS) [401 KAR 10:031].

13.4.1. Flow

The monitoring requirements for this parameter are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(ii)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

13.4.2. Hardness and Total Recoverable: Arsenic, Cadmium, Chromium, Copper, Iron Lead, Mercury, Nickel, Silver, and Zinc

The monitoring requirements for these pollutants are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)(1)(i)] and requirements for recording and reporting of monitoring results [401 KAR 5:050, Section 4 – 40 CFR 122.48].

13.4.3. Total Suspended Solids

The limitations for this parameter are consistent with the requirements of 40 CFR 125.3(c)(2) as incorporated by reference in 401 KAR 5:080, Section 2(3). The limits are representative of the Division of Water's "Best Professional Judgment" (BPJ) determination of the "Best Conventional Pollutant Control Technology" (BCT) requirements for these pollutants.

13.4.4. pH

The limitations for this parameter are consistent Kentucky's Water Quality Standards [401 KAR 10:031, Section 4(1)(b) and Section 7].

SECTION 14

OUTFALL 013

14. OUTFALL 013

14.1. Outfall Description

The following table lists the outfall type, location, and description:

TABLE 67.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.732222°	85.005556°	UT to Agniels Creek	Temporary Stormwater pond to manage stormwater runoff from future/undeveloped parts of the landfill.

14.2. Effluent Limitations and Monitoring Requirements

The stormwater runoff from the future/undeveloped parts of the landfill served by Outfall 013 shall be managed using appropriate Best Management Practices (BMPs) to prevent the discharge of pollutants from those areas at this time.

14.3. Pertinent Factors

The effluent limitations for this outfall were developed in accordance with DOW's General Procedures for Limitations Development located on DOW's webpage at:

http://dep.ky.gov/formslibrary/Documents/General%20Procedures%20for%20Limitations%20Development.pdf

14.4. Justification of Requirements

Chapters 5 and 10 of Title 401 of the Kentucky Administrative Regulations (KARs), cited in the following, have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

At a minimum, all permits shall contain technology-based effluent limitations (TBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)]. When necessary to achieve water quality standards, all permits shall contain water quality-based effluent limitations (WQBELs) [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(d)]. Any WQBELs included in this permit are based upon the Kentucky Water Quality Standards (KYWQS) [401 KAR 10:031].

14.4.1. Best Management Practices (BMPs)

The use of BMPs for the control of drainage from the non-industrial portions of the facility are consistent with the KPDES permit program requirements for establishing effluent limitations, standards, and permit conditions [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(k)].

SECTION 15

OTHER CONDITIONS

15. OTHER CONDITIONS

15.1. Schedule of Compliance

The permittee is required to comply with all effluent limitations by the effective date of the permit unless a compliance schedule is included with the permit. The schedule of compliance is consistent with the regulatory provisions for establishing a schedule of compliance [401 KAR 5:050, Section 3 and 40 CFR 122.47].

15.2. Antidegradation

The conditions of Kentucky's Antidegradation Policy have been satisfied [401 KAR 10:029, Section 1]. The facility dischargers to waters categorized as "Impaired Waters" pursuant to 33 U.S.C. 1315(b). Therefore pursuant to 401 KAR 10:030, Section 1(4), further review is not required.

The conditions of Kentucky's Antidegradation Policy have been satisfied [401 KAR 10:029, Section 1]. This permitting action is a reissuance of a KPDES permit that does not authorize an expanded discharge.

15.3. Standard Conditions

The conditions listed in the Standard Conditions Section of the permit are consistent with the conditions applicable to all permits [401 KAR 5:065, Section 2(1) – 40 CFR 122.41].

15.4. Sufficiently Sensitive Analytical Methods

Analytical methods utilized to demonstrate compliance with the effluent limitations established in this permit shall be sufficiently sensitive to detect pollutant levels at or below the required effluent limit [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(i)].

15.5. Certified Laboratory

All environmental analysis to be performed by a certified laboratory is consistent with the certified wastewater laboratory requirements [401 KAR 5:320, Section 2].

15.6. BMP Plan

Permits are to include BMPs to control or abate the discharge of pollutants when: 1) authorized under section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities; 2) authorized under Section 402(p) of the CWA for the control of stormwater discharges; 3) numeric effluent limitations are infeasible; or 4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(k)]

15.7. Ohio River Outfall Signage

Kentucky is a member of the Ohio River Valley Water Sanitation Compact (ORSANCO) [KRS 224.18-760]. Article I of the Compact pledges faithful cooperation between the signatory states. Article IV authorizes the Commission to adopt, prescribe and promulgate rules, regulations and standards for administering and enforcing the Compact. The ORSANCO pollution control standards for discharges to the Ohio River require that holders of an individual NPDES permit post and maintain a permanent marker having specific dimensions at each Ohio River outfall. The permittee shall comply with the permanent marker requirements of ORSANCO's Pollution Control Standards.

15.8. Cooling Water Additives, FIFRA, and Mollusk Control

The discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) in cooling water which ultimately may be released to the waters of the Commonwealth is prohibited, except Herbicides, unless specifically identified and authorized by the KPDES permit. In the event the permittee needs to use a biocide or chemical not previously reported for mollusk control or

other purpose, the permittee shall submit sufficient information, a minimum of thirty (30) days prior to the commencement of use of said biocides or chemicals to the Division of Water for review and establishment of appropriate control parameters.

15.9. Polychlorinated Biphenyls

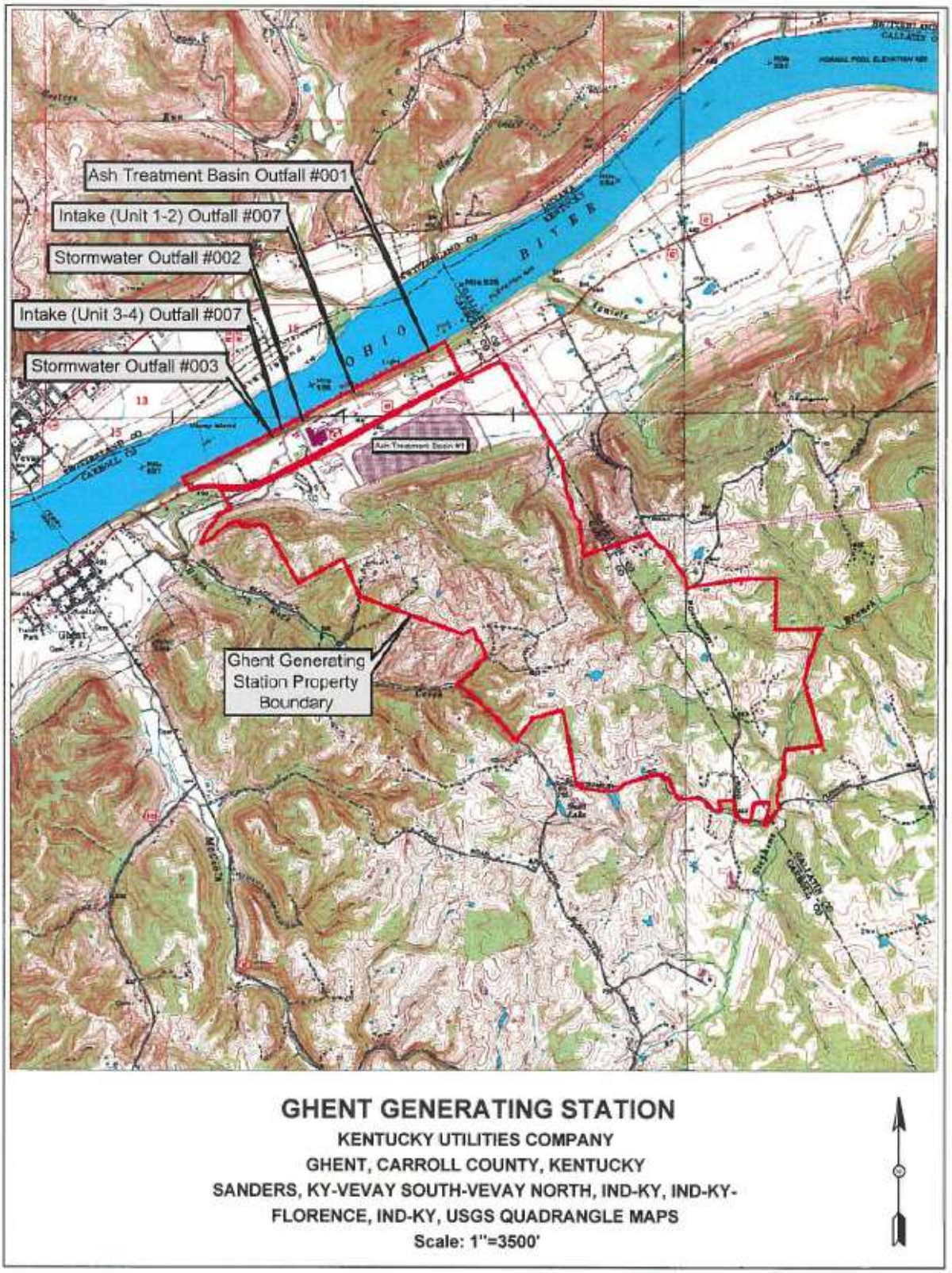
Pursuant to the requirements of 40 CFR Part 423.12(b) (2), there shall be no discharge, from any point source, of Polychlorinated Biphenyl compounds such as those commonly used in transformer fluids. The permittee shall implement this requirement as a specific section of the BMP plan developed for this section.

15.10. Combustion Residual Leachate

Pursuant to 40 CFR 423.11(r), the term combustion residual leachate ("leachate") means "leachate from landfills or surface impoundments containing combustion residuals. Leachate is composed of liquid, including any suspended or dissolved constituents in the liquid, that has percolated through waste or other materials emplaced in a landfill, or that passes through the surface impoundment's containment structure (*e.g.,* bottom, dikes, berms). Combustion residual leachate includes seepage and/or leakage from a combustion residual landfill or impoundment unit. Combustion residual leachate includes wastewater from landfills and surface impoundments located on non-adjoining property when under the operational control of the permitted facility."

This permit authorizes the discharge of leachate from outfall 001. For newly discovered leachate seeps from a CCR surface impoundment or a CCR landfill, as defined at 40 CFR 257.53, to the surface that discharge or have a potential to discharge to a water of the commonwealth other than through outfall 001, the permittee shall develop and implement a plan to address such surface seeps. The plan shall be included as part of the on-site BMP Plan and shall address, at a minimum, (1) scheduled inspections for identifying surface leachate seeps, (2) maintenance of CCR landfills and/or impoundments to minimize the potential for surface leachate seeps, and (3) corrective measures that will be implemented upon the discovery of a surface leachate seep that is not being controlled by a permitted outfall authorized for discharge of leachate. The permittee shall notify the DOW Surface Water Permits Branch and the appropriate DOW Field Office of planned corrective measures for any identified surface seeps of leachate as soon as feasible after discovery of such a leachate seep, but no later than ten (10) days after the discovery. Such corrective measures may include: (1) plans to reduce or eliminate the leachate seep to the surface; (2) actions to route the surface leachate seep (via a conveyance designed to contain the flow or eliminate the possibility of infiltration) to an outfall permitted to discharge leachate; and (3) combinations of actions to eliminate or, if elimination is not feasible, reduce and control a surface leachate seep and ensure any discharge to a receiving stream is authorized by the permit. Please note that this does not exempt the permittee from 24-hour reporting Section 2.12 of the permit.

15.11. Location Map



15.12. CORMIX Session Report

```
CORMIX SESSION REPORT:
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
                CORMIX MIXING ZONE EXPERT SYSTEM
                  CORMIX Version 11.0GTD
                 HYDRO2:Version-11.0.0.0  April,2018
SITE NAME/LABEL:
  DESIGN CASE:              KU Ghent Generating Station
  FILE NAME:               C:\Users\Andrew.Parrish\Desktop\Cormix\KU Ghent\Ghent.prd
  Using subsystem CORMIX2:     Multiport Diffuser Discharges
  Start of session:          01/11/2019--08:36:04
*******************************************************************************
SUMMARY OF INPUT DATA:
-------------------------------------------------------------------------------
AMBIENT PARAMETERS:
  Cross-section                    = bounded
  Width                    BS     = 304.80 m
  Channel regularity               ICHREG = 1
  Ambient flowrate          QA     = 300.16 m^3/s
  Average depth            HA     = 6.10 m
  Depth at discharge        HD     = 6.10 m
  Ambient velocity          UA     = 0.1615 m/s
  Darcy-Weisbach friction factor  F      = 0.0172
    Calculated from Manning's n         = 0.02
  Wind velocity            UW     = 4 m/s
  Stratification Type       STRCND = U
  Surface temperature                = 20 degC
  Bottom temperature                 = 20 degC
  Calculated FRESH-WATER DENSITY values:
  Surface density          RHOAS  = 998.2051 kg/m^3
  Bottom density           RHOAB  = 998.2051 kg/m^3
-------------------------------------------------------------------------------
DISCHARGE PARAMETERS:          Submerged Multiport Diffuser Discharge
  Diffuser type            DITYPE = unidirectional perpendicular
  Diffuser length           LD     = 24.38 m
  Nearest bank                     = left
  Diffuser endpoints        YB1    = 121.92 m;    YB2 = 146.30 m
  Number of openings        NOPEN  = 5
  Number of Risers          NRISER = 5
  Ports/Nozzles per Riser   NPPERR  = 1
  Spacing between risers/openings SPAC   = 6.10 m
  Port/Nozzle diameter       D0     = 0.4572 m
    with contraction ratio          = 1
  Equivalent slot width      B0     = 0.026931 m
  Total area of openings     TA0    = 0.8209 m^2
  Discharge velocity         U0     = 2.76 m/s
  Total discharge flowrate    Q0     = 2.26949 m^3/s
  Discharge port height      H0     = 0.61 m
  Nozzle arrangement         BETYPE = unidirectional without fanning
  Diffuser alignment angle    GAMMA  = 90 deg
  Vertical discharge angle    THETA  = 0 deg
  Actual Vertical discharge angle THEAC  = 0 deg
  Horizontal discharge angle   SIGMA  = 315 deg
  Relative orientation angle   BETA   = 45 deg
  Discharge temperature (freshwater)    = 43.33 degC
  Corresponding density       RHO0   = 990.8954 kg/m^3
  Density difference         DRHO   = 7.3097 kg/m^3
  Buoyant acceleration       GP0    = 0.0718 m/s^2
  Discharge concentration     C0     = 5 TUa
  Surface heat exchange coeff.   KS     = 0 m/s
```

```
 Coefficient of decay          KD    = 0 /s
-------------------------------------------------------------------------------
FLUX VARIABLES PER UNIT DIFFUSER LENGTH:
 Discharge (volume flux)       q0    = 0.093073 m^2/s
 Momentum flux
   (based on slot width B0)    m0 =U0^2*B0   = 0.205859 m^3/s^2
   (based on volume flux q0)   m0 =U0*q0     = 0.257323 m^3/s^2
 Buoyancy flux
   (based on slot width B0)    j0 =U0*GP0*B0 = 0.005347 m^3/s^3
   (based on volume flux q0)   j0 =q0*GP0    = 0.006684 m^3/s^3
-------------------------------------------------------------------------------
DISCHARGE/ENVIRONMENT LENGTH SCALES:
 LQ  = 0.03 m        Lm  = 9.86 m        LM  = 6.72 m
 lm' = 99999 m       Lb' = 99999 m       La  = 99999 m
 (These refer to the actual discharge/environment length scales.)
-------------------------------------------------------------------------------
NON-DIMENSIONAL PARAMETERS:
Slot Froude number           FR0   = 62.87
 Port/nozzle Froude number    FRD0  = 15.26
 Velocity ratio               R     = 17.11
-------------------------------------------------------------------------------
MIXING ZONE / TOXIC DILUTION ZONE / AREA OF INTEREST PARAMETERS:
 Toxic discharge                    = yes
 CMC concentration            CMC   = 1 TUa
 CCC concentration            CCC   = 0.3 TUa
 Water quality standard specified   = given by CCC value
 Regulatory mixing zone             = yes
 Regulatory mixing zone specification  = distance
 Regulatory mixing zone value       = 17.62 m (m^2 if area)
 Region of interest                 = 10000 m
*******************************************************************************
HYDRODYNAMIC CLASSIFICATION:
 *------------------------*
 | FLOW CLASS   = MU2 |
 *------------------------*
 This flow configuration applies to a layer corresponding to the full water
 depth at the discharge site.
 Applicable layer depth = water depth = 6.10 m

 Limiting Dilution S = (QA/Q0)+ 1.0 = 133.3

*******************************************************************************
MIXING ZONE EVALUATION (hydrodynamic and regulatory summary):

-------------------------------------------------------------------------------
X-Y-Z Coordinate system:
 Origin is located at the BOTTOM below the port/diffuser center:
  134.11 m from the left bank/shore.
 Number of display steps NSTEP = 500 per module.
-------------------------------------------------------------------------------
NEAR-FIELD REGION (NFR) CONDITIONS :
Note: The NFR is the zone of strong initial mixing.  It has no regulatory
 implication.  However, this information may be useful for the discharge
 designer because the mixing in the NFR is usually sensitive to the
 discharge design conditions.
 Pollutant concentration at NFR edge  c = 0.3091 TUa
 Dilution at edge of NFR           s = 16.2
 NFR Location:                  x = 8.62 m
  (centerline coordinates)         y = -8.62 m
                              z = 6.10 m
 NFR plume dimensions:  half-width (bh) = 9.07 m
```

thickness (bv) = 6.10 m
Cumulative travel time: 36.6734 sec.

Buoyancy assessment:
The effluent density is less than the surrounding ambient water
density at the discharge level.
Therefore, the effluent is POSITIVELY BUOYANT and will tend to rise towards
the surface.

Near-field instability behavior:
The diffuser flow will experience instabilities with full vertical mixing
in the near-field.
There may be benthic impact of high pollutant concentrations.

FAR-FIELD MIXING SUMMARY:
Plume becomes vertically fully mixed WITHIN NEAR-FIELD at 0 m
downstream, but RE-STRATIFIES LATER and is not mixed in the far-field.
Plume becomes laterally fully mixed at 449.39 m
downstream.

PLUME BANK CONTACT SUMMARY:
Plume in bounded section contacts nearest bank at 367.35 m downstream.
Plume contacts second bank at 449.39 m downstream.
********** TOXIC DILUTION ZONE SUMMARY **********
Recall: The TDZ corresponds to the three (3) criteria issued in the USEPA
Technical Support Document (TSD) for Water Quality-based Toxics Control,
1991 (EPA/505/2-90-001).
Criterion maximum concentration (CMC) = 1 TUa
Corresponding dilution = 5
The CMC was encountered at the following plume position:
Plume location: x = 0.60 m
(centerline coordinates) y = -0.60 m
z = 0.68 m
Plume dimension: half-width (bh) = 11.60 m
thickness (bv) = 0.42 m

Computed distance from port opening to CMC location = 0.85 m.
CRITERION 1: This location is within 50 times the discharge length scale of
Lq = 0.41 m.
+++++ The discharge length scale TEST for the TDZ has been SATISFIED. ++++++

Computed horizontal distance from port opening to CMC location = 0.85 m.
CRITERION 2: This location is within 5 times the ambient water depth of
HD = 6.10 m.
++++++++++ The ambient depth TEST for the TDZ has been SATISFIED. ++++++++++

Computed distance from port opening to CMC location = 0.85 m.
CRITERION 3: This location is within one tenth the distance of the extent
of the Regulatory Mixing Zone of 20.37 m in any
spatial direction from the port opening.
+++++ The Regulatory Mixing Zone TEST for the TDZ has been SATISFIED. ++++++

The diffuser discharge velocity is equal to 2.76 m/s.
This is below the value of 3.0 m/s recommended in the TSD.

*** All three CMC criteria for the TDZ are SATISFIED for this discharge. ***
********** REGULATORY MIXING ZONE SUMMARY **********
The plume conditions at the boundary of the specified RMZ are as follows:
Pollutant concentration c = 0.288188 TUa
Corresponding dilution s = 17.3
Plume location: x = 17.62 m

(centerline coordinates) y = -8.62 m
z = 6.10 m
Plume dimensions: half-width (bh) = 24.46 m
thickness (bv) = 4.94 m
Cumulative travel time: 91.9455 sec.

Note:
Plume concentration c and dilution s values are reported based on prediction file values - assuming linear interpolation between predicted points just before and just after the RMZ boundary has been detected.

Please ensure a small step size is used in the prediction file to account for this linear interpolation. Step size can be controlled by increasing (reduces the prediction step size) or decreasing (increases the prediction step size) the - Output Steps per Module - in CORMIX input.

At this position, the plume is CONTACTING the LEFT bank.
Furthermore, the CCC for the toxic pollutant has indeed been met within the RMZ. In particular:
The CCC was encountered at the following plume position:
The CCC for the toxic pollutant was encountered at the following plume position:
CCC = 0.3 TUa
Corresponding dilution = 16.7
Plume location: x = 12.00 m
(centerline coordinates) y = -8.62 m
z = 6.10 m
Computed horizontal distance from port opening to CCC location = 15.76
Plume dimensions: half-width (bh) = 20.84 m
thickness (bv) = 5.58 m

Regulatory Mixing Zone Analysis:
The specified RMZ is less than the multiport diffuser length LD.
The user is advised to perform CORMIX1 (single port discharge) analysis for an individual port. This may give more realistic predictions at the RMZ.

********** FINAL DESIGN ADVICE AND COMMENTS **********
CORMIX2 uses the TWO-DIMENSIONAL SLOT DIFFUSER CONCEPT to represent the actual three-dimensional diffuser geometry. Thus, it approximates the details of the merging process of the individual jets from each port/nozzle.
In the present design, the spacing between adjacent ports/nozzles (or riser assemblies) is of the order of, or less than, the local water depth so that the slot diffuser approximation holds well.

Nevertheless, if this is a final design, the user is advised to use a final CORMIX1 (single port discharge) analysis, with discharge data for an individual diffuser jet/plume, in order to compare to the present near-field prediction.

REMINDER: The user must take note that HYDRODYNAMIC MODELING by any known technique is NOT AN EXACT SCIENCE.
Extensive comparison with field and laboratory data has shown that the CORMIX predictions on dilutions and concentrations (with associated plume geometries) are reliable for the majority of cases and are accurate to within about +-50% (standard deviation).
As a further safeguard, CORMIX will not give predictions whenever it judges the design configuration as highly complex and uncertain for prediction.

15.13. CORMIX Prediction File

```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222
                CORMIX MIXING ZONE EXPERT SYSTEM
          Subsystem CORMIX2: Multiport Diffuser Discharges
                   CORMIX Version 11.0GTD
               HYDRO2 Version 11.0.0.0 April 2018
------------------------------------------------------------------------------------------------
------------------------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:
 Design case:      KU Ghent Generating Station
 FILE NAME:        C:\...\Andrew.Parrish\Desktop\Cormix\KU Ghent\Ghent.prd
 Time stamp:       01/11/2019--08:38:32

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS   =   304.80  AS   =  1858.06  QA   =   300.16  ICHREG= 1
 HA   =     6.10  HD   =     6.10
 UA   =     0.162 F    =     0.017 USTAR =0.7488E-02
 UW   =     4.000 UWSTAR=0.4609E-02
 Uniform density environment
 STRCND=  U        RHOAM =  998.2051

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:    DITYPE= unidirectional_perpendicular
 BANK =  LEFT      DISTB =   134.11  YB1  =   121.92  YB2  =   146.30
 LD   =    24.38  NOPEN =   5      NRISER=   5      SPAC =     6.10   NPPERR =   1
 D0   =     0.457 A0   =     0.164 H0   =     0.61  SUB0 =     5.49
 D0INP =    0.457 CR0  =     1.000 B0   =0.2693E-01
 Nozzle/port arrangement:   unidirectional_without_fanning
 GAMMA =    90.00  THETA =     0.00  SIGMA =   315.00  BETA =    45.00
 U0   =     2.765 Q0   =     2.269 Q0A  =0.2269E+01
 RHO0 =  990.8954  DRHO0 =0.7310E+01  GP0  =0.7181E-01
 C0   =0.5000E+01  CUNITS=  TUa
 IPOLL =  1        KS   =0.0000E+00  KD   =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0   =0.9307E-01        SIGNJ0=      1.0
 m0 =U0^2*B0 =0.2059E+00   j0 =U0*GP0*B0 =0.5347E-02   (based on slot width B0)
 m0 =U0*q0   =0.2573E+00   j0 =q0*GP0    =0.6684E-02   (based on volume flux q0)
 Associated 2-d length scales (meters)
 lQ=B =     0.034 lM   =     6.72  lm   =     9.86
 lmp  =  99999.00  lbp  =  99999.00  la   =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0   =0.2269E+01  M0   =0.5020E+01  J0   =0.1304E+00
 Associated 3-d length scales (meters)
 LQ   =     0.41  LM   =     9.29  Lm   =    15.51  Lb   =    38.66
                          Lmp  =  99999.00  Lbp  =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0  =    62.87  FRD0 =    15.26  R    =    17.11  PL   =   12.60
 (slot)          (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR RISER GROUPS:
 Properties of riser group with  1 ports/nozzles each:
 U0   =     2.765 D0   =     0.457 A0   =     0.164 THETA =     0.00
 FR0  =    62.87  FRD0 =    15.26  R    =    17.11
 (slot)          (riser group)
```

```
FLOW CLASSIFICATION
 22222222222222222222222222222222222222222
 2  Flow class (CORMIX2)     =   MU2   2
 2  Applicable layer depth HS =    6.10  2
 2  Limiting Dilution S =QA/Q0=   133.26  2
 22222222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0   =0.5000E+01  CUNITS=  TUa
 NTOX  =  1       CMC   =0.1000E+01  CCC   =  CSTD
 NSTD  =  1       CSTD  =0.3000E+00
 REGMZ =  1
 REGSPC=  1       XREG  =    17.62  WREG  =     0.00  AREG  =     0.00
 XINT  =  10000.00  XMAX  =  10000.00

X-Y-Z COORDINATE SYSTEM:
   ORIGIN is located at the bottom and the diffuser mid-point:
     134.11 m  from the LEFT  bank/shore.
   X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP = 100 display intervals per module
-------------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
BEGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

 Profile definitions:
  BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
  BH = top-hat half-width, in horizontal plane normal to trajectory
  S  = hydrodynamic centerline dilution
  C  = centerline concentration (includes reaction effects, if any)
  Uc = Local centerline excess velocity (above ambient)
  TT = Cumulative travel time

    X      Y      Z      S      C      BV      BH      Uc      TT
   0.00    0.00   0.61    1.0 0.500E+01   0.02    12.19    2.651   .00000E+00

END OF MOD201: DIFFUSER DISCHARGE MODULE
-------------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
BEGIN MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

 In this laterally contracting zone the diffuser plume becomes VERTICALLY FULLY
  MIXED over the entire layer depth (HS =    6.10m).
  Full mixing is achieved after a plume distance of about five
  layer depths from the diffuser.

 Profile definitions:
  BV = layer depth (vertically mixed)
  BH = top-hat half-width, in horizontal plane normal to trajectory
  S  = hydrodynamic average (bulk) dilution
  C  = average (bulk) concentration (includes reaction effects, if any)
  TT = Cumulative travel time

    X          Y      Z          S      C          BV      BH       0  TT
   0.00    -0.00   0.61    1.0 0.500E+01   0.02    12.19 .00000E+00
   0.09    -0.09   0.62    2.5 0.199E+01   0.06    12.10 .96789E-01
   0.17    -0.17   0.63    3.1 0.159E+01   0.12    12.01 .23441E+00
   0.26    -0.26   0.64    3.6 0.138E+01   0.18    11.92 .39609E+00
   0.34    -0.34   0.65    4.0 0.124E+01   0.24    11.84 .57601E+00
```

0.43	-0.43	0.66	4.4	0.114E+01	0.30	11.76	.77088E+00
0.52	-0.52	0.67	4.7	0.106E+01	0.37	11.68	.97851E+00

** CMC HAS BEEN FOUND **
The pollutant concentration in the plume falls below CMC value of 0.100E+01
in the current prediction interval.
This is the extent of the TOXIC DILUTION ZONE.

0.60	-0.60	0.68	5.0	0.997E+00	0.43	11.60	.11973E+01
0.69	-0.69	0.69	5.3	0.945E+00	0.49	11.52	.14262E+01
0.78	-0.78	0.70	5.6	0.900E+00	0.55	11.45	.16640E+01
0.86	-0.86	0.71	5.8	0.862E+00	0.61	11.38	.19102E+01
0.95	-0.95	0.72	6.0	0.829E+00	0.67	11.31	.21639E+01
1.03	-1.03	0.73	6.3	0.799E+00	0.73	11.24	.24248E+01
1.12	-1.12	0.74	6.5	0.773E+00	0.79	11.18	.26923E+01
1.21	-1.21	0.75	6.7	0.749E+00	0.85	11.11	.29659E+01
1.29	-1.29	0.76	6.9	0.727E+00	0.91	11.05	.32454E+01
1.38	-1.38	0.77	7.1	0.707E+00	0.98	10.99	.35304E+01
1.47	-1.47	0.78	7.3	0.689E+00	1.04	10.94	.38207E+01
1.55	-1.55	0.79	7.4	0.672E+00	1.10	10.88	.41159E+01
1.64	-1.64	0.79	7.6	0.657E+00	1.16	10.82	.44159E+01
1.72	-1.72	0.80	7.8	0.642E+00	1.22	10.77	.47204E+01
1.81	-1.81	0.81	8.0	0.629E+00	1.28	10.72	.50293E+01
1.90	-1.90	0.82	8.1	0.616E+00	1.34	10.67	.53423E+01
1.98	-1.98	0.83	8.3	0.604E+00	1.40	10.62	.56593E+01
2.07	-2.07	0.84	8.4	0.593E+00	1.46	10.57	.59801E+01
2.16	-2.16	0.85	8.6	0.582E+00	1.52	10.52	.63047E+01
2.24	-2.24	0.86	8.7	0.572E+00	1.58	10.48	.66328E+01
2.33	-2.33	0.87	8.9	0.563E+00	1.65	10.43	.69644E+01
2.41	-2.41	0.88	9.0	0.554E+00	1.71	10.39	.72994E+01
2.50	-2.50	0.89	9.2	0.545E+00	1.77	10.34	.76375E+01
2.59	-2.59	0.90	9.3	0.537E+00	1.83	10.30	.79788E+01
2.67	-2.67	0.91	9.5	0.529E+00	1.89	10.26	.83232E+01
2.76	-2.76	0.92	9.6	0.522E+00	1.95	10.22	.86705E+01
2.84	-2.84	0.93	9.7	0.514E+00	2.01	10.18	.90206E+01
2.93	-2.93	0.94	9.8	0.508E+00	2.07	10.14	.93735E+01
3.02	-3.02	0.95	10.0	0.501E+00	2.13	10.11	.97292E+01
3.10	-3.10	0.96	10.1	0.495E+00	2.19	10.07	.10087E+02
3.19	-3.19	0.97	10.2	0.489E+00	2.26	10.03	.10448E+02
3.28	-3.28	0.98	10.4	0.483E+00	2.32	10.00	.10812E+02
3.36	-3.36	0.99	10.5	0.477E+00	2.38	9.97	.11177E+02
3.45	-3.45	1.00	10.6	0.472E+00	2.44	9.93	.11546E+02
3.53	-3.53	1.01	10.7	0.466E+00	2.50	9.90	.11916E+02
3.62	-3.62	1.02	10.8	0.461E+00	2.56	9.87	.12289E+02
3.71	-3.71	1.03	11.0	0.457E+00	2.62	9.84	.12664E+02
3.79	-3.79	1.04	11.1	0.452E+00	2.68	9.81	.13041E+02
3.88	-3.88	1.05	11.2	0.447E+00	2.74	9.78	.13420E+02
3.97	-3.97	1.06	11.3	0.443E+00	2.80	9.75	.13802E+02
4.05	-4.05	1.07	11.4	0.438E+00	2.87	9.72	.14185E+02
4.14	-4.14	1.08	11.5	0.434E+00	2.93	9.69	.14571E+02
4.22	-4.22	1.09	11.6	0.430E+00	2.99	9.66	.14958E+02
4.31	-4.31	1.10	11.7	0.426E+00	3.05	9.64	.15347E+02
4.40	-4.40	1.11	11.8	0.422E+00	3.11	9.61	.15739E+02
4.48	-4.48	1.12	11.9	0.419E+00	3.17	9.59	.16132E+02
4.57	-4.57	1.13	12.0	0.415E+00	3.23	9.56	.16526E+02
4.66	-4.66	1.14	12.2	0.411E+00	3.29	9.54	.16923E+02
4.74	-4.74	1.15	12.3	0.408E+00	3.35	9.52	.17321E+02
4.83	-4.83	1.16	12.4	0.405E+00	3.41	9.49	.17721E+02
4.91	-4.91	1.17	12.5	0.401E+00	3.47	9.47	.18123E+02
5.00	-5.00	1.18	12.6	0.398E+00	3.54	9.45	.18527E+02
5.09	-5.09	1.19	12.7	0.395E+00	3.60	9.43	.18932E+02
5.17	-5.17	1.19	12.8	0.392E+00	3.66	9.41	.19338E+02
5.26	-5.26	1.20	12.9	0.389E+00	3.72	9.39	.19746E+02

5.35	-5.35	1.21	13.0	0.386E+00	3.78	9.37	.20156E+02
5.43	-5.43	1.22	13.0	0.383E+00	3.84	9.35	.20567E+02
5.52	-5.52	1.23	13.1	0.380E+00	3.90	9.34	.20980E+02
5.60	-5.60	1.24	13.2	0.378E+00	3.96	9.32	.21394E+02
5.69	-5.69	1.25	13.3	0.375E+00	4.02	9.30	.21810E+02
5.78	-5.78	1.26	13.4	0.372E+00	4.08	9.29	.22227E+02
5.86	-5.86	1.27	13.5	0.370E+00	4.15	9.27	.22645E+02
5.95	-5.95	1.28	13.6	0.367E+00	4.21	9.26	.23065E+02
6.03	-6.03	1.29	13.7	0.365E+00	4.27	9.24	.23486E+02
6.12	-6.12	1.30	13.8	0.363E+00	4.33	9.23	.23909E+02
6.21	-6.21	1.31	13.9	0.360E+00	4.39	9.22	.24333E+02
6.29	-6.29	1.32	14.0	0.358E+00	4.45	9.21	.24758E+02
6.38	-6.38	1.33	14.1	0.356E+00	4.51	9.20	.25185E+02
6.47	-6.47	1.34	14.1	0.354E+00	4.57	9.19	.25612E+02
6.55	-6.55	1.35	14.2	0.351E+00	4.63	9.18	.26041E+02
6.64	-6.64	1.36	14.3	0.349E+00	4.69	9.17	.26472E+02
6.72	-6.72	1.37	14.4	0.347E+00	4.75	9.16	.26903E+02
6.81	-6.81	1.38	14.5	0.345E+00	4.82	9.15	.27336E+02
6.90	-6.90	1.39	14.6	0.343E+00	4.88	9.14	.27770E+02
6.98	-6.98	1.40	14.7	0.341E+00	4.94	9.13	.28205E+02
7.07	-7.07	1.41	14.7	0.339E+00	5.00	9.13	.28641E+02
7.16	-7.16	1.42	14.8	0.337E+00	5.06	9.12	.29078E+02
7.24	-7.24	1.43	14.9	0.335E+00	5.12	9.11	.29516E+02
7.33	-7.33	1.44	15.0	0.333E+00	5.18	9.11	.29956E+02
7.41	-7.41	1.45	15.1	0.332E+00	5.24	9.10	.30397E+02
7.50	-7.50	1.46	15.2	0.330E+00	5.30	9.10	.30838E+02
7.59	-7.59	1.47	15.2	0.328E+00	5.36	9.10	.31281E+02
7.67	-7.67	1.48	15.3	0.326E+00	5.43	9.09	.31725E+02
7.76	-7.76	1.49	15.4	0.325E+00	5.49	9.09	.32170E+02
7.85	-7.85	1.50	15.5	0.323E+00	5.55	9.08	.32616E+02
7.93	-7.93	1.51	15.6	0.321E+00	5.61	9.08	.33063E+02
8.02	-8.02	1.52	15.6	0.320E+00	5.67	9.08	.33511E+02
8.10	-8.10	1.53	15.7	0.318E+00	5.73	9.08	.33960E+02
8.19	-8.19	1.54	15.8	0.317E+00	5.79	9.07	.34410E+02
8.28	-8.28	1.55	15.9	0.315E+00	5.85	9.07	.34860E+02
8.36	-8.36	1.56	15.9	0.314E+00	5.91	9.07	.35312E+02
8.45	-8.45	1.57	16.0	0.312E+00	5.97	9.07	.35765E+02
8.53	-8.53	1.58	16.1	0.311E+00	6.04	9.07	.36219E+02
8.62	-8.62	1.58	16.2	0.309E+00	6.10	9.07	.36674E+02

Cumulative travel time = 36.6736 sec (0.01 hrs)
Plume centerline may exhibit slight discontinuities in transition
to subsequent far-field module.

END OF MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

BEGIN MOD251: DIFFUSER PLUME IN CO-FLOW

Phase 1: Vertically mixed, Phase 2: Re-stratified

Phase 2: The flow has RESTRATIFIED at the beginning of this zone.

This flow region is INSIGNIFICANT in spatial extent and will be by-passed.

END OF MOD251: DIFFUSER PLUME IN CO-FLOW

** End of NEAR-FIELD REGION (NFR) **

The initial plume WIDTH values in the next far-field module will be
CORRECTED by a factor 2.04 to conserve the mass flux in the far-field!

```
 The correction factor is quite large because of the small ambient velocity
   relative to the strong mixing characteristics of the discharge!
   This indicates localized RECIRCULATION REGIONS and INTERNAL HYDRAULIC JUMPS.
   Width predictions show discontinuities. Dilution values should be acceptable.
-------------------------------------------------------------------------------------------------
BEGIN MOD241: BUOYANT AMBIENT SPREADING

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)
   TT = Cumulative travel time

 Plume Stage 1 (not bank attached):
      X      Y      Z      S      C      BV      BH     ZU     ZL     TT
     8.62   -8.62   6.10   16.2 0.309E+00  6.10   18.50   6.10   0.00  .36674E+02
** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
 The pollutant concentration in the plume falls below water quality standard
   or CCC value of 0.300E+00 in the current prediction interval.
 This is the spatial extent of concentrations exceeding the water quality
   standard or CCC value.
    12.21   -8.62   6.10   16.7 0.299E+00  5.55   20.98   6.10   0.55  .58710E+02
    15.79   -8.62   6.10   17.1 0.292E+00  5.12   23.32   6.10   0.97  .80746E+02
 ** REGULATORY MIXING ZONE BOUNDARY **
 In this prediction interval the plume DOWNSTREAM distance meets or exceeds
 the regulatory value =    17.62 m.
 This is the extent of the REGULATORY MIXING ZONE.
    19.38   -8.62   6.10   17.5 0.285E+00  4.79   25.55   6.10   1.31  .10278E+03
    22.97   -8.62   6.10   17.9 0.279E+00  4.51   27.68   6.10   1.59  .12482E+03
    26.55   -8.62   6.10   18.2 0.274E+00  4.27   29.73   6.10   1.82  .14685E+03
Simulation limit based on maximum specified distance =  10000.00 m.
   This is the REGION OF INTEREST limitation.

END OF MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT
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CORMIX2: Multiport Diffuser Discharges       End of Prediction File
22222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222
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