KPDES

KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

FACT SHEET

KPDES No.: KY0000388
AI No.: 339
Catlettsburg Refining, LLC
11631 US Route 23
Catlettsburg, Boyd County, Kentucky

Date: October 17, 2022

Public Notice Information

Public Notice Start Date: August 12, 2022

Comment Due Date: September 11, 2022

General information concerning the public notice process may be obtained on the Division of Water's Public Notice Webpage at the following address:
https://eec.ky.gov/Environmental-Protection/Water/Pages/Water-Public-Notices-and-Hearings.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

Catlettsburg Refining, LLC
11631 US Route 23
PO Box 1492
Catlettsburg, Kentucky 41129

1.2. Facility Location

Catlettsburg Refining, LLC
11631 US Route 23
Catlettsburg, Boyd County, Kentucky

1.3. Description of Applicant's Operation

The facility produces petroleum and petrochemical products from crude oil refining under 40 CFR419. Catlettsburg Refining, LLC Complex is classified in the Integrated Subcategory.

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	5.23	Process Wastewater Non-Process Wastewater Domestic Sanitary Stormwater Runoff	Ammonia Stripping Distillation Flocculation Flotation Gas Phase separation Grinding Sedimentation Coagulation Disinfection Neutralization Activated Sludge Discharge to Surface Water Aerobic Digestion Belt filtration Centrifugation Gravity Thickening Landfill
002	No Discharge	Non-Process Wastewater Stormwater Runoff	Sedimentation Discharge to Surface Water
004	0.13	Non-Process Wastewater Stormwater Runoff	Discharge to Surface Water
005	0.27	Non-Process Wastewater Stormwater Runoff	Discharge to Surface Water
006	3.86	Non-Process Wastewater Non-Contact Cooling Water Stormwater Runoff	Sedimentation Discharge to Surface Water
007	0.19	Non-Process Wastewater Stormwater Runoff	Discharge to Surface Water
015	0.92	Non-Process Wastewater Stormwater Runoff	Sedimentation Discharge to Surface Water

TABLE 1.			
Outfall No.	**Average Flow**	**Wastewater Types Collected**	**Treatment Type**
021	0.006	Non-Process Wastewater Stormwater Runoff	Discharge to Surface Water
022	0.10	Non-Process Wastewater Stormwater Runoff	Discharge to Surface Water
023	0.02	Non-Process Wastewater Stormwater Runoff	Discharge to Surface Water
025	No Discharge	Non-Process Wastewater Stormwater Runoff	Sedimentation Discharge to Surface Water
027	5.67	Stormwater Runoff	Discharge to Surface Water
028	11.2	Raw Water Intake	None

The design flow of the facility is 11.520 MGD. The average annual flow is 5.23 MGD.

1.5. Permitting Action

This is a reissuance of a major KPDES permit for an existing petroleum refining facility [SIC Code 2911].

1.6. Significant Changes from Prior Permit

The significant changes for this permit include:

Outfall 028 was added related to 316(b)

The majority of the Effluent Limitations and/or Monitoring Requirements were updated at each outfall based on new reported values.

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 for non-support of uses in Kentucky's most recently approved *Integrated Report to Congress on the Condition of Water Resources in Kentucky*. The 305 (b) List identifies stream segments that do not support their use designation. However, Outstanding State Resource Waters, Exceptional Waters, and waters found only as mercury or methylmercury impaired for fish consumption shall not be categorized as impaired *for antidegradation purposes*[401 KAR 10:030].

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

TABLE 2.

Receiving Water Name	Use Designation	Antidegradation Category	7Q10 Low Flow (cfs)	Harmonic Mean Flow (cfs)
Big Sandy River[1]	WAH PCR SCR DWS	IW	220	925
Chadwick Creek	WAH PCR SCR DWS	HQ	0.0	0.40

[1]This segment of Big Sandy River (mile point 0.0 to 27.1) is listed for non-support of uses in the 2018/2020 Integrated Report to Congress. The non-supported uses are Warm Water Aquatic Habitat (Non-Support). The pollutants of concern are Sedimentation/Siltation. The suspected sources are Coal Mining and Habitat Modification – other than hydromodification. Facility in compliance with KPDES permit will not contribute to this 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	Ashland Municipal Water Works	38.453432°	82.607551°	5	10,000	38,400

SECTION 3

OUTFALL 001

3. OUTFALL 001

3.1. Outfall Description

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

TABLE 4.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.38598°	82.59741°	Big Sandy River	Process & non-process wastewater form refinery and petrochemical production treated wastewater from NESHAP-controlled sewer system, boiler blowdown, water supply filter and process and non-process area stormwater; hydrostatic test water, offsite wastewater including petroleum transportation. Storage and marketing facilities wastewater and process wastewater from AOC Maleic Anhydride Plant; on-site and off-site spill response and remediation actions wastewater.

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**
Effluent Flow	MGD	5.23	13.4	N/A	N/A	N/A	N/A
BOD_5[1]	mg/l	306	1253	N/A	5.91	175	N/A
Total Suspended Solids	mg/l	914	17900	N/A	21.5	250	N/A
Chemical Oxygen Demand	mg/l	1930	36740	N/A	N/A	N/A	N/A
Oil & Grease	mg/l	219	3120	N/A	5.06	80.3	N/A
Phenolic Compounds	mg/l	0.90	66.6	N/A	0.02	7.00	N/A
Ammonia (as N)	mg/l	12.3	559	N/A	0.27	10.8	N/A
Sulfide	mg/l	3.82	61.6	N/A	0.09	0.55	N/A
Total Recoverable Chromium	mg/l	0.16	1.90	N/A	0.003	0.025	N/A
Hexavalent Chromium	mg/l	0.33	4.17	N/A	0.008	0.104	N/A
pH	SU	N/A	N/A	6.90	N/A	N/A	8.40

TABLE 5.							
Reported Parameters	Units	EFFLUENT					
		Loadings (lbs./day)		Concentrations			
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum
Temperature	^{o}F	N/A	N/A	N/A	83.6	95.0	N/A
Chronic WET	TU_c	N/A	N/A	N/A	N/A	N/A	47.62
[1]BOD_5 – Biochemical Oxygen Demand (5-day)							

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2017 to 03/31/2022.

3.3. Effluent Limitations and Monitoring Requirements

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	1/Week	Instantaneous
Temperature	^{o}F	N/A	N/A	N/A	Report	Report	N/A	1/Week	Grab
BOD_5[1]	mg/l	6,847	12,890	N/A	Report	Report	N/A	1/Week	24-Hour Composite
Total Suspended Solids	mg/l	5,652	8,923	N/A	Report	Report	N/A	1/Week	24-Hour Composite
Chemical Oxygen Demand	mg/l	46,753	90,879	N/A	Report	Report	N/A	1/Week	24-Hour Composite
Oil & Grease	mg/l	2,136	4,008	N/A	Report	Report	N/A	1/Week	Grab
Phenolic Compounds	mg/l	20.6	83.5	N/A	Report	Report	N/A	1/Week	Grab
Ammonia (as N)	mg/l	2,496	5,451	N/A	Report	Report	N/A	1/Week	Grab
Sulfide	mg/l	36.8	81.4	N/A	Report	Report	N/A	1/Week	Grab
Total Recoverable Chromium	mg/l	24.1	69.3	N/A	Report	Report	N/A	1/Week	Grab
Hexavalent Chromium	mg/l	2.02	4.54	N/A	Report	Report	N/A	1/Week	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Week	Grab
Chloride	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	Report	Report	N/A	1/Quarter	Grab

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**		
Acute WET[2]	TU_A	N/A	N/A	N/A	N/A	N/A	1.00	1/Quarter	([3])
[1]BOD_5 – Biochemical Oxygen Demand (5-day)									
[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: https://eec.ky.gov/Environmental-Protection/Forms%20Library/General%20Procedures%20for%20Limitations%20Development.pdf

3.4.1. Federally-Listed Threatened or Endangered Aquatic Species

There are no know federally-listed threatened or endangered aquatic species.

3.4.2. Technology-Based Effluent Limitations

3.4.2.1. General Requirement for Technology-Based 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 [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)].

3.4.2.2. 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 419 shall be applied to this outfall. The following is a list of those requirements:

419.52 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT)

(a) Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

TABLE 7.		
Pollutant or pollutant property	**BPT Effluent Limitations**	
	Maximum for any 1 day	**Average of daily values for 30 consecutive days shall not exceed**
	English units (pounds per 1,000 bbl of feedstock)	
BOD5	19.2	10.2
TSS	13.2	8.4
COD[1]	136.0	70.0
Oil and grease	6.0	3.2
Phenolic compounds	0.14	0.068
Ammonia as N	8.3	3.8
Sulfide	0.124	0.056
Total chromium	0.29	0.17
Hexavalent chromium	0.025	0.011
pH	([2])	([2])

[1]In any case in which the applicant can demonstrate that the chloride ion concentration in the effluent exceeds 1,000 mg/l (1,000 ppm), the Regional Administrator may substitute TOC as a parameter in lieu of COD Effluent limitations for TOC shall be based on effluent data from the plant correlation TOC to BOD5.

If in the judgment of the Regional Administrator, adequate correlation data are not available, the effluent limitations for TOC shall be established at a ratio of 2.2 to 1 to the applicable effluent limitations on BOD5,

[2]Within the range 6.0 to 9.0.

(b) The limits set forth in paragraph (a) of this section are to be multiplied by the following factors to calculate the maximum for any one day and maximum average of daily values for thirty consecutive days.

(1) Size factor

TABLE 8.	
1,000 bbl of feedstock per stream day	**Size factor**
Less than 124.9	0.73
125.0 to 149.9	0.76
150.0 to 174.9	0.83
175.0 to 199.9	0.91
200.0 to 224.9	0.99
225 or greater	1.04

(2) Process factor

TABLE 9.	
Process configuration	**Process factor**
Less than 6.49	0.75
6.5 to 7.49	0.82
7.5 to 7.99	0.92
8.0 to 8.49	1.00
8.5 to 8.99	1.10
9.0 to 9.49	1.20
9.5 to 9.99	1.30
10.0 to 10.49	1.42
10.5 to 10.99	1.54
11.0 to 11.49	1.68
11.5 to 11.99	1.83
12.0 to 12.49	1.99
12.5 to 12.99	2.17
13.0 or greater	2.26

(3) See the comprehensive example in subpart D, 40 CFR 419.42(b)(3)

(e) ***Effluent limitations for contaminated runoff.*** The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best practicable control technology currently available by a point source subject to this subpart.

(2) If contaminated runoff is commingled or treated with process wastewater, or if wastewater consisting solely of contaminated runoff which exceeds 15 mg/l oil and grease or 110 mg/l TOC is not commingled or treated with any other type of wastewater, the quantity of pollutants discharged shall not exceed the quantity determined by multiplying the flow of contaminated runoff as determined by the permit writer times the concentrations listed in the following table:

TABLE 10.		
Pollutant or pollutant property	**BPT Effluent Limitations for contaminated runoff**	
	Maximum for any 1 day	**Average of daily values for 30 consecutive days shall not exceed**
	English units (pounds per 1,000 gallons of flow)	
BOD5	0.40	0.22

TSS	0.28	0.18
COD[1]	3.0	1.5
Oil and grease	0.13	0.067
Phenolic compounds (4AAP)	0.0029	0.0014
Total chromium	0.0060	0.0035
Hexavalent chromium	0.00052	0.00023
pH	([2])	([2])

[1]In any case in which the applicant can demonstrate that the chloride ion concentration in the effluent exceeds 1,000 mg/l (1,000 ppm), the permitting authority may substitute TOC as a parameter in lieu of COD. A TOC effluent limitation shall be based on effluent data from the particular refinery which correlates TOC to BOD_5. If in the judgment of the permitting authority, adequate correlation data are not available, the effluent limitations for TOC shall be established at a ratio of 2.2 to 1 to the applicable effluent limitations for BOD_5.

[2]Within the range 6.0 to 9.0.

419.53 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT)

(a) Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT):

TABLE 11.		
Pollutant or pollutant property	**BAT Effluent Limitations**	
	Maximum for any 1 day	**Average of daily values for 30 consecutive days shall not exceed**
	English units (pounds per 1,000 bbl of feedstock)	
COD[1]	136.0	70.0
Oil and grease	6.0	3.2
Ammonia as N	8.3	3.8
Sulfide	0.124	0.056

[1]In any case in which the applicant can demonstrate that the chloride ion concentration in the effluent exceeds 1,000 mg/l (1,000 ppm), the Regional Administrator may substitute TOC as a parameter in lieu of COD Effluent limitations for TOC shall be based on effluent data from the plant correlation TOC to BOD5.

If in the judgment of the Regional Administrator, adequate correlation data are not available, the effluent limitations for TOC shall be established at a ratio of 2.2 to 1 to the applicable effluent limitations on BOD5,

(b) The limits set forth in paragraph (a) of this section are to be multiplied by the following factors to calculate the maximum for any one day and maximum average of daily values for thirty consecutive days.

(1) Size factor

TABLE 12.	
1,000 bbl of feedstock per stream day	**Size factor**
Less than 124.9	0.73
125.0 to 149.9	0.76
150.0 to 174.9	0.83
175.0 to 199.9	0.91

200.0 to 224.9	0.99
225 or greater	1.04

(2) Process factor

TABLE 13.	
Process configuration	**Process factor**
Less than 6.49	0.75
6.5 to 7.49	0.82
7.5 to 7.99	0.92
8.0 to 8.49	1.00
8.5 to 8.99	1.10
9.0 to 9.49	1.20
9.5 to 9.99	1.30
10.0 to 10.49	1.42
10.5 to 10.99	1.54
11.0 to 11.49	1.68
11.5 to 11.99	1.83
12.0 to 12.49	1.99
12.5 to 12.99	2.17
13.0 or greater	2.26

(3) See the comprehensive example in subpart D, 40 CFR 419.42(b)(3)

(c)(1) In addition to the provisions contained above pertaining to COD, ammonia and sulfide, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT):

(i) For each of the regulated pollutant parameters listed below, the effluent limitation for a given refinery is the sum of the products of each effluent limitation factor times the applicable process feedstock rate, calculated as provided in 40 CFR 122.45(b). Applicable production processes are presented in appendix A, by process type. The process identification numbers presented in this appendix A are for the convenience of the reader. They can be cross-referenced in the *Development Document for Effluent Limitations Guidelines, New Source Performance Standards, and Pretreatment Standards for the Petroleum Refining Point Source Category* (EPA 440/1-82/014), Table III-7, pp. 49-54.

TABLE 14.		
Pollutant or pollutant property and process type	**BAT effluent limitation factor**	
	Maximum for any 1 day	**Average of daily values for 30 consecutive days shall not exceed**
	English units (pounds per 1,000 bbl of feedstock)	
Phenolic compounds (4AAP):		
Crude	0.013	0.003
Cracking and coking	0.147	0.036
Asphalt	0.079	0.019
Lube	0.369	0.90
Reforming and alkylation	0.132	0.032
Total chromium:		
Crude	0.011	0.004
Cracking and coking	0.119	0.041
Asphalt	0.064	0.022

Lube	0.299	0.104
Reforming and alkylation	0.107	0.037
Hexavalent chromium:		
Crude	0.0007	0.0003
Cracking and coking	0.0076	0.0034
Asphalt	0.0041	0.0019
Lube	0.0192	0.0087
Reforming and alkylation	0.0069	0.0031

(c)(2) See the comprehensive example in subpart D, 40 CFR 419.43(c)(2).

(f) ***Effluent limitations for contaminated runoff.*** The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(2) If contaminated runoff is commingled or treated with process wastewater, or if wastewater consisting solely of contaminated runoff which exceeds 110 mg/l TOC is not commingled or treated with any other type of wastewater, the quantity of pollutants discharged shall not exceed the quantity determined by multiplying the flow of contaminated runoff as determined by the permit writer times the concentrations listed in the following table:

TABLE 15.		
Pollutant or pollutant property	**BAT Effluent Limitations for contaminated runoff**	
	Maximum for any 1 day	**Average of daily values for 30 consecutive days shall not exceed**
	English units (pounds per 1,000 gallons of flow)	
Phenolic compounds (4AAP)	0.0029	0.0014
Total chromium	0.0050	0.0018
Hexavalent chromium	0.00052	0.00023
COD[1]	3.0	1.5

[1]In any case in which the applicant can demonstrate that the chloride ion concentration in the effluent exceeds 1,000 mg/l (1,000 ppm), the permitting authority may substitute TOC as a parameter in lieu of COD. A TOC effluent limitation shall be based on effluent data from the particular refinery which correlates TOC to BOD_5. If in the judgement of the permitting authority, adequate correlation data are not available, the effluent limitations for TOC shall be established at a ratio of 2.2 to 1 to the applicable effluent limitations for BOD_5[2]Within the range 6.0 to 9.0.

419.54 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT)

(a) Any existing point subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT):

TABLE 16.		
Pollutant or pollutant property	**BCT Effluent Limitations**	
	Maximum for any 1 day	**Average of daily values for 30 consecutive days shall not exceed**
	English units (pounds per 1,000 bbl of feedstock)	
BOD5	19.2	10.2
TSS	13.2	8.4

Oil and grease	6.0	3.2
pH	([1])	([1])

[1]Within the range 6.0 to 9.0.

(b) The limits set forth in paragraph (a) of this section are to be multiplied by the following factors to calculate the maximum for any one day and maximum average of daily values for thirty consecutive days.

(1) Size factor

TABLE 17.	
1,000 bbl of feedstock per stream day	**Size factor**
Less than 124.9	0.73
125.0 to 149.9	0.76
150.0 to 174.9	0.83
175.0 to 199.9	0.91
200.0 to 224.9	0.99
225 or greater	1.04

(2) Process factor

TABLE 18.	
Process configuration	**Process factor**
Less than 6.49	0.75
6.5 to 7.49	0.82
7.5 to 7.99	0.92
8.0 to 8.49	1.00
8.5 to 8.99	1.10
9.0 to 9.49	1.20
9.5 to 9.99	1.30
10.0 to 10.49	1.42
10.5 to 10.99	1.54
11.0 to 11.49	1.68
11.5 to 11.99	1.83
12.0 to 12.49	1.99
12.5 to 12.99	2.17
13.0 or greater	2.26

(3) See the comprehensive example in subpart D, 40 CFR 419.42(b)(3)

(e) ***Effluent limitations for contaminated runoff.*** The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best practicable control technology currently available by a point source subject to this subpart.

(2) If contaminated runoff is commingled or treated with process wastewater, or if wastewater consisting solely of contaminated runoff which exceeds 15 mg/l oil and grease or 110 mg/l TOC is not commingled or treated with any other type of wastewater, the quantity of pollutants discharged shall not exceed the quantity determined by multiplying the flow of contaminated runoff as determined by the permit writer times the concentrations listed in the following table:

TABLE 19.		
Pollutant or pollutant property	**BCT Effluent Limitations for contaminated runoff**	
	Maximum for any 1 day	**Average of daily values for 30 consecutive days shall not exceed**
	English units (pounds per 1,000 gallons of flow)	
BOD5	0.40	0.22
TSS	0.28	0.18
Oil and grease	0.13	0.067
pH	([1])	([1])

[1]Within the range of 6.0 to 9.0.

40 CFR 414

In addition to refinery process wastewater and contaminated runoff commingled and treated with process wastewater this outfall discharges process wastewater from AOC Maleic Anhydride Plant. The wastewaters form the production of maleic anhydride are subject to the BPT, BAT, and BCT requirements promulgated in Subpart G – Bulk Organic Chemicals of the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) Effluent Limitations Guideline (40 CFR 414)

414.71 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT)

Except as provided in 40 CFR 125.30 through 125.32, and in 40 CFR 414.11(i) for point sources with production in two or more subcategories, any existing point source subject to this subpart must achieve discharges not exceeding the quantity (mass) determined by multiplying the process wastewater flow subject to this subpart times the concentration listed in the following table.

TABLE 20.		
Effluent characteristics	**BPT Effluent Limitations[1]**	
	Maximum for any one day	**Maximum for monthly aveage**
BOD5	92	34
TSS	159	49
pH	([2])	([2])

[1]All units except pH are milligrams per liter

[2]Within the range of 6.0 to 9.0 at all times

414.73 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT)

(a) The Agency has determined that for existing point sources whose total OCPSF production defined by § 414.11 is less than or equal to five (5) million pounds of OCPSF products per year, the BPT level of treatment is the best available technology economically achievable. Accordingly, the Agency is not promulgating more stringent BAT limitations for these point sources.

3.4.2.3. Best Professional Judgement

Non-process Wastewater

The hydrostatic test water, off-site petroleum transportation, storage and marketing facilities wastewaters, on-site/off-site response and remediation actions wastewaters are not subject to any promulgated ELGs.

However, these wastewaters are contribution sources to this outfall and a pollutant load must be assigned for their contribution. It is DOW's opinion that the type and concentration of the pollutants found in these wastewaters are sufficiently similar to refinery contaminated runoff to allow the use of the BPT, BAT and BCT requirements of Subpart E – Integrated Subcategory of the Petroleum Refining ELG in assigning an appropriate allotment. A summary of these requirements is presented in the following table.

TABLE 21.		
Pollutant or pollutant property	**BPJ Effluent Limitations**	
	Maximum for any 1 day	**Average of daily values for 30 consecutive days shall not exceed**
	English units (pounds per 1,000 gallons of flow)	
BOD5	0.40	0.22
TSS	0.28	0.18
COD[1]	3.0	1.5
Oil and grease	0.13	0.067
Phenolic compounds (4AAP)	0.0029	0.0014
Total chromium	0.0050	0.0018
Hexavalent chromium	0.00052	0.00023
pH	([2])	([2])

Secondary Treatment Standards

Discharges of biochemically degradable wastes are subject to technology-based effluent limitations (TBELs) known as the Secondary Treatment Standards. Both state and federal regulations establish the requirements for secondary treatment. State regulations for secondary treatment only apply to non-POTWs [401 KAR 5:045]. While facilities state secondary treatment standards do not apply to facilities already subject to a federal ELG is DOW's best profession judgement to apply secondary treatment requirements to the facility's sanitary wastewater.

TABLE 22.		
Pollutant or pollutant property	**Secondary Treatment Requirements**	
	Maximum Weekly Average	**Maximum Monthly Average**
BOD5	45 mg/L	30 mg/L
TSS	45 mg/L	30 mg/L

3.4.3. 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. This table may also include pollutants for which DOW has found the existence of reasonable potential to be indeterminate or for which DOW needs additional study.

TABLE 23.	
Pollutant or Pollutant Characteristic	**Basis**
Whole Effluent Toxicity	The facility is rated as a "major discharger". The facility's discharge is a complex wastewater.
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.

Chloride Total Recoverable Selenium	A Mixing Zone has been granted for these parameters. Because a Mixing Zone has been granted there is no reasonable potential for these parameters 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.

3.4.4. 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 24.

Pollutant or Pollutant Characteristic	Mixing Zone Factor (MZF)	Linear Distance (ft)	Surface Area (sq. ft)	Volume (cfs)
Whole Effluent Toxicity	0.331	154	37253	72.82
Temperature	0.155	72	8143	34.1
Chloride	0.037	17	454	8.14
Hexavalent Chromium	0.333	155	37738	73.26
Total Recoverable Selenium	0.333	155	37738	73.26

3.4.5. 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 25.

Pollutant or Pollutant Characteristic	Dilutions	Linear Distance to ZID Edge (ft)
Phenol	7.1	7.38
Hexavalent Chromium	7.1	7.38

3.5. Limitation Calculations

3.5.1. Calculations for Technology-Based Effluent Limitations

The TBELS for Ammonia (as N), BOD_5, COD, hexavalent Chromium, Oil & Grease, Phenolic Compounds, Sulfide, Total Recoverable Chromium, and Total Suspended Solids are an aggregate value determined by summing the contributions from each contributing wastestream. The following equations are used to determine the monthly average and daily maximum effluent limits for these parameters.

Petroleum Refining – Integrated Subcategory – BPT – Process Wastewater

Monthly average Limit = (Monthly Average Factor) x (Size Factor) x (Process Factor) x (Feedstock)

Daily Maximum Limit = (Daily Maximum Factor) x (Size Factor) x (Process Factor) x (Feedstock)

The monthly average , daily maximum, and the size factors are determined from tables in the petroleum refining effluent limitations guideline (ELG). The process factor also comes from a table in the ELG that requires first determining the process configuration for the refinery. The following equations are used to determine the overall process configuration for the refinery:

$$Process\ Capacity\ Relative\ to\ Throughput\ = \left(\frac{Process\ Capacity}{Refinery\ Throughput}\right)$$

$$Processing\ configuration = Capacity\ relative\ to\ throughtput\ \times Weighting\ Factor$$

Each of the processes is categorized as Crude, Cracking and Coking, Lube or Asphalt with weighting factors of 1, 6, 13, and 12 respectively. The following table summarizes these calculations and the determination of the overall process configuration.

TABLE 26.					
Refinery Throughput – 291.0 thousand bbls/day		**Capacity (1000 bbls/day)**	**Capacity Relative to Throughput**	**Weighting Factor**	**Process Configuration**
Category	**Process**				
Crude	Atmospheric Distillation	328.6	1.129	1	1.13
	Vacuum Distillation	139.3	0.479	1	0.48
	Desalting	278.1	0.956	1	0.96
Cracking & Coking	Fluid Catalytic Cracking	109.3	0.376	6	2.26
	Hydrotreating	306.3	1.053	6	6.32
Lube	Solvent De-asphalting	15.0	0.052	13	0.67
Asphalt	Asphalt Production	28.0	0.096	12	1.15
Total					**12.97**

From Table 9 and based on the above refinery process configuration the process factor to be used is 2.17. The Size factor determined from Table 8 is 1.04. Using this information, the monthly average and daily maximum BPT limit are calculated below.

TABLE 27.							
Pollutant	ELG		Production			Limitations	
	Monthly Average Factor	Daily Max Factor	1,000 bbl of feedstock	Process Factor	Size Factor	Monthly Average Limit	Daily Max Limit
BOD_5	10.2	19.2	291	2.17	1.04	6698.63	12609.19
TSS	8.4	13.2	291	2.17	1.04	5516.52	8668.82
COD	70.0	136.0	291	2.17	1.04	45971.02	89315.12
O&G	3.2	6.0	291	2.17	1.04	2101.53	3940.37
Phenolic Compounds	0.068	0.14	291	2.17	1.04	44.66	91.94
Ammonia as N	3.8	8.3	291	2.17	1.04	2495.57	5450.85
Sulfide	0.056	0.124	291	2.17	1.04	36.78	81.43
Total Chromium	0.17	0.29	291	2.17	1.04	111.64	190.45
Hexavalent Chromium	0.011	0.025	291	2.17	1.04	7.22	16.42

Petroleum Refining – Integrated Subcategory – BCT – Process Wastewater

The BCT TBELs address only the conventional pollutants of BOD, TSS and O&G and are calculated using the same equations, size factor, process factor, and feedstock rates as used to calculate the BPT TBELs. Using this information, the monthly average and daily maximum BCT limit are calculated below.

TABLE 28.							
Pollutant	ELG		Production			Limitations	
	Monthly Average Factor	Daily Max Factor	1,000 bbl of feedstock	Process Factor	Size Factor	Monthly Average Limit	Daily Max Limit
BOD_5	10.2	19.2	291	2.17	1.04	6698.63	12609.19
TSS	8.4	13.2	291	2.17	1.04	5516.52	8668.82
O&G	3.2	6.0	291	2.17	1.04	2101.53	3940.37

Petroleum Refining – Integrated Subcategory – BAT – Process Wastewater

The BAT TBELs for the non-conventional pollutants of COD, Ammonia (as N), and Sulfide are calculated using the same equations, size factor, process factor, and feedstock rates as used to calculate the BPT TBELs. Using this information, the monthly average and daily maximum BAT limits for the non-conventional pollutants are calculated below.

TABLE 29.							
Pollutant	ELG		Production			Limitations	
	Monthly Average Factor	Daily Max Factor	1,000 bbl of feedstock	Process Factor	Size Factor	Monthly Average Limit	Daily Max Limit
COD	70.0	136.0	291	2.17	1.04	45971.02	89315.12
Ammonia as N	3.8	8.3	291	2.17	1.04	2495.57	5450.85
Sulfide	0.056	0.124	291	2.17	1.04	36.78	81.43

The BAT TBELs for the toxic pollutants of phenolic compounds, total chromium, and hexavalent chromium are calculated using the following equation

$$\text{Monthly average Limit} = \sum (Process\ Average\ Factor) \times (Process\ Categorty\ Feedstock)$$

$$\text{Daily MaximumLimit} = \sum (Process\ Daily\ Max\ Factor) \times (Process\ Categorty\ Feedstock)$$

TABLE 30.					
Pollutant or Pollutant Property and Process Type	ELG		Production	Limitations	
	Monthly Average Factor	Daily Max Factor	1,000 bbl of feedstock	Monthly Average Limit	Daily Max Limit
Phenolic Compounds (4AAP):					
Crude	0.003	0.013	640.4	1.9212	8.3252
Cracking and Coking	0.036	0.147	368.6	13.2696	54.1842
Asphalt	0.019	0.079	23.5	0.4465	1.8565
Lube	0.090	0.369	14.3	1.287	5.2767
Reforming and alkylation	0.032	0.132	93.5	2.992	12.342
Total:				19.9163	81.9846
Total Chromium:					
Crude	0.004	0.011	640.4	2.5616	7.0444
Cracking and Coking	0.041	0.119	368.6	15.1126	43.8634
Asphalt	0.022	0.064	23.5	0.517	1.504
Lube	0.104	0.299	14.3	1.4872	4.2757
Reforming and alkylation	0.037	0.107	93.5	3.4595	10.0045
Total:				23.1379	66.692
Hexavalent Chromium:					
Crude	0.0003	0.0007	640.4	0.19212	0.44828
Cracking and Coking	0.0034	0.0076	368.6	1.25324	2.80136
Asphalt	0.0019	0.0041	23.5	0.04465	0.09635
Lube	0.0087	0.0192	14.3	0.12441	0.27456
Reforming and alkylation	0.0031	0.0069	93.5	0.28985	0.64515
Total:				1.90427	4.2657

Petroleum Refining – Integrated Subcategory – Process Wastewater – TBEL Comparison

The following table compares the BPT, BCT and BAT TBELs developed from the Petroleum Refining ELG for this outfalls process wastewater. The most stringent limits for each pollutant will apply when calculating the facilities final discharge limitation

TABLE 31.

Pollutant or Pollutant Property	BPT		BCT		BAT	
	Monthly Average (lbs/day)	Daily Maximum (lbs/day)	Monthly Average (lbs/day)	Daily Maximum (lbs/day)	Monthly Average (lbs/day)	Daily Maximum (lbs/day)
BOD_5	**6698.63**	**12609.19**	6698.63	12609.19	-	-
TSS	**5516.52**	**8668.82**	5516.52	8668.82	-	-
COD	**45971.02**	**89315.12**	-	-	45971.02	89315.12
Oil & Grease	**2101.53**	**3940.37**	2101.53	3940.37	-	-
Phenolic Compounds	44.66	91.94	-	-	**19.9163**	**81.9846**
Ammonia as N	**2495.57**	**5450.85**	-	-	2495.57	5450.85
Sulfide	**36.78**	**81.43**	-	-	36.78	81.43
Total Chromium	111.64	190.45	-	-	**23.1379**	**66.692**
Hexavalent Chromium	7.22	16.42	-	-	**1.90427**	**4.2657**

Petroleum Refining – Integrated Subcategory – Contaminated Stormwater

Monthly average Limit = (Monthly Average Factor) x (Flow (1,000 gal/day))

Daily Maximum Limit = (Daily Maximum Factor) x (Flow (1,000 gal/day))

Using these equations, the monthly average and daily maximum limits for contaminated stormwater are calculated below. The most stringent of the BPT, BAT, and BCT monthly average and daily maximum factor were used in the calculation.

TABLE 32.

Pollutant or Pollutant Property	ELG		Flow	Limitations	
	Monthly Average Factor	Daily Max Factor	1,000 gal/day	Monthly Average Limit	Daily Max Limit
BOD_5	0.22	0.40	457	100.54	182.80
TSS	0.18	0.28	457	82.26	127.96
COD	1.5	3.0	457	685.50	1371.00
Oil & Grease	0.067	0.13	457	30.62	59.41
Phenolic Compounds	0.0014	0.0029	457	0.64	1.33
Total Chromium	0.0018	0.0050	457	0.82	2.29
Hexavalent Chromium	0.00023	0.00052	457	0.11	0.24

OCPSF – Bulk Organic Chemicals Subcategory

Monthly average Limit = (Monthly Average Factor) x (8.345) x (Process Flow)

Daily Maximum Limit = (Daily Maximum Factor) x (8.345) x (Process Flow)

Using these equations, the monthly average and daily maximum limits for the production of Maleic Anhydride are calculated below.

TABLE 33.

Pollutant or Pollutant Property	ELG		Flow	Limitations	
	Monthly Average Factor	Daily Max Factor	MGD	Monthly Average Limit	Daily Max Limit
BOD_5	34	92	0.065	18.44	49.87

TSS	49	159	0.065	26.58	86.19

Best Professional Judgement – Miscellaneous Flows

The pollutant loading assigned to the hydrostatic test water, off-site petroleum transportation, storage and marketing facilities wastewaters, on-site/off-site spill response and radiation actions wastewater are derived in a similar manner as the pollutant loadings for contaminated stormwater. The following equations were used to determine these loadings.

Monthly average Limit = (Monthly Average Factor) x (Flow (1,000 gal/day))

Daily Maximum Limit = (Daily Maximum Factor) x (Flow (1,000 gal/day))

TABLE 34.

Pollutant or Pollutant Property	ELG		Flow	Limitations	
	Monthly Average Factor	Daily Max Factor	1,000 gal/day	Monthly Average Limit	Daily Max Limit
BOD_5	0.22	0.40	64.3	14.15	25.72
TSS	0.18	0.28	64.3	11.57	18.00
COD	1.5	3.0	64.3	96.45	192.90
Oil & Grease	0.067	0.13	64.3	4.31	8.36
Phenolic Compounds	0.0014	0.0029	64.3	0.09	0.19
Total Chromium	0.0018	0.0050	64.3	0.12	0.32
Hexavalent Chromium	0.00023	0.00052	64.3	0.01	0.03

Best Professional Judgement – Secondary Treatment Standards

Monthly average Limit = (Monthly Average Factor) x (8.345) x (Process Flow)

Daily Maximum Limit = (Daily Maximum Factor) x (8.345) x (Process Flow)

There are 11 package sanitary treatment plants that contribute this outfall. The cumulative flow from these plants is 0.060 MGD. Using these equations, the monthly average and daily maximum limits sanitary wastewater are calculated below.

TABLE 35.

Pollutant or Pollutant Property	Secondary Treatment		Flow	Limitations	
	Monthly Average Factor	Daily Max Factor	MGD	Monthly Average Limit	Daily Max Limit
BOD_5	30	45	0.060	15.0	22.5
TSS	30	45	0.060	15.0	22.5

Final TBELs

The following tables summarizes the final TBELs for this outfall.

TABLE 36.

Pollutants	Monthly Average Wastestream Limits (lbs/day)					
	Process	Contaminated Stormwater	OCPSF Wastewater	BPJ Flows	Sanitary	Total
BOD_5	6698.63	100.54	18.44	14.15	15.0	6846.76
TSS	5516.52	82.26	26.58	11.57	15.0	5651.93
COD	45971.02	685.50	-	96.45	-	46752.97
Oil & Grease	2101.53	30.62	-	4.31	-	2136.46
Phenolic Compounds	19.9163	0.64	-	0.09	-	20.6463
Ammonia as N	2495.57	-	-	-	-	2495.57

Sulfide	36.78	-	-	-	-	36.78
Total Chromium	23.1379	0.82	-	0.12	-	24.0779
Hexavalent Chromium	1.90427	0.11	-	0.01	-	2.02427

TABLE 37.						
Pollutants	Daily Maximum Wastestream Limits (lbs/day)					
	Process	Contaminated Stormwater	OCPSF Wastewater	BPJ Flows	Sanitary	Total
BOD_5	12609.19	182.80	49.87	25.72	22.5	12890.08
TSS	8668.82	127.96	86.19	18.00	22.5	8923.47
COD	89315.12	1371.00	-	192.90	-	90879.02
Oil & Grease	3940.37	59.41	-	8.36	-	4008.14
Phenolic Compounds	81.9846	1.33	-	0.19	-	83.5046
Ammonia as N	5450.85	-	-	-	-	5450.85
Sulfide	81.43	-	-	-	-	81.43
Total Chromium	66.692	2.29	-	0.32	-	69.302
Hexavalent Chromium	4.2657	0.24	-	0.03	-	4.5357

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:

Effluent Characteristic	Units	Reported Av	Reported M	Average Limitation	Maximum Limitation	Average Discharge %	Maximum Discharge %	MZF	Data Sou
Acenaphthene	µg/L	0	0	990	N/A	0.00	N/A	0	APP
Acrolein	µg/L	0	0	3	3	0.00	0.00	0	APP
Acrylonitrile	µg/L	0	0	0.25	N/A	0.00	N/A	0	APP
Aldrin	µg/L	0	0	0.00005	3	0.00	0.00	0	APP
alpha-BHC	µg/L	0	0	0.0049	N/A	0.00	N/A	0	APP
alpha-Endosulfan	µg/L	0	0	0.056	0.22	0.00	0.00	0	APP
Anthracene	µg/L	0	0	40000	N/A	0.00	N/A	0	APP
Antimony	µg/L	0	0	640	N/A	0.00	N/A	0	APP
Arsenic	µg/L	8	8	150	340	5.33	2.35	0	APP
Barium	µg/L	108	108	1236181.644	N/A	0.01	N/A	0	APP
Benzene	µg/L	0	0	51	N/A	0.00	N/A	0	APP
Benzidine	µg/L	0	0	0.0002	N/A	0.00	N/A	0	APP
Benzo(a)anthracene	µg/L	0	0	0.018	N/A	0.00	N/A	0	APP
Benzo(a)pyrene	µg/L	0	0	0.018	N/A	0.00	N/A	0	APP
Benzo(b)fluoranthene	µg/L	0	0	0.018	N/A	0.00	N/A	0	APP
Benzo(k)fluoranthene	µg/L	0	0	0.018	N/A	0.00	N/A	0	APP
Beryllium	µg/L	0	0	4944.726577	N/A	0.00	N/A	0	APP
Beta-BHC	µg/L	0	0	0.017	N/A	0.00	N/A	0	APP
Beta-Endosulfan	µg/L	0	0	0.056	0.22	0.00	0.00	0	APP
bis(2-chloroethyl)ether	µg/L	0	0	0.53	N/A	0.00	N/A	0	APP
bis(2-chloroisopropyl)ether	µg/L	0	0	65000	N/A	0.00	N/A	0	APP
bis(2-ethylhexyl)phthalate	µg/L	0	0	2.2	N/A	0.00	N/A	0	APP
Bromoform	µg/L	0	0	140	N/A	0.00	N/A	0	APP
Butylbenzyl phthalate	µg/L	0	0	1900	N/A	0.00	N/A	0	APP
Cadmium	µg/L	0	0	2.387844961	7.382000299	0.00	0.00	0	APP
Carbon tetrachloride	µg/L	0	0	1.6	N/A	0.00	N/A	0	APP
Chlordane	µg/L	0	0	0.00081	2.4	0.00	0.00	0	APP
Chloride	µg/L	581000	581000	1200000	1200000	48.42	48.42	0.0367999	APP
Chlorobenzene	µg/L	0	0	1600	N/A	0.00	N/A	0	APP
Chlorodibromomethane	µg/L	0	0	13	N/A	0.00	N/A	0	APP
Chloroform	µg/L	0	0	470	N/A	0.00	N/A	0	APP
Chromium	µg/L	3	25	123618.1644	N/A	0.00	N/A	0	DMR
Chromium (VI)	µg/L	8	104	110.538348	113.6	7.24	91.55	0.333	DMR
Chrysene	µg/L	0	0	0.018	N/A	0.00	N/A	0	APP
Color	Platinum Cobalt Units	20	20	92713.62333	N/A	0.02	N/A	0	APP
Copper	µg/L	1.2	1.2	30.49938305	51.68449826	3.93	2.32	0	APP

Cyanide, Free	µg/L	0	0	5.2	22	0.00	0.00	0	APP
Dibenzo(a,h)anthracene	µg/L	0	0	0.018	N/A	0.00	N/A	0	APP
Dichlorobromomethane	µg/L	0	0	17	N/A	0.00	N/A	0	APP
Dieldrin	µg/L	0	0	0.000054	0.24	0.00	0.00	0	APP
Diethyl phthalate	µg/L	0	0	44000	N/A	0.00	N/A	0	APP
Dimethyl phthalate	µg/L	0	0	1100000	N/A	0.00	N/A	0	APP
Di-n-butyl phthalate	µg/L	0	0	4500	N/A	0.00	N/A	0	APP
Endosulfan sulfate	µg/L	0	0	89	N/A	0.00	N/A	0	APP
Endrin	µg/L	0	0	0.036	0.086	0.00	0.00	0	APP
Ethylbenzene	µg/L	0	0	2100	N/A	0.00	N/A	0	APP
Fluoranthene	µg/L	0	0	140	N/A	0.00	N/A	0	APP
Fluorene	µg/L	0	0	5300	N/A	0.00	N/A	0	APP
Fluoride	µg/L	1200	1200	4944726.577	N/A	0.02	N/A	0	APP
Heptachlor	µg/L	0	0	0.000079	0.52	0.00	0.00	0	APP
Heptachlor epoxide	µg/L	0	0	0.000039	0.52	0.00	0.00	0	APP
Hexachlorobenzene	µg/L	0	0	0.00029	N/A	0.00	N/A	0	APP
Hexachlorobutadiene	µg/L	0	0	18	N/A	0.00	N/A	0	APP
Hexachlorocyclopentadiene	µg/L	0	0	1100	N/A	0.00	N/A	0	APP
Hexachloroethane	µg/L	0	0	3.3	N/A	0.00	N/A	0	APP
Ideno(1,2,3-cd)pyrene	µg/L	0	0	0.018	N/A	0.00	N/A	0	APP
Iron	µg/L	301	301	3500	4000	8.60	7.53	0	APP
Isophorone	µg/L	0	0	960	N/A	0.00	N/A	0	APP
Lead	µg/L	0	0	18.58090366	476.8177624	0.00	0.00	0	APP
Mercury	µg/L	0.0277	0.0277	0.051	1.4	54.31	1.98	0	APP
Methylbromide	µg/L	0	0	1500	N/A	0.00	N/A	0	APP
Methylene Chloride	µg/L	0	0	590	N/A	0.00	N/A	0	APP
Nickel	µg/L	7.3	7.3	168.5409938	1515.921838	4.33	0.48	0	APP
Nitrate (as N)	µg/L	7100	7100	12361816.44	N/A	0.06	N/A	0	APP
Nitrobenzene	µg/L	0	0	690	N/A	0.00	N/A	0	APP
N-Nitrosodimethylamine	µg/L	0	0	3	N/A	0.00	N/A	0	APP
N-Nitrosodi-n-Propylamine	µg/L	0	0	0.51	N/A	0.00	N/A	0	APP
N-Nitrosodiphenylamine	µg/L	0	0	6	N/A	0.00	N/A	0	APP
Pentachlorophenol	µg/L	0	0	3	10.45311479	0.00	0.00	0	APP
Phenol	µg/L	20	930	2130	2130	0.94	43.66	0	DMR
Polychlorinated Biphenyls (PCBs)	µg/L	0	0	0.000064	N/A	0.00	N/A	0	APP
Pyrene	µg/L	0	0	4000	N/A	0.00	N/A	0	APP
Selenium	µg/L	26.7	26.7	50.24470363	N/A	53.14	N/A	0.333	APP
Silver	µg/L	0	0	N/A	41.07168773	N/A	0.00	0	APP
Sulfate	µg/L	211000	211000	309045411.1	N/A	0.07	N/A	0	APP
Tetrachloroethylene	µg/L	0	0	3.3	N/A	0.00	N/A	0	APP
Thallium	µg/L	0	0	0.47	N/A	0.00	N/A	0	APP
Toluene	µg/L	0	0	15000	N/A	0.00	N/A	0	APP
Toxaphene	µg/L	0	0	0.0002	0.73	0.00	0.00	0	APP
Trichloroethylene	µg/L	0	0	30	N/A	0.00	N/A	0	APP
Vinyl Chloride	µg/L	0	0	2.4	N/A	0.00	N/A	0	APP
Zinc	µg/L	51.3	51.3	387.8303147	387.8303147	13.23	13.23	0	APP
1,1-dichloroethylene	µg/L	0	0	7100	N/A	0.00	N/A	0	APP
1,1,1-trichloroethane	µg/L	0	0	247236.3289	N/A	0.00	N/A	0	APP
1,1,2-trichloroethane	µg/L	0	0	16	N/A	0.00	N/A	0	APP
1,1,2,2-tetrachloroethane	µg/L	0	0	4	N/A	0.00	N/A	0	APP
1,2-dichlorobenzene	µg/L	0	0	1300	N/A	0.00	N/A	0	APP
1,2-dichloroethane	µg/L	0	0	37	N/A	0.00	N/A	0	APP
1,2-dichloropropane	µg/L	0	0	15	N/A	0.00	N/A	0	APP
1,2-diphenylhydrazine	µg/L	0	0	0.2	N/A	0.00	N/A	0	APP
1,2-trans-dichloroethylene	µg/L	0	0	10000	N/A	0.00	N/A	0	APP
1,2,4-trichlorobenzene	µg/L	0	0	70	N/A	0.00	N/A	0	APP
1,3-dichlorobenzene	µg/L	0	0	960	N/A	0.00	N/A	0	APP
1,4-dichlorobenzene	µg/L	0	0	190	N/A	0.00	N/A	0	APP
2-chloronaphthalene	µg/L	0	0	1600	N/A	0.00	N/A	0	APP
2-chlorophenol	µg/L	0	0	150	N/A	0.00	N/A	0	APP
2-methyl-4,6-dinitrophenol	µg/L	0	0	280	N/A	0.00	N/A	0	APP
2,4-dichlorophenol	µg/L	0	0	290	N/A	0.00	N/A	0	APP
2,4-dimethylphenol	µg/L	0	0	850	N/A	0.00	N/A	0	APP
2,4-dinitrophenol	µg/L	0	0	5300	N/A	0.00	N/A	0	APP
2,4-dinitrotoluene	µg/L	0	0	3.4	N/A	0.00	N/A	0	APP
2,4,6-trichlorophenol	µg/L	0	0	2.4	N/A	0.00	N/A	0	APP
3,3'-dichlorobenzidine	µg/L	0	0	0.028	N/A	0.00	N/A	0	APP
4,4'-DDD	µg/L	0	0	0.00031	N/A	0.00	N/A	0	APP
4,4'-DDE	µg/L	0	0	0.00022	N/A	0.00	N/A	0	APP
4,4'-DDT	µg/L	0	0	0.00022	1.1	0.00	0.00	0	APP
Summer Ammonia (as N)	mg/l	0.27	10.8	114.6140652	N/A	0.24	N/A	0	DMR
Winter Ammonia (as N)	mg/l	0.27	10.8	284.5907815	N/A	0.09	N/A	0	DMR
Temperature	°F	83.6	95	0	110	76.00	86.36	0.1545595	DMR

Effluent Characteristic	Reported Units	Reported Avg	Reported Max	Toxicity Type	Toxicity Units	Maximum Limitation	%Effluent	MZF	Data Source
Toxicity	None			AcuteWET	TUa	1.00	100.00	0.331199	

3.5.3. Comparison of Technology Based Effluent Limitations to Water Quality Based Effluent Limitations

The final step in determining a permit's final limits is to compare the limitations generated from any effluent guidelines and other technology-based limitations to those generated from the water quality standards. With regards to metals, the Kentucky Water Quality Standards are expressed as Total Recoverable. EPA uses the terms "total metal" and "total recoverable metal" synonymously to refer to metals solubilized by digestion with strong solutions of mineral acids: therefore, "total" and "total recoverable" metals can be directly compared. Kentucky does not have a water quality criterion for phenolic compounds but does have water quality criteria for phenol and several other chlorinated phenolic compounds. Therefore, a direct comparison would not seem possible. However, the 4AAP (amino antipyrine) analytical method for measuring the presence of phenolic compounds reports the results as phenol; therefore, the TBEL results can be compared to the calculated WQBELs for phenol. The final limitations are the more stringent of the WQBELs or the TBELs.

TABLE 38.

Pollutant	WQBEL (µg/l)		TBEL (µg/l)	
	Average	Maximum	Average	Maximum
Phenolic Compounds	2130	2130	473	1913
Ammonia as N	114614	-	57180	124892
Sulfide	-	-	843	1866
Total Chromium	123618164	-	552	1598
Hexavalent Chromium	110.5	113.6	46	104

Based on a review of the table above the TBEL were demonstrated to be protective of water quality criteria for all pollutants. Therefore, no additional requirements are needed.

BOD_5, Ammonia, and COD

In order to determine if the calculated BOD_5, Ammonia, and COD Technology Based Effluent Limits (TBEL) are consistent with Kentucky water quality criteria for dissolved oxygen, [401 KAR 10:031, Section 4(1)(e)], EPA's River and Stream Water Quality Model (QUAL 2E/K) was used. The final limits are based upon the TBEL.

Oil & Grease

To ensure that both technology and water quality standards are achieved, both the numeric TBEL and the narrative water quality criteria [401 KAR 10:031 Section 2(b)] are applied.

TSS

Based upon review of the proposed discharge and the receiving stream. The Division of Water does not believe the calculated total suspended solids limit will have an adverse effect on the indigenous aquatic community [401 KAR 10:031, Section 4(1)(g)].

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 MZ for temperature has been granted by DOW that allows the end-of-pipe effluent limitations for temperature to be set at the technology-based requirements.

3.6.3. Total Suspended Solids

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BCT requirements for Petroleum Refining Point Source Category Integrated Subcategory [40 CFR 419.52 and 40 CFR 419.54], representative of the BPT requirements for Bulk Organic Chemical Production [40 CFR 414.71], imposing Best Professional Judgement [401 KAR 5:080, Section 2(3) – 40 CFR 125.3], and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 4(1)(g)].

3.6.4. Oil & Grease

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BCT requirements for Petroleum Refining Point Source Category Integrated Subcategory [40 CFR 419.52 and 40 CFR 419.54], representative of the BPT requirements for Bulk Organic Chemical Production [40 CFR 414.71], imposing Best Professional Judgement [401 KAR 5:080, Section 2(3) – 40 CFR 125.3], and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 2(1)(b)].

3.6.5. COD

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Petroleum Refining Point Source Category Integrated Subcategory [40 CFR 419.52 and 40 CFR 419.53] and imposing Best Professional Judgement [401 KAR 5:080, Section 2(3) – 40 CFR 125.3].

3.6.6. Phenolic Compounds

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Petroleum Refining

Point Source Category Integrated Subcategory [40 CFR 419.52 and 40 CFR 419.53], imposing Best Professional Judgement [401 KAR 5:080, Section 2(3) – 40 CFR 125.3], and representative of state water quality standards [401 KAR 10:031 Section 6] and [401 KAR 10:031 Section 2(2)]. A zone of initial dilution and mixing zone have been granted, in accordance with 401 KAR 10:029 Section 4, for this parameter.

3.6.7. Ammonia as N

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Petroleum Refining Point Source Category Integrated Subcategory [40 CFR 419.52 and 40 CFR 419.53], imposing Best Professional Judgement [401 KAR 5:080, Section 2(3) – 40 CFR 125.3], and representative of state water quality standards [401 KAR 10:031 Section 4(1)(i)].

3.6.8. Sulfide

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Petroleum Refining Point Source Category Integrated Subcategory [40 CFR 419.52 and 40 CFR 419.53].

3.6.9. Total Recoverable Chromium, and Hexavalent Chromium

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)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Petroleum Refining Point Source Category Integrated Subcategory [40 CFR 419.52 and 40 CFR 419.53], imposing Best Professional Judgement [401 KAR 5:080, Section 2(3) – 40 CFR 125.3], and representative of state water quality standards [401 KAR 10:031 Section 6]. A zone of initial dilution and mixing zone have been granted, in accordance with 401 KAR 10:029 Section 4, for these parameters as needed.

3.6.10. pH

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BCT requirements for Petroleum Refining Point Source Category Integrated Subcategory [40 CFR 419.52 and 40 CFR 419.54], representative of the BPT requirements for Bulk Organic Chemical Production [40 CFR 414.71], and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 4(1)(b) and Section 7].

3.6.11. Chloride and Total Recoverable Selenium

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

3.6.12. 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 zone of initial dilution and mixing zone have 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 39.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.377277°	82.594015°	Big Sandy River	Water decanted from solids holding pond that receives raw water supply clarifier blowdown, steam condensate and stormwater from non-process areas and secondary containment. Discharge through this outfall is very rare.

4.2. Reported Values

There has been no reported discharge from Outfall 002 during the last permit cycle.

4.3. Effluent Limitations and Monitoring Requirements

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

TABLE 40.									
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	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	30	50	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab
Total Recoverable Iron	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab

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: https://eec.ky.gov/Environmental-Protection/Forms%20Library/General%20Procedures%20for%20Limitations%20Development.pdf

4.4.1. Federally-Listed Threatened or Endangered Aquatic Species

There are no know federally-listed threatened or endangered aquatic species.

4.4.2. Technology-Based Effluent Limitations

4.4.2.1. General Requirement for Technology-Based 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 [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)].

4.4.2.2. Federal Effluent Limitations Guidelines

The DOW has reviewed this non-POTW's operation, its processes, it wastestreams and its Standard Industrial Classification. The DOW found no Effluent Guideline that applies to this Outfall's discharge.

4.4.2.3. Best Professional Judgement

In July 1973 EPA Region IV issued a guidance document titled "Interim BPCTA for Municipal and Industrial Water Treatment Plants". This document is EPA Region IV's BPJ determination of the TSS BCT requirements for TSS and pH for wastewaters discharged by these types of facilities.

4.4.3. 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. This table may also include pollutants for which DOW has found the existence of reasonable potential to be indeterminate or for which DOW needs additional study.

TABLE 41.

Pollutant or Pollutant Characteristic	Basis
Total Recoverable Iron	While estimated results excess 90% it is the Division best professional judgement to collect additional data prior to imposing a limit. The estimated result is based on the discharge results from other stormwater outfalls is not expected to be representative of the discharge from this outfall.

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
Barium	µg/L	361	361	646001000	N/A	0.00	N/A	0	APP
Chloride	µg/L	50000	50000	600000	1200000	8.33	4.17	0	APP
Color	Platinum Cobalt Units	140	140	48450075	N/A	0.00	N/A	0	APP
Fluoride	µg/L	22000	22000	2584004000	N/A	0.00	N/A	0	APP
Iron	µg/L	8571	8571	3500	4000	244.89	214.28	0	APP
Nitrate (as N)	µg/L	31250	31250	6460010000	N/A	0.00	N/A	0	APP
Sulfate	µg/L	77000	77000	1.615E+11	N/A	0.00	N/A	0	APP
Total Residual Chlorine	µg/L	0	0	11	19	0.00	0.00	0	APP
Summer Ammonia (as N)	mg/l	1572	1572	57819.61843	N/A	2.72	N/A	0	APP
Winter Ammonia (as N)	mg/l	1572	1572	143568.1595	N/A	1.09	N/A	0	APP

Comparison of Technology Based Effluent Limitations to Water Quality Based Effluent Limitations

The final step in determining a permit's final limits is to compare the limitations generated from any effluent guidelines and other technology-based limitations to those generated from the water quality standards.

TSS

Based upon review of the proposed discharge and the receiving stream. The Division of Water does not believe the calculated total suspended solids limit will have an adverse effect on the indigenous aquatic community [401 KAR 10:031, Section 4(1)(g)].

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. 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.

4.6.3. pH

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

4.6.4. Total Recoverable Iron

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

SECTION 5

OUTFALL 004

5. OUTFALL 004

5.1. Outfall Description

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

TABLE 42.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.380667°	82.594139°	Big Sandy River	No treatment of stormwater and minor amounts of steam condensate from secondary containment structures and non-process operations located in the New North, NASA Control room and FE storeroom areas

5.2. Reported Values

The following table summarizes the reported values for Outfall 004:

TABLE 43.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Effluent Flow	MGD	0.13	0.61	N/A	N/A	N/A	N/A
Total Suspended Solids	mg/l	N/A	N/A	N/A	N/A	538	N/A
Oil & Grease	mg/l	N/A	N/A	N/A	N/A	9.50	N/A
Total Organic Carbon	mg/l	N/A	N/A	N/A	N/A	28.0	N/A
pH	SU	N/A	N/A	7.00	N/A	N/A	8.50
Total Recoverable Iron	mg/l	N/A	N/A	N/A	N/A	10.3	N/A

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2017 to 03/31/2022.

5.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 004:

TABLE 44.

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	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	Report	15	N/A	1/Month	Grab
Total Organic Carbon	mg/l	N/A	N/A	N/A	Report	110	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab
Total Recoverable Iron	mg/l	N/A	N/A	N/A	Report	4.00[1]	N/A	1/Month	Grab
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab

[1]These limitations shall apply on the date specified in the compliance schedule for this Outfall (see Section 16.1) 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.

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: https://eec.ky.gov/Environmental-Protection/Forms%20Library/General%20Procedures%20for%20Limitations%20Development.pdf

5.4.1. Federally-Listed Threatened or Endangered Aquatic Species

There are no know federally-listed threatened or endangered aquatic species.

5.4.2. Technology-Based Effluent Limitations

5.4.2.1. General Requirement for Technology-Based 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 [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)].

5.4.2.2. 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 419 shall be applied to this outfall. The following is a list of those requirements:

419.52(e) BPT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best practicable control technology currently available by a point source subject to this subpart.

(1) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease and 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.53(f) BAT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(1) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.54(f) BCT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(1) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease based upon an analysis of any single grab or composite sample.

5.4.3. 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. This table may also include pollutants for which DOW has found the existence of reasonable potential to be indeterminate or for which DOW needs additional study.

TABLE 45.

Pollutant or Pollutant Characteristic	Basis
Total Suspended Solids	Due to the nature of the facility and the fact the receiving stream is impaired for sedimentation it is the division best professional judgement to continue monitoring for this pollutant.
Total Recoverable Iron	The discharge concentration of this pollutant exceeds 90% of the calculated acute water quality-based effluent limitations (WQBELs) for this pollutant.
Total Recoverable Zinc	The discharge concentration of this pollutant exceeds 70% of the calculated acute water quality-based effluent limitations (WQBELs) for this pollutant.

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 9	Maximum Discharge 9	MZF	Data Sou
Antimony	µg/L	0	0	640	N/A	0.00	N/A	0	APP
Arsenic	µg/L	1.2	1.2	340	340	0.35	0.35	0.0011586	APP
Barium	µg/L	50.38	50.38	49693307.69	N/A	0.00	N/A	0	APP
Beryllium	µg/L	0	0	198773.2308	N/A	0.00	N/A	0	APP
Cadmium	µg/L	0	0	1.476777751	4.093344313	0.00	0.00	0	APP
Chloride	µg/L	36100	36100	600000	1200000	6.02	3.01	0	APP
Chromium	µg/L	4.3	4.3	4969330.769	N/A	0.00	N/A	0	APP
Color	Platinum Cobalt Units	58.8	58.8	3726998.077	N/A	0.00	N/A	0	APP
Copper	µg/L	7.43	7.43	18.22805322	29.29987893	40.76	25.36	0	APP
Cyanide, Free	µg/L	0	0	5.2	22	0.00	0.00	0	APP
Fluoride	µg/L	150	150	198773230.8	N/A	0.00	N/A	0	APP
Iron	µg/L	10300	10300	3500	4000	294.29	257.50	0	DMR
Isophorone	µg/L	2.78	2.78	960	N/A	0.29	N/A	0	APP
Mercury	µg/L	0.06238	0.06238	0.051	1.4	122.31	4.46	0	APP
Nickel	µg/L	22.38	22.38	101.2461503	910.6464058	22.10	2.46	0	APP
Nitrate (as N)	µg/L	680	680	496933076.9	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	14.57347908	N/A	0.00	0	APP
Sulfate	µg/L	23130	23130	12423326923	N/A	0.00	N/A	0	APP
Thallium	µg/L	0	0	0.47	N/A	0.00	N/A	0	APP
Zinc	µg/L	186.75	186.75	232.7955212	232.7955212	80.22	80.22	0	APP
Summer Ammonia (as N)	mg/l	0.25	0.25	4451.418107	N/A	0.01	N/A	0	APP
Winter Ammonia (as N)	mg/l	0.25	0.25	11053.02875	N/A	0.00	N/A	0	APP

5.5.2. Comparison of Technology Based Effluent Limitations to Water Quality Based Effluent Limitations

The final step in determining a permit's final limits is to compare the limitations generated from any effluent guidelines and other technology-based limitations to those generated from the water quality standards.

Oil & Grease

To ensure that both technology and water quality standards are achieved, both the numeric TBEL and the narrative water quality criteria [401 KAR 10:031 Section 2(b)] are applied.

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. Total Suspended Solids

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

5.6.3. Oil & Grease

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BCT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.54(e)], and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 2(1)(b)].

5.6.4. Total Organic Carbon

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.53(f)].

5.6.5. pH

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

5.6.6. Total Recoverable Iron

The limitations for this parameter are consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 6]. The chronic criteria for this parameter do not apply, since this outfall discharges intermittently.

5.6.7. Total Recoverable Zinc and Hardness

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

SECTION 6

OUTFALL 005

6. OUTFALL 005

6.1. Outfall Description

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

TABLE 46.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.363389°	82.597972°	Big Sandy River	No treatment of stormwater and minor amounts of steam condensate from secondary containment structures and non-process operations located in the Viney Branch area.

6.2. Reported Values

The following table summarizes the reported values for Outfall 005:

TABLE 47.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Effluent Flow	MGD	0.27	5.00	N/A	N/A	N/A	N/A
Total Suspended Solids	mg/l	N/A	N/A	N/A	N/A	90.0	N/A
Oil & Grease	mg/l	N/A	N/A	N/A	N/A	5.00	N/A
Total Organic Carbon	mg/l	N/A	N/A	N/A	N/A	4.80	N/A
pH	SU	N/A	N/A	7.20	N/A	N/A	8.30

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2017 to 03/31/2022.

6.3. Effluent Limitations and Monitoring Requirements

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

TABLE 48.									
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	Instantaneous

TABLE 48.									
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 Suspended Solids	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	Report	15	N/A	1/Month	Grab
Total Organic Carbon	mg/l	N/A	N/A	N/A	Report	110	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab

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: https://eec.ky.gov/Environmental-Protection/Forms%20Library/General%20Procedures%20for%20Limitations%20Development.pdf

6.4.1. Federally-Listed Threatened or Endangered Aquatic Species

There are no know federally-listed threatened or endangered aquatic species.

6.4.2. Technology-Based Effluent Limitations

6.4.2.1. General Requirement for Technology-Based 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 [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)].

6.4.2.2. 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 419 shall be applied to this outfall. The following is a list of those requirements:

419.52(e) BPT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best practicable control technology currently available by a point source subject to this subpart.

(2) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease and 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.53(f) BAT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(2) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.54(f) BCT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(2) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease based upon an analysis of any single grab or composite sample.

6.4.3. 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. This table may also include pollutants for which DOW has found the existence of reasonable potential to be indeterminate or for which DOW needs additional study.

TABLE 49.

Pollutant or Pollutant Characteristic	Basis
Total Suspended Solids	Due to the nature of the facility and the fact the receiving stream is impaired for sedimentation it is the division best professional judgement to continue monitoring for this pollutant.

6.5. Limitation Calculations

6.5.1. 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	0	640	N/A	0.00	N/A	0	APP
Arsenic	µg/L	0	0	150	340	0.00	0.00	0	APP
Barium	µg/L	58.8	58.8	23926925.93	N/A	0.00	N/A	0	APP
Beryllium	µg/L	0	0	95707.7037	N/A	0.00	N/A	0	APP
Cadmium	µg/L	0	0	2.387844961	7.382000299	0.00	0.00	0	APP
Chloride	µg/L	21680	21680	600000	1200000	3.61	1.81	0	APP
Chromium	µg/L	0	0	2392692.593	N/A	0.00	N/A	0	APP
Color	Platinum Cobalt Units	20	20	1794519.444	N/A	0.00	N/A	0	APP
Copper	µg/L	0	0	30.49938305	51.68449826	0.00	0.00	0	APP
Cyanide, Free	µg/L	0	0	5.2	22	0.00	0.00	0	APP
Fluoride	µg/L	200	200	95707703.7	N/A	0.00	N/A	0	APP
Iron	µg/L	322	322	3500	4000	9.20	8.05	0	APP
Lead	µg/L	0	0	18.58090366	476.8177624	0.00	0.00	0	APP
Mercury	µg/L	0.00075	0.000075	0.051	1.4	1.47	0.01	0	APP
Nickel	µg/L	0.88	0.88	168.5409938	1515.921838	0.52	0.06	0	APP
Nitrate (as N)	µg/L	300	300	239269259.3	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	41.07168773	N/A	0.00	0	APP
Sulfate	µg/L	60130	60130	5981731481	N/A	0.00	N/A	0	APP
Thallium	µg/L	0	0	0.47	N/A	0.00	N/A	0	APP
Zinc	µg/L	11.45	11.45	387.8303147	387.8303147	2.95	2.95	0	APP
Total Residual Chlorine	µg/L	0	0	11	19	0.00	0.00	0	APP
Summer Ammonia (as N)	mg/l	0.25	0.25	2145.38476	N/A	0.01	N/A	0	APP
Winter Ammonia (as N)	mg/l	0.25	0.25	5327.06631	N/A	0.00	N/A	0	APP

6.5.2. Comparison of Technology Based Effluent Limitations to Water Quality Based Effluent Limitations

The final step in determining a permit's final limits is to compare the limitations generated from any effluent guidelines and other technology-based limitations to those generated from the water quality standards.

Oil & Grease

To ensure that both technology and water quality standards are achieved, both the numeric TBEL and the narrative water quality criteria [401 KAR 10:031 Section 2(b)] are applied.

6.6. 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].

6.6.1. 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].

6.6.2. Total Suspended Solids

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

6.6.3. Oil & Grease

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BCT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.54(e)], and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 2(1)(b)].

6.6.4. Total Organic Carbon

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.53(f)].

6.6.5. pH

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

SECTION 7

OUTFALL 006

7. OUTFALL 006

7.1. Outfall Description

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

TABLE 50.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.376083°	82.592944°	Big Sandy River	No treatment of firewater pond overflow, water filter backwash, boiler blowdown, reverse osmosis reject and wash water, non-contact cooling water, stormwater and minor amounts of steam condensate from secondary containment structures and non-process operations.

7.2. Reported Values

The following table summarizes the reported values for Outfall 006:

TABLE 51.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Effluent Flow	MGD	3.86	14.2	N/A	N/A	N/A	N/A
Total Suspended Solids	mg/l	N/A	N/A	N/A	3.08	26.0	N/A
Oil & Grease	mg/l	N/A	N/A	N/A	N/A	5.30	N/A
Total Organic Carbon	mg/l	N/A	N/A	N/A	N/A	10.0	N/A
pH	SU	N/A	N/A	6.90	N/A	N/A	8.70
Total Residual Chlorine	mg/l	N/A	N/A	N/A	0.005	0.01	N/A

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2017 to 03/31/2022.

7.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 006:

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	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Month	Instantaneous
Temperature	^{o}F	N/A	N/A	N/A	Report	110	N/A	1/Month	Grab
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	Report	15	N/A	1/Month	Grab
Total Organic Carbon	mg/l	N/A	N/A	N/A	Report	110	N/A	1/Month	Grab
Total Residual Chlorine	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab

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: https://eec.ky.gov/Environmental-Protection/Forms%20Library/General%20Procedures%20for%20Limitations%20Development.pdf

7.4.1. Federally-Listed Threatened or Endangered Aquatic Species

There are no know federally-listed threatened or endangered aquatic species.

7.4.2. Technology-Based Effluent Limitations

7.4.2.1. General Requirement for Technology-Based 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 [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)].

7.4.2.2. 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 419 shall be applied to this outfall. The following is a list of those requirements:

419.52(e) BPT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best practicable control technology currently available by a point source subject to this subpart.

(3) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease and 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.53(f) BAT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(3) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.54(f) BCT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(3) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease based upon an analysis of any single grab or composite sample.

7.4.3. 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. This table may also include pollutants for which DOW has found the existence of reasonable potential to be indeterminate or for which DOW needs additional study.

TABLE 53.	
Pollutant or Pollutant Characteristic	**Basis**
Total Suspended Solids	Due to the nature of the facility and the fact the receiving stream is impaired for sedimentation it is the division best professional judgement to continue monitoring for this pollutant.
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	While the facility does not show reasonable potential for this pollutant, this is an expected pollutant with the type of operation that contribute to this outfall. Therefore, it is the Divisions best professional judgement to continue to monitor for this pollutant.

7.4.4. 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 54.				
Pollutant or Pollutant Characteristic	**Mixing Zone Factor (MZF)**	**Linear Distance (ft)**	**Surface Area (sq. ft)**	**Volume (cfs)**
Temperature	0.114	53	4412	25

7.5. Limitation Calculations

7.5.1. 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	0	640	N/A	0.00	N/A	0	APP
Arsenic	µg/L	0	0	150	340	0.00	0.00	0	APP
Barium	µg/L	75.15	75.15	1674575.13	N/A	0.00	N/A	0	APP
Beryllium	µg/L	0	0	6698.300518	N/A	0.00	N/A	0	APP
Cadmium	µg/L	0	0	1.801672715	5.224637335	0.00	0.00	0	APP
Chloride	µg/L	364250	364250	600000	1200000	60.71	30.35	0	APP
Chloroform	µg/L	12.63	12.63	470	N/A	2.69	N/A	0	APP
Chromium	µg/L	0	0	167457.513	N/A	0.00	N/A	0	APP
Color	Platinum Cobalt Units	5	5	125593.1347	N/A	0.00	N/A	0	APP
Copper	µg/L	3.18	3.18	22.55539007	37.05701859	14.10	8.58	0	APP
Cyanide, Free	µg/L	0	0	5.2	22	0.00	0.00	0	APP
Fluoride	µg/L	230	230	6698300.518	N/A	0.00	N/A	0	APP
Iron	µg/L	216.7	216.7	3500	4000	6.19	5.42	0	APP
Lead	µg/L	0	0	11.8535274	304.1817833	0.00	0.00	0	APP
Mercury	µg/L	0.00172	0.00172	0.051	1.4	3.37	0.12	0	APP
Nickel	µg/L	0	0	125.0167902	1124.448588	0.00	0.00	0	APP
Nitrate (as N)	µg/L	320	320	16745751.3	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	22.37557655	N/A	0.00	0	APP
Sulfate	µg/L	356500	356500	418643782.4	N/A	0.09	N/A	0	APP
Thallium	µg/L	0	0	0.47	N/A	0.00	N/A	0	APP
Zinc	µg/L	31.9	31.9	287.5445806	287.5445806	11.09	11.09	0	APP
Total Residual Chlorine	µg/L	5	10	11	19	45.45	52.63	0	DMR
Summer Ammonia (as N)	mg/l	0.25	0.25	153.8492983	N/A	0.16	N/A	0	APP
Winter Ammonia (as N)	mg/l	0.25	0.25	382.0132545	N/A	0.07	N/A	0	APP
Temperature	˚F	89.6	89.6	0	110	81.45	81.45	0.1140726	APP

7.5.2. Comparison of Technology Based Effluent Limitations to Water Quality Based Effluent Limitations

The final step in determining a permit's final limits is to compare the limitations generated from any effluent guidelines and other technology-based limitations to those generated from the water quality standards.

Oil & Grease

To ensure that both technology and water quality standards are achieved, both the numeric TBEL and the narrative water quality criteria [401 KAR 10:031 Section 2(b)] are applied.

7.6. 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].

7.6.1. 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].

7.6.2. Total Suspended Solids

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

7.6.3. Oil & Grease

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BCT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.54(e)], and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 2(1)(b)].

7.6.4. Total Organic Carbon

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.53(f)].

7.6.5. pH

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

7.6.6. 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.

7.6.7. Total Residual Chlorine

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

SECTION 8

OUTFALL 007

8. OUTFALL 007

8.1. 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	38.381573°	82.601686°	Chadwick's Creek	No treatment of stormwater and minor amounts of steam condensate from secondary containment structures and non-process operations located in the Crude Tank Farm, North End employee parking lot, Old US 23 roadway and CSX Railroad areas.

8.2. Reported Values

The following table summarizes the reported values for Outfall 007:

TABLE 56.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Effluent Flow	MGD	0.19	3.56	N/A	N/A	N/A	N/A
Total Suspended Solids	mg/l	N/A	N/A	N/A	8.19	195	N/A
Oil & Grease	mg/l	N/A	N/A	N/A	N/A	5.20	N/A
Total Organic Carbon	mg/l	N/A	N/A	N/A	N/A	28.0	N/A
pH	SU	N/A	N/A	7.10	N/A	N/A	8.50

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2017 to 03/31/2022.

8.3. Effluent Limitations and Monitoring Requirements

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

TABLE 57.									
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	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	Report	15	N/A	1/Month	Grab
Total Organic Carbon	mg/l	N/A	N/A	N/A	Report	110	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab

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: https://eec.ky.gov/Environmental-Protection/Forms%20Library/General%20Procedures%20for%20Limitations%20Development.pdf

8.4.1. Federally-Listed Threatened or Endangered Aquatic Species

There are no know federally-listed threatened or endangered aquatic species.

8.4.2. Technology-Based Effluent Limitations

8.4.2.1. General Requirement for Technology-Based 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 [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)].

8.4.2.2. 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 419 shall be applied to this outfall. The following is a list of those requirements:

419.52(e) BPT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best practicable control technology currently available by a point source subject to this subpart.

(4) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease and 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.53(f) BAT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(4) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.54(f) BCT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(4) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease based upon an analysis of any single grab or composite sample.

8.4.3. 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. This table may also include pollutants for which DOW has found the existence of reasonable potential to be indeterminate or for which DOW needs additional study.

TABLE 58.

Pollutant or Pollutant Characteristic	Basis
Total Suspended Solids	Due to the nature of the facility, it is the division best professional judgement to continue monitoring for this pollutant.

8.5. Limitation Calculations

8.5.1. 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 9	Maximum Discharge 9	MZF	Data Sou
Antimony	µg/L	0	0	640	N/A	0.00	N/A	0	APP
Arsenic	µg/L	0	0	150	340	0.00	0.00	0	APP
Barium	µg/L	79	79	34001000	N/A	0.00	N/A	0	APP
Beryllium	µg/L	0	0	136004	N/A	0.00	N/A	0	APP
Cadmium	µg/L	0	0	1.99599421	5.92439573	0.00	0.00	0	APP
Chloride	µg/L	145750	145750	600000	1200000	24.29	12.15	0	APP
Chromium	µg/L	0	0	3400100	N/A	0.00	N/A	0	APP
Color	Platinum Cobalt Units	5	5	2550075	N/A	0.00	N/A	0	APP
Copper	µg/L	0	0	25.17103907	41.82267696	0.00	0.00	0	APP
Cyanide, Free	µg/L	0	0	5.2	22	0.00	0.00	0	APP
Fluoride	µg/L	350	350	136004000	N/A	0.00	N/A	0	APP
Iron	µg/L	0	0	3500	4000	0.00	0.00	0	APP
Lead	µg/L	0	0	13.95840743	358.1966043	0.00	0.00	0	APP
Mercury	µg/L	0.00115	0.00115	0.051	1.4	2.25	0.08	0	APP
Nickel	µg/L	0.89	0.89	139.3622494	1253.477106	0.64	0.07	0	APP
Nitrate (as N)	µg/L	260	260	340010000	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	27.90546397	N/A	0.00	0	APP
Sulfate	µg/L	92450	92450	8500250000	N/A	0.00	N/A	0	APP
Thallium	µg/L	0	0	0.47	N/A	0.00	N/A	0	APP
Zinc	µg/L	0	0	320.5933309	320.5933309	0.00	0.00	0	APP
Total Residual Chlorine	µg/L	0	0	11	19	0.00	0.00	0	APP
Summer Ammonia (as N)	mg/l	0.25	0.25	4.068079817	N/A	6.15	N/A	0	APP
Winter Ammonia (as N)	mg/l	0.25	0.25	10.10118621	N/A	2.47	N/A	0	APP

8.5.2. Comparison of Technology Based Effluent Limitations to Water Quality Based Effluent Limitations

The final step in determining a permit's final limits is to compare the limitations generated from any effluent guidelines and other technology-based limitations to those generated from the water quality standards.

<u>Oil & Grease</u>

To ensure that both technology and water quality standards are achieved, both the numeric TBEL and the narrative water quality criteria [401 KAR 10:031 Section 2(b)] are applied.

8.6. 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].

8.6.1. 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].

8.6.2. Total Suspended Solids

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

8.6.3. Oil & Grease

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BCT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.54(e)], and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 2(1)(b)].

8.6.4. Total Organic Carbon

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.53(f)].

8.6.5. pH

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

SECTION 9

OUTFALL 015

9. OUTFALL 015

9.1. Outfall Description

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

TABLE 59.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.385977°	82.597415°	Big Sandy River	No treatment of stormwater and minor amounts of steam condensate from secondary containment structures and non-process operations located in the H-Coal Facility

9.2. Reported Values

The following table summarizes the reported values for Outfall 015:

TABLE 60.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Effluent Flow	MGD	0.92	1.66	N/A	N/A	N/A	N/A
Total Suspended Solids	mg/l	N/A	N/A	N/A	N/A	73.0	N/A
Oil & Grease	mg/l	N/A	N/A	N/A	N/A	4.80	N/A
Total Organic Carbon	mg/l	N/A	N/A	N/A	N/A	9.50	N/A
pH	SU	N/A	N/A	6.50	N/A	N/A	8.00
Total Recoverable Iron	mg/l	N/A	N/A	N/A	N/A	2.00	N/A
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	N/A	0.092	N/A

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2017 to 03/31/2022.

9.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 015:

TABLE 61.									
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	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	Report	15	N/A	1/Month	Grab
Total Organic Carbon	mg/l	N/A	N/A	N/A	Report	110	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab

9.4. 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: https://eec.ky.gov/Environmental-Protection/Forms%20Library/General%20Procedures%20for%20Limitations%20Development.pdf

9.4.1. Federally-Listed Threatened or Endangered Aquatic Species

There are no know federally-listed threatened or endangered aquatic species.

9.4.2. Technology-Based Effluent Limitations

9.4.2.1. General Requirement for Technology-Based 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 [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)].

9.4.2.2. 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 419 shall be applied to this outfall. The following is a list of those requirements:

419.52(e) BPT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best practicable control technology currently available by a point source subject to this subpart.

(5) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease and 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.53(f) BAT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(5) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.54(f) BCT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(5) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease based upon an analysis of any single grab or composite sample.

9.4.3. 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. This table may also include pollutants for which DOW has found the existence of reasonable potential to be indeterminate or for which DOW needs additional study.

TABLE 62.

Pollutant or Pollutant Characteristic	Basis
Total Suspended Solids	Due to the nature of the facility and the fact the receiving stream is impaired for sedimentation it is the division best professional judgement to continue monitoring for this pollutant.

9.5. Limitation Calculations

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	0	640	N/A	0.00	N/A	0	APP
Arsenic	µg/L	1.08	1.08	150	340	0.72	0.32	0	APP
Barium	µg/L	56680	56680	34001000	N/A	0.17	N/A	0	APP
Beryllium	µg/L	0	0	136004	N/A	0.00	N/A	0	APP
Cadmium	µg/L	0	0	1.045257476	2.678505813	0.00	0.00	0	APP
Chloride	µg/L	14780	14780	600000	1200000	2.46	1.23	0	APP
Chromium	µg/L	0	0	3400100	N/A	0.00	N/A	0	APP
Color	Platinum Cobalt Units	20	20	2550075	N/A	0.00	N/A	0	APP
Copper	µg/L	2.88	2.88	12.58812892	19.47984329	22.88	14.78	0	APP
Cyanide, Free	µg/L	0	0	5.2	22	0.00	0.00	0	APP
Fluoride	µg/L	820	820	136004000	N/A	0.00	N/A	0	APP
Iron	µg/L	2000	2000	3500	4000	57.14	50.00	0	DMR
Lead	µg/L	0	0	4.971729882	127.5830907	0.00	0.00	0	APP
Mercury	µg/L	0.137	0.137	0.051	1.4	268.63	9.79	0	APP
Nickel	µg/L	7.03		70.17763642	631.2043687	10.02	0.00	0	APP
Nitrate (as N)	µg/L	0	0	340010000	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	6.91727938	N/A	0.00	0	APP
Sulfate	µg/L	443300	44330	8500250000	N/A	0.01	N/A	0	APP
Thallium	µg/L	0	0	0.47	N/A	0.00	N/A	0	APP
Zinc	µg/L	92	92	161.2687561	161.2687561	57.05	57.05	0	DMR
Total Residual Chlorine	µg/L	0	0	11	19	0.00	0.00	0	APP
Summer Ammonia (as N)	mg/l	0.25	0.25	3046.991783	N/A	0.01	N/A	0	APP
Winter Ammonia (as N)	mg/l	0.25	0.25	7565.788468	N/A	0.00	N/A	0	APP

9.5.1. Comparison of Technology Based Effluent Limitations to Water Quality Based Effluent Limitations

The final step in determining a permit's final limits is to compare the limitations generated from any effluent guidelines and other technology-based limitations to those generated from the water quality standards.

<u>Oil & Grease</u>

To ensure that both technology and water quality standards are achieved, both the numeric TBEL and the narrative water quality criteria [401 KAR 10:031 Section 2(b)] are applied.

9.6. 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].

9.6.1. 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].

9.6.2. Total Suspended Solids

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

9.6.3. Oil & Grease

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BCT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.54(e)], and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 2(1)(b)].

9.6.4. Total Organic Carbon

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.53(f)].

9.6.5. pH

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

9.6.6. Total Recoverable Iron and Total Recoverable Zinc Removal

Based on the last five years of DMR data, the facility does not show reasonable potential for these parameters at this outfall. Therefore, the decision to remove these parameters from the permit is based

on the Division of Water's EPA-Approved "Permitting Procedures For Determining Reasonable Potential" and 40 CFR 122.44(d).

SECTION 10

OUTFALL 021

10. OUTFALL 021

10.1. Outfall Description

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

TABLE 63.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.370522°	82.595151°	Big Sandy River	No treatment of stormwater from Columbia Gas right-of-way through the refinery and minor amounts of steam condensate from secondary containment structures and non-process operations located in the #5 Crude Petrochemical and Catalytic Reforming Area.

10.2. Reported Values

The following table summarizes the reported values for Outfall 021:

TABLE 64.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Effluent Flow	MGD	0.006	0.110	N/A	N/A	N/A	N/A
Total Suspended Solids	mg/l	N/A	N/A	N/A	N/A	348	N/A
Oil & Grease	mg/l	N/A	N/A	N/A	N/A	5.00	N/A
Total Organic Carbon	mg/l	N/A	N/A	N/A	N/A	74.5	N/A
pH	SU	N/A	N/A	6.50	N/A	N/A	8.40
Total Recoverable Iron	mg/l	N/A	N/A	N/A	N/A	11.0	N/A
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	N/A	0.420	N/A

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2017 to 03/31/2022.

10.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 021:

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/Month	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	Report	15	N/A	1/Month	Grab
Total Organic Carbon	mg/l	N/A	N/A	N/A	Report	110	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab
Total Recoverable Iron	mg/l	N/A	N/A	N/A	Report	4.00[1]	N/A	1/Month	Grab
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	Report	0.145[1]	N/A	1/Month	Grab
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab

[1]These limitations shall apply on the date specified in the compliance schedule for this Outfall (see Section 16.1) 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.

10.4. 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: https://eec.ky.gov/Environmental-Protection/Forms%20Library/General%20Procedures%20for%20Limitations%20Development.pdf

10.4.1. Federally-Listed Threatened or Endangered Aquatic Species

There are no know federally-listed threatened or endangered aquatic species.

10.4.2. Technology-Based Effluent Limitations

10.4.2.1. General Requirement for Technology-Based 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 [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)].

10.4.2.2. 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 419 shall be applied to this outfall. The following is a list of those requirements:

419.52(e) BPT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best practicable control technology currently available by a point source subject to this subpart.

(6) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease and 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.53(f) BAT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(6) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.54(f) BCT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(6) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease based upon an analysis of any single grab or composite sample.

10.4.3. 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. This table may also include pollutants for which DOW has found the existence of reasonable potential to be indeterminate or for which DOW needs additional study.

TABLE 66.

Pollutant or Pollutant Characteristic	Basis
Total Suspended Solids	Due to the nature of the facility and the fact the receiving stream is impaired for sedimentation it is the division best professional judgement to continue monitoring for this pollutant.
Total Recoverable Iron	The discharge concentration of this pollutant exceeds 90% of the calculated acute water quality-based effluent limitations (WQBELs) for this pollutant.
Total Recoverable Zinc	The discharge concentration of this pollutant exceeds 90% of the calculated acute water quality-based effluent limitations (WQBELs) for this pollutant.

10.5. Limitation Calculations

10.5.1. 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	0	640	N/A	0.00	N/A	0	APP
Arsenic	µg/L	5.83	5.83	150	340	3.89	1.71	0	APP
Barium	µg/L	62.38	62.38	1076667667	N/A	0.00	N/A	0	APP
Beryllium	µg/L	0	0	4306670.667	N/A	0.00	N/A	0	APP
Cadmium	µg/L	0	0	0.944165197	2.364192007	0.00	0.00	0	APP
Chloride	µg/L	4650	4650	600000	1200000	0.78	0.39	0	APP
Color	Platinum Cobalt Units	60	60	80750075	N/A	0.00	N/A	0	APP
Copper	µg/L	0	0	11.28860815	17.27459981	0.00	0.00	0	APP
Cyanide, Free	µg/L	0	0	5.2	22	0.00	0.00	0	APP
Fluoride	µg/L	0	0	4306670667	N/A	0.00	N/A	0	APP
Iron	µg/L	1590	11000	3500	4000	45.43	275.00	0	DMR
Lead	µg/L	0	0	4.226792316	108.4667189	0.00	0.00	0	APP
Mercury	µg/L	0.00195	0.00195	0.051	1.4	3.82	0.14	0	APP
Nickel	µg/L	1.01	1.01	63.00117782	566.656569	1.60	0.18	0	APP
Nitrate (as N)	µg/L	0	0	10766676667	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	5.555006694	N/A	0.00	0	APP
Sulfate	µg/L	20300	20300	2.69167E+11	N/A	0.00	N/A	0	APP
Thallium	µg/L	0	0	0.47	N/A	0.00	N/A	0	APP
Zinc	µg/L	58	420	144.7532009	144.7532009	40.07	290.15	0	DMR
Total Residual Chlorine	µg/L	0	0	11	19	0.00	0.00	0	APP
Summer Ammonia (as N)	mg/l	0.25	0.25	96363.31867	N/A	0.00	N/A	0	APP
Winter Ammonia (as N)	mg/l	0.25	0.25	239273.5318	N/A	0.00	N/A	0	APP

10.5.2. Comparison of Technology Based Effluent Limitations to Water Quality Based Effluent Limitations

The final step in determining a permit's final limits is to compare the limitations generated from any effluent guidelines and other technology-based limitations to those generated from the water quality standards.

Oil & Grease

To ensure that both technology and water quality standards are achieved, both the numeric TBEL and the narrative water quality criteria [401 KAR 10:031 Section 2(b)] are applied.

10.6. 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].

10.6.1. 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].

10.6.2. Total Suspended Solids

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

10.6.3. Oil & Grease

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BCT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.54(e)], and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 2(1)(b)].

10.6.4. Total Organic Carbon

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.53(f)].

10.6.5. pH

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

10.6.6. Total Recoverable Iron and Total Recoverable Zinc

The limitations for these parameters are consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 6]. The chronic criteria for these parameters do not apply since this outfall discharges intermittently.

10.6.7. Hardness

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

SECTION 11

OUTFALL 022

11. OUTFALL 022

11.1. 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	38.377762°	82.593748°	Big Sandy River	No treatment of stormwater and minor amounts of steam condensate from secondary containment structures and non-process operations located in the Air Assisted Flare and old Barge Slip Areas.

11.2. Reported Values

The following table summarizes the reported values for Outfall 022:

TABLE 68.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Effluent Flow	MGD	0.100	2.40	N/A	N/A	N/A	N/A
Total Suspended Solids	mg/l	N/A	N/A	N/A	N/A	682	N/A
Oil & Grease	mg/l	N/A	N/A	N/A	N/A	5.30	N/A
Total Organic Carbon	mg/l	N/A	N/A	N/A	N/A	12.0	N/A
pH	SU	N/A	N/A	6.80	N/A	N/A	8.30

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2017 to 03/31/2022.

11.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 022:

TABLE 69.									
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	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	Report	15	N/A	1/Month	Grab
Total Organic Carbon	mg/l	N/A	N/A	N/A	Report	110	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab
Total Recoverable Iron	mg/l	N/A	N/A	N/A	Report	4.00[1]	N/A	1/Month	Grab
[1]These limitations shall apply on the date specified in the compliance schedule for this Outfall (see Section 16.1) 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.									

11.4. 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: https://eec.ky.gov/Environmental-Protection/Forms%20Library/General%20Procedures%20for%20Limitations%20Development.pdf

11.4.1. Federally-Listed Threatened or Endangered Aquatic Species

There are no know federally-listed threatened or endangered aquatic species.

11.4.2. Technology-Based Effluent Limitations

11.4.2.1. General Requirement for Technology-Based 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 [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)].

11.4.2.2. 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 419 shall be applied to this outfall. The following is a list of those requirements:

419.52(e) BPT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best practicable control technology currently available by a point source subject to this subpart.

(7) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease and 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.53(f) BAT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(7) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.54(f) BCT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(7) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease based upon an analysis of any single grab or composite sample.

11.4.3. 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. This table may also include pollutants for which DOW has found the existence of reasonable potential to be indeterminate or for which DOW needs additional study.

TABLE 70.

Pollutant or Pollutant Characteristic	Basis
Total Suspended Solids	Due to the nature of the facility and the fact the receiving stream is impaired for sedimentation it is the division best professional judgement to continue monitoring for this pollutant.
Total Recoverable Iron	The discharge concentration of this pollutant exceeds 90% of the calculated acute water quality-based effluent limitations (WQBELs) for this pollutant.

11.5. Limitation Calculations

11.5.1. 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 9	Maximum Discharge 9	MZF	Data Sou
Antimony	µg/L	0	0	640	N/A	0.00	N/A	0	APP
Arsenic	µg/L	0	0	150	340	0.00	0.00	0	APP
Barium	µg/L	123	123	64601000	N/A	0.00	N/A	0	APP
Beryllium	µg/L	0	0	258404	N/A	0.00	N/A	0	APP
Cadmium	µg/L	0	0	1.217934443	3.231292924	0.00	0.00	0	APP
Chloride	µg/L	11250	11250	600000	1200000	1.88	0.94	0	APP
Color	Platinum Cobalt Units	445	445	4845075	N/A	0.01	N/A	0	APP
Copper	µg/L	13.05	13.05	14.8282483	23.33534808	88.01	55.92	0	APP
Cyanide, Free	µg/L	0	0	5.2	22	0.00	0.00	0	APP
Fluoride	µg/L	170	170	258404000	N/A	0.00	N/A	0	APP
Iron	µg/L	13182.5	13182.5	3500	4000	376.64	329.56	0	APP
Lead	µg/L	10.85	10.85	6.345592446	162.8387535	170.98	6.66	0	APP
Mercury	µg/L	0.01368	0.01368	0.051	1.4	26.82	0.98	0	APP
Nickel	µg/L	11.68	11.68	82.53152383	742.3199334	14.15	1.57	0	APP
Nitrate (as N)	µg/L	860	860	646010000	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	9.618520899	N/A	0.00	0	APP
Sulfate	µg/L	16030	16030	16150250000	N/A	0.00	N/A	0	APP
Thallium	µg/L	0	0	0.47	N/A	0.00	N/A	0	APP
Zinc	µg/L	70.4	70.4	189.7053483	189.7053483	37.11	37.11	0	APP
Total Residual Chlorine	µg/L	0	0	11	19	0.00	0.00	0	APP
Summer Ammonia (as N)	mg/l	0.25	0.25	5785.623115	N/A	0.00	N/A	0	APP
Winter Ammonia (as N)	mg/l	0.25	0.25	14365.90702	N/A	0.00	N/A	0	APP

11.5.2. Comparison of Technology Based Effluent Limitations to Water Quality Based Effluent Limitations

The final step in determining a permit's final limits is to compare the limitations generated from any effluent guidelines and other technology-based limitations to those generated from the water quality standards.

Oil & Grease

To ensure that both technology and water quality standards are achieved, both the numeric TBEL and the narrative water quality criteria [401 KAR 10:031 Section 2(b)] are applied.

11.6. 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].

11.6.1. 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].

11.6.2. Total Suspended Solids

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

11.6.3. Oil & Grease

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BCT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.54(e)], and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 2(1)(b)].

11.6.4. Total Organic Carbon

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.53(f)].

11.6.5. pH

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

11.6.6. Total Recoverable Iron

The limitation for this parameter is consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 6]. The chronic criteria for this parameter do not apply since this outfall discharges intermittently.

SECTION 12

OUTFALL 023

12. OUTFALL 023

12.1. Outfall Description

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

TABLE 71.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.375842°	82.593016°	Big Sandy River	No treatment of stormwater and minor amounts of steam condensate from secondary containment structures and non-process operations located in the Dry Well Area.

12.2. Reported Values

The following table summarizes the reported values for Outfall 023:

TABLE 72.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Effluent Flow	MGD	0.023	0.639	N/A	N/A	N/A	N/A
Total Suspended Solids	mg/l	N/A	N/A	N/A	547	4920	N/A
Oil & Grease	mg/l	N/A	N/A	N/A	N/A	5.10	N/A
Total Organic Carbon	mg/l	N/A	N/A	N/A	N/A	14.0	N/A
pH	SU	N/A	N/A	6.80	N/A	N/A	8.40

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2017 to 03/31/2022.

12.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 023:

TABLE 73.

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	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	Report	15	N/A	1/Month	Grab
Total Organic Carbon	mg/l	N/A	N/A	N/A	Report	110	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab
Total Recoverable Iron	mg/l	N/A	N/A	N/A	Report	4.00[1]	N/A	1/Month	Grab

[1]These limitations shall apply on the date specified in the compliance schedule for this Outfall (see Section 16.1) 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.

12.4. 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: https://eec.ky.gov/Environmental-Protection/Forms%20Library/General%20Procedures%20for%20Limitations%20Development.pdf

12.4.1. Federally-Listed Threatened or Endangered Aquatic Species

There are no know federally-listed threatened or endangered aquatic species.

12.4.2. Technology-Based Effluent Limitations

12.4.2.1. General Requirement for Technology-Based 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 [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)].

12.4.2.2. 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 419 shall be applied to this outfall. The following is a list of those requirements:

419.52(e) BPT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best practicable control technology currently available by a point source subject to this subpart.

(8) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease and 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.53(f) BAT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(8) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.54(f) BCT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(8) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease based upon an analysis of any single grab or composite sample.

12.4.3. 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. This table may also include pollutants for which DOW has found the existence of reasonable potential to be indeterminate or for which DOW needs additional study.

TABLE 74.

Pollutant or Pollutant Characteristic	Basis
Total Suspended Solids	Due to the nature of the facility and the fact the receiving stream is impaired for sedimentation it is the division best professional judgement to continue monitoring for this pollutant.
Total Recoverable Iron	The discharge concentration of this pollutant exceeds 90% of the calculated acute water quality-based effluent limitations (WQBELs) for this pollutant.

12.5. Limitation Calculations

12.5.1. 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	0	640	N/A	0.00	N/A	0	APP
Arsenic	µg/L	2.65	2.65	150	340	1.77	0.78	0	APP
Barium	µg/L	91.08	91.08	280870565.2	N/A	0.00	N/A	0	APP
Cadmium	µg/L	0	0	1.143924486	2.992024724	0.00	0.00	0	APP
Chloride	µg/L	6030	6030	600000	1200000	1.01	0.50	0	APP
Chromium	µg/L	8.13	8.13	28087056.52	N/A	0.00	N/A	0	APP
Color	Platinum Cobalt Units	625	625	21065292.39	N/A	0.00	N/A	0	APP
Copper	µg/L	12.95	12.95	13.86515199	21.66984232	93.40	59.76	0	APP
Cyanide, Free	µg/L	0	0	5.2	22	0.00	0.00	0	APP
Fluoride	µg/L	200	200	1123482261	N/A	0.00	N/A	0	APP
Iron	µg/L	12317	12317	3500	4000	351.91	307.93	0	APP
Lead	µg/L	10.13	10.13	5.741468704	147.3359052	176.44	6.88	0	APP
Mercury	µg/L	0.279	0.279	0.051	1.4	547.06	19.93	0	APP
Nickel	µg/L	14.73	14.73	77.22266137	694.5700042	19.07	2.12	0	APP
Nitrate (as N)	µg/L	150	150	2808705652	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	8.402381922	N/A	0.00	0	APP
Sulfate	µg/L	7600	7600	70217641304	N/A	0.00	N/A	0	APP
Thallium	µg/L	0	0	0.47	N/A	0.00	N/A	0	APP
Zinc	µg/L	93.55	93.55	177.4843668	177.4843668	52.71	52.71	0	APP
Total Residual Chlorine	µg/L	0	0	11	19	0.00	0.00	0	APP
Summer Ammonia (as N)	mg/l	0.25	0.25	25141.26389	N/A	0.00	N/A	0	APP
Winter Ammonia (as N)	mg/l	0.25	0.25	62426.6483	N/A	0.00	N/A	0	APP

12.5.2. Comparison of Technology Based Effluent Limitations to Water Quality Based Effluent Limitations

The final step in determining a permit's final limits is to compare the limitations generated from any effluent guidelines and other technology-based limitations to those generated from the water quality standards.

Oil & Grease

To ensure that both technology and water quality standards are achieved, both the numeric TBEL and the narrative water quality criteria [401 KAR 10:031 Section 2(b)] are applied.

12.6. 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].

12.6.1. 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].

12.6.2. Total Suspended Solids

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

12.6.3. Oil & Grease

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BCT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.54(e)], and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 2(1)(b)].

12.6.4. Total Organic Carbon

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.53(f)].

12.6.5. pH

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

12.6.6. Total Recoverable Iron

The limitation for this parameter is consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 6]. The chronic criteria for this parameter do not apply since this outfall discharges intermittently.

SECTION 13

OUTFALL 025

13. OUTFALL 025

13.1. Outfall Description

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

TABLE 75.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.374423°	82.593378°	Big Sandy River	Stormwater and occasional clarified water from the firewater system. Discharge through this outfall is very rare.

13.2. Reported Values

There has been no reported discharge from Outfall 025 during the last permit cycle.

13.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 025:

TABLE 76.									
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	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	30	50	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab
Total Recoverable Iron	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Total Residual Chlorine	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab

13.4. 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: https://eec.ky.gov/Environmental-Protection/Forms%20Library/General%20Procedures%20for%20Limitations%20Development.pdf

13.4.1. Federally-Listed Threatened or Endangered Aquatic Species

There are no know federally-listed threatened or endangered aquatic species.

13.4.2. Technology-Based Effluent Limitations

13.4.2.1. General Requirement for Technology-Based 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 [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)].

13.4.2.2. Federal Effluent Limitations Guidelines

The DOW has reviewed this non-POTW's operation, its processes, it wastestreams and its Standard Industrial Classification. The DOW found no Effluent Guideline that applies to this Outfall's discharge.

13.4.3. 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. This table may also include pollutants for which DOW has found the existence of reasonable potential to be indeterminate or for which DOW needs additional study.

TABLE 77.

Pollutant or Pollutant Characteristic	Basis
Total Suspended Solids	Due to the nature of the facility and the fact the receiving stream is impaired for sedimentation it is the division best professional judgement to continue monitoring for this pollutant.
Total Residual Chlorine	Since the facility identified chlorine as a possible treatment for their water supply it is the Divisions best professional judgement to continue monitoring for this pollutant.
Total Recoverable Iron	While estimated results excess 90% it is the Division best professional judgement to collect additional data prior to imposing a limit. The estimated result is not expected to be representative of the discharge from this outfall. However, DOW will continue to monitor this pollutant.

13.5. Limitation Calculations

13.5.1. 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
Barium	µg/L	361	361	646001000	N/A	0.00	N/A	0	APP
Chloride	µg/L	50000	50000	600000	1200000	8.33	4.17	0	APP
Color	Platinum Cobalt Units	140	140	48450075	N/A	0.00	N/A	0	APP
Fluoride	µg/L	22000	22000	2584004000	N/A	0.00	N/A	0	APP
Iron	µg/L	8571	8571	3500	4000	244.89	214.28	0	APP
Nitrate (as N)	µg/L	31250	31250	6460010000	N/A	0.00	N/A	0	APP
Sulfate	µg/L	77000	77000	1.615E+11	N/A	0.00	N/A	0	APP
Total Residual Chlorine	µg/L	0	0	11	19	0.00	0.00	0	APP
Summer Ammonia (as N)	mg/l	1572	1572	57819.61843	N/A	2.72	N/A	0	APP
Winter Ammonia (as N)	mg/l	1572	1572	143568.1595	N/A	1.09	N/A	0	APP

13.6. 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].

13.6.1. 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].

13.6.2. Total Suspended Solids and Total Recoverable Iron

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

13.6.3. pH

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

13.6.4. Total Residual Chlorine

The limitations for this parameter are consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 6].

SECTION 14

OUTFALL 027

14. OUTFALL 027

14.1. Outfall Description

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

TABLE 78.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.381726°	82.600843°	Chadwick's Creek	No treatment of stormwater from Cider Drive, North Gate Entrance, CSX Railroad, North End Truck Scales, H-Coal Office Building Parking Area and North Product Tank Farm Area.

14.2. Reported Values

The following table summarizes the reported values for Outfall 027:

TABLE 79.							
Reported Parameters	**Units**	**EFFLUENT**					
		Loadings (lbs./day)		**Concentrations**			
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**
Effluent Flow	MGD	5.67	73.7	N/A	N/A	N/A	N/A
Total Suspended Solids	mg/l	N/A	N/A	N/A	N/A	670	N/A
Oil & Grease	mg/l	N/A	N/A	N/A	N/A	18.4	N/A
Total Organic Carbon	mg/l	N/A	N/A	N/A	N/A	65.0	N/A
pH	SU	N/A	N/A	6.60	N/A	N/A	8.30
Total Recoverable Iron	mg/l	N/A	N/A	N/A	N/A	29.0	N/A

The above values are based on 5-year Discharge Monitoring Report (DMR) averages from 10/31/2017 to 03/31/2022.

14.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 027:

TABLE 80.

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	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	Report	15	N/A	1/Month	Grab
Total Organic Carbon	mg/l	N/A	N/A	N/A	Report	110	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab
Total Recoverable Iron	mg/l	N/A	N/A	N/A	Report	4.00[1]	N/A	1/Month	Grab

[1]These limitations shall apply on the date specified in the compliance schedule for this Outfall (see Section 16.1) 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.

14.4. 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: https://eec.ky.gov/Environmental-Protection/Forms%20Library/General%20Procedures%20for%20Limitations%20Development.pdf

14.4.1. Federally-Listed Threatened or Endangered Aquatic Species

There are no know federally-listed threatened or endangered aquatic species.

14.4.2. Technology-Based Effluent Limitations

14.4.2.1. General Requirement for Technology-Based 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 [401 KAR 5:065, Section 2(4) – 40 CFR 122.44(a)].

14.4.2.2. 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 419 shall be applied to this outfall. The following is a list of those requirements:

419.52(e) BPT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best practicable control technology currently available by a point source subject to this subpart.

(9) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease and 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.53(f) BAT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(9) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 110 mg/l total organic carbon (TOC) based upon an analysis of any single grab or composite sample.

419.54(f) BCT for contaminated runoff

The following effluent limitations constitute the quantity and quality of pollutants or pollutant properties controlled by this paragraph and attributable to contaminated runoff, which may be discharged after the application of the best available technology economically achievable by a point source subject to this subpart.

(9) If wastewater consists solely of contaminated runoff and is not commingled or treated with process wastewater, it may be discharged if it does not exceed 15 mg/l oil and grease based upon an analysis of any single grab or composite sample.

14.4.3. 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. This table may also include pollutants for which DOW has found the existence of reasonable potential to be indeterminate or for which DOW needs additional study.

TABLE 81.

Pollutant or Pollutant Characteristic	Basis
Total Suspended Solids	Due to the nature of the facility, it is the division best professional judgement to continue monitoring for this pollutant.
Total Recoverable Iron	The discharge concentration of this pollutant exceeds 90% of the calculated acute water quality-based effluent limitations (WQBELs) for this pollutant.

14.5. Limitation Calculations

14.5.1. 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	0	640	N/A	0.00	N/A	0	APP
Arsenic	µg/L	0	0	150	340	0.00	0.00	0	APP
Barium	µg/L	51.7	51.7	1140329.806	N/A	0.00	N/A	0	APP
Beryllium	µg/L	0	0	4561.319224	N/A	0.00	N/A	0	APP
Cadmium	µg/L	0	0	1.750340225	5.04256113	0.00	0.00	0	APP
Chloride	µg/L	88130	88130	600000	1200000	14.69	7.34	0	APP
Chromium	µg/L	0	0	114032.9806	N/A	0.00	N/A	0	APP
Color	Platinum Cobalt Units	15	15	85524.73545	N/A	0.02	N/A	0	APP
Copper	µg/L	0	0	21.86769716	35.81319329	0.00	0.00	0	APP
Cyanide, Free	µg/L	0	0	5.2	22	0.00	0.00	0	APP
Fluoride	µg/L	250	250	4561319.224	N/A	0.01	N/A	0	APP
Iron	µg/L	2000	29000	3500	4000	57.14	725.00	0	DMR
Lead	µg/L	0	0	11.31916446	290.4691165	0.00	0.00	0	APP
Mercury	µg/L	0	0	0.051	1.4	0.00	0.00	0	APP
Nickel	µg/L	3.18	3.18	121.2424818	1090.501022	2.62	0.29	0	APP
Nitrate (as N)	µg/L	200	200	11403298.06	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	21.02357384	N/A	0.00	0	APP
Sulfate	µg/L	75780	75780	285082451.5	N/A	0.03	N/A	0	APP
Thallium	µg/L	0	0	0.47	N/A	0.00	N/A	0	APP
Zinc	µg/L	9.85	9.85	278.8503553	278.8503553	3.53	3.53	0	APP
Total Residual Chlorine	µg/L	0	0	11	19	0.00	0.00	0	APP
Summer Ammonia (as N)	mg/l	0.25	0.25	4.068079817	N/A	6.15	N/A	0	APP
Winter Ammonia (as N)	mg/l	0.25	0.25	10.10118621	N/A	2.47	N/A	0	APP

14.5.2. Comparison of Technology Based Effluent Limitations to Water Quality Based Effluent Limitations

The final step in determining a permit's final limits is to compare the limitations generated from any effluent guidelines and other technology-based limitations to those generated from the water quality standards.

Oil & Grease

To ensure that both technology and water quality standards are achieved, both the numeric TBEL and the narrative water quality criteria [401 KAR 10:031 Section 2(b)] are applied.

14.6. 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].

14.6.1. 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].

14.6.2. Total Suspended Solids

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

14.6.3. Oil & Grease

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BCT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.54(e)], and consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 2(1)(b)].

14.6.4. Total Organic Carbon

The limits 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(a)(1) and 122.44(i)(1)], and the criteria and standards for imposing TBELs [401 KAR 5:065, Section 2(6) – 40 CFR 122 Appendix A]. The limits are representative of the BPT and BAT requirements for Integrated Subcategory Petroleum Refining Point Source Category [40 CFR 419.52(e) and 419.53(f)].

14.6.5. pH

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

14.6.6. Total Recoverable Iron

The limitation for this parameter is consistent with Kentucky's Water Quality Standards [401 KAR 10:031, Section 6]. The chronic criteria for this parameter do not apply since this outfall discharges intermittently.

SECTION 15

OUTFALL 028

15. OUTFALL 028

15.1. Outfall Description

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

TABLE 82.				
Outfall Type	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
External	38.375917°	82.592900°	Big Sandy River	Raw Water Intake

15.2. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 028:

TABLE 83.									
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/Week	Instantaneous
Temperature	°F	N/A	N/A	N/A	Report	Report	N/A	1/Week	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 is functioning as designed and is being appropriately maintained and operated.									
[2]If intake system is not functioning as designed a "1" is to be reported. If intake system is functioning as designed a "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.									

15.3. 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: https://eec.ky.gov/Environmental-Protection/Forms%20Library/General%20Procedures%20for%20Limitations%20Development.pdf

15.3.1. Cooling Water Intake

15.3.1.1. Cooling Water Intake Description

Catlettsburg Refining, LLC is located near Catlettsburg, Boyd County, Kentucky and owned by Marathon Petroleum Corporation. Catlettsburg Refining operates an integrated petroleum refinery processing sweet and sour as well as light and heavy crude oils into a variety of products including, but not limited to unleaded, mid-grade, super unleaded, and reformulated gasolines, asphalt; jet fuel; diesel fuels; heavy fuel oil; propane; propylene; cumene; toluene; butane; and sulfur. The facility is located on the western bank of the Big Sandy River approximately three miles from the confluence with the Ohio River. Catlettsburg Refining operates a Cooling Water Intake Structure that draws water directly from the river which has a $7Q_{10}$ flow of 220 cfs. The Cooling Water Intake Structure operates to provide a continuous supply for water from the Big Sandy River to the facility for process purposes and non-contact, closed-cycle cooling, 365 days per year. The Cooling Water Intake Structure consist of the following major components:

-Intake structure consisting of a concrete and sheet pile box in the Big Sandy River

-Vertical grate with removable panels and screens at face of intake

-Four (4) perforated intake pipes located inside the intake structure

- Four (4) intake water pumps

The Cooling Water Intake Structure is constructed of concrete and sheet pile box that is trapezoidal in shape and built into the shoreline. The structure extends into the river (perpendicular to river flow) approximately 60 feet. Water is drawn into the Cooling Water Intake Structure through the eastern face of the structure through an opening constructed of vertical grate with screens, which include a lower section with blinder panels and an upper section with removable screens. The overall dimensions of the intake face are approximately 48 feet wide by 24 feet high. The six blinder panels are constructed of 3/8 – inch steel plates. The six removable screens are constructed of ¾ - inch crossbar openings. After passing through the removable screens, water enters a chamber with four 30-in diameter perforated intake pipes. The four intake pipes discharge to a drywell that house four pumps to convey the water to one of two clarifiers for treatment prior to use in the facility. Each pump has a dedicated intake pie and only one intake pump is typically in operation at a time, with three additional pumps providing backup for maintenance purposes. The design intake flow is 15.5 MGD, which is equivalent to 11% of the Big Sandy River $7Q_{10}$, due to the physical configuration of the Facility river water supply system. Monthly withdrawal data from January 2016 through December 2020, indicates that the average actual intake flow form this period was 11.2 MGD, which is equivalent to 8% of the Big Sandy River $7Q_{10}$. Approximately 42% is used for non-contact cooling, 28% is used for high quality water production, and 29 % is used for fire water supply. The through screen velocity through the intake screens has been calculated assuming the Design Intake Flow (15.5 MGD) and maximum 5-year Average Intake Flow (15.4 MGD).The calculations assume that under current operations, up to 15.5 MGD may be withdrawn on a daily basis due to the downstream pumping and piping limitations. The through-screen velocity were calculated as 0.09 feet per second based on design flow and actual intake flow. Catlettsburg Refining employs a Closed Cycle Recirculating System that includes elven mechanical draft cooling towers that are used to dissipate heat from the plant condenser steam cycle. Closed Cycle Recirculating System includes a blowdown system to control the

dissolved solids concentration in the circulating water. Approximately 749 GPM or 0.4 percent of the total circulating water is discharge continually as blowdown to control the solids build-up and to minimize scale formation in the system. The total typical flow of circulating water for the Closed Cycle Recirculating System is 278 MGD. Each mechanical draft cooling tower currently discharges between 77 and 609 GPM of water vapor to the atmosphere. Additionally, total of approximately 749 GPM of water is discharge as blowdown. Blowdown form the Closed Cycle Recirculating System is discharge to the on-site wastewater treatment plant for treatment prior to ultimate discharge to the Big Sandy River via a multi-port diffuser at Outfall 001. The makeup for the Closed Cycle Recirculating System is provided from the Cooling Water Intake Structure and is designed to provide approximately 4.2 MGD, equivalent to 3% of the Big Sandy River $7Q_{10}$, of total makeup water. The cooling towers typically operate between three to six cycles of concentration. Due to the operations of the cooling towers intake flow reductions are achieved through minimized makeup water withdrawals when compared to the facilities circulating water flow. The combined internal circulating water flow in cooling water systems is 278 MGD with a design and maximum average makeup water flow of 15.5 MGD. This results in 94.4% reduction in the cooling water flow withdrawn from the Big Sandy River. There is no emergency intake at the facility.

15.3.1.2. 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). Catlettsburg Refining employs a Closed Cycle Recirculating System that includes eleven mechanical draft cooling towers. The cooling towers typically operate between three to six cycles of concentration.

In addition to meeting the requirements of 40 CFR 125.94(c)(1), Catlettsburg Refining has a through-bar velocity at the face of the Cooling Water Intake Structure of less thank 0.5 feet per second at normal river water elevation and both the Design and maximum Average Intake Flows. While the Rule does not require a facility to meet more than one compliance alternative to demonstrate impingement mortality compliance, the ability to meet multiple compliance alternatives further documents that Catlettsburg Refining complies with BTA for impingement.

15.3.1.3. 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.” The use of closed-cycle cooling compared to once-through reduces the water withdrawal rate (and thus minimizes entrainment through flow reduction) at Catlettsburg Refining by approximately 94.4%.

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 land is not available on or near the facility. The facility already uses mechanical draft cooling towers. Therefore, this is not considered a critical factor.
Remaining useful plant life	There are no plans for any new units at Catlettsburg Refining in the next five 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. However, all the cooling systems utilize wet mechanical draft cooling towers.
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 no plans for any new units at Catlettsburg Refining in the next five 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.

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 as opposed to the 3 mm screens already in installed is early life stage organisms (i.e. nursery areas). Since the facilities intake screens are already 60 feet from the banks of the Big Sandy 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 and thus increasing the area of influence.

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. 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 no plans for any new units at Catlettsburg Refining in the next five 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. This technology is estimated to provide only minor reductions to entrainment in conjunction with the low design velocity.

Water Reuse or Alternate Sources of Cooling Water
This is typically not an option for large industrial sites due to the high volume of cooling water that is required. Recent cooling water withdraw flows average around 4.2 MGD.

15.3.2. Intake Structure Standard Requirements

15.3.2.1. 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).

15.3.2.2. 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).

15.3.2.3. Reporting Requirements

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

15.3.2.4. 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.

15.4. 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].

15.4.1. 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].

15.4.2. Temperature

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

15.4.3. 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 16

OTHER CONDITIONS

16. OTHER CONDITIONS

16.1. 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].

16.1.1. Stormwater Compliance Schedule

The permittee shall comply with all Outfall 004, 021, 022, 023, and 027 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 Total Recoverable Iron requirement at Outfall 004, 021, 022, 023, and 027, and the Total Recoverable Zinc requirement at Outfall 021. These outfalls consist of stormwater runoff from the facility, there are no discernable stream or sources to check, and the outfalls have low intermittent discharge rates. It is not clear if iron or zinc is being introduced from sources outside the refinery or if the source can be attributed to a particular industrial activity or multiple diffused sources with the refinery. This compliance schedule will allow the facility time to properly study and track sources of iron and zinc, and to evaluate feasible control methods, including Best Management Practices, to minimize concentrations in these outfalls' discharges. Unless something obvious that can be fixed quickly is found, engineering would need to be involved to develop a repair plan and budget. Then the budget would need to be approved by management and a contract awarded to perform the work. This engineering, budget approval and contract work could take as much as a year. Not knowing what the fix may entail, proposed corrections could take a year to fully implement. The milestones and compliance dates in the following schedule of compliance were developed for these outfalls. The following table outlines each of the compliance schedule's milestones and the corresponding compliance duration:

TABLE 84.

Milestone	Compliance Date
Initiate an investigation to determine the possible causes for the elevated iron and zinc results. Additionally, the permittee shall submit to DOW Surface Water Permits Branch a report on the possible causes of elevated iron and zinc levels.	One year from the effective date of this permit
Continue an investigation to determine the possible causes for the elevated iron and zinc results. Additionally, the permittee shall submit to DOW Surface Water Permits Branch a report on the possible causes of elevated iron and zinc levels.	Two years from the effective date of this permit
The permittee shall submit to DOW Surface Water Permits Branch a status report how the facility plans to come into compliance with the iron and zinc requirements and what steps still need to be taken.	Three years from the effective date of this permit
The permittee shall submit to DOW Surface Water Permits Branch a status report of the steps the facility has taken to come into compliance with the iron and zinc requirements and what steps still need to be taken.	Four years from the effective date of this permit

The permittee shall achieve compliance with the Total Recoverable Iron and Zinc limitations.	As soon as possible, but not later than 5 years from the effective date of this permit

16.2. Antidegradation

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.

16.3. 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].

16.4. 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)].

16.5. Certified Laboratory

The condition that all environmental analysis to be performed by a certified laboratory is consistent with the certified wastewater laboratory requirements [401 KAR 5:320, Section 1].

16.6. Best Management Practices Plan (BMPP)

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)]

16.7. 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.

16.8. Location Map