pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Southwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0031933**
Facility Type	**Industrial**	APS ID	**1076342**
Major / Minor	**Minor**	Authorization ID	**1418714**

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

Applicant and Facility Information

Applicant Name	**Brunot Island Power LLC**	Facility Name	**Brunot Island Generating Station**
Applicant Address	PO Box 99907	Facility Address	Brunot Island @ Ohio River MM 2.2
	Pittsburgh, PA 15233-0907		Pittsburgh, PA 15233-0907
Applicant Contact	Karen McClelland, Sr. Env. Specialist	Facility Contact	David Solomon, Ops & Maintenance Mgr.
Applicant Phone	(724) 877-4462	Facility Phone	(410) 474-3185
Applicant Email	karen.mcclelland@genon.com	Facility Phone	david.solomon@genon.com
Client ID	351064	Site ID	245377
SIC Code	4911	Municipality	Pittsburgh City
SIC Description	Trans. & Utilities - Electric Services	County	Allegheny
Date Application Received	November 28, 2022	EPA Waived?	Yes
Date Application Accepted	November 30, 2022	If No, Reason	
Purpose of Application	Renewal of an NPDES permit for discharges from an oil and natural gas-fired power station.		

Summary of Review

On November 28, 2022, Brunot Island Power, LLC submitted an application to renew the NPDES permit for the Brunot Island Generating Station (Station), which consists of one oil-fired, simple cycle peaking unit and a 3×1 gas-fired, combined cycle unit with a total capacity of 259 MW. The NPDES permit currently in effect was issued on May 7, 2018 with an effective date of June 1, 2018 and an expiration date of May 31, 2023. The permit was amended on October 10, 2019 to transfer the permit from NRG Power Midwest LP to Brunot Island Power, LLC. The permit renewal application was due by December 2, 2022 (180 days before expiration). Since the application was received before December 2, 2022, the renewal application was timely, so the terms and conditions of the 2018 NPDES permit were administratively extended past May 31, 2023.

The NPDES permit authorizes discharges from five outfalls: 001, 002, 003, 004 and 005, and two internal monitoring points (IMPs): 201 and 301. Outfall 001 discharges a combination of low volume waste sources—monitored internally at IMPs 201 and 301—and cooling tower blowdown. Outfall 002 discharges treated sewage. Outfall 003 discharges low volume waste sources and storm water. Outfall 004 discharges intake screen backwash water from the Station's cooling water intake structure. Outfall 005 discharges storm water runoff that is not exposed to industrial activities. Effluent limits for process wastewater discharges and sewage discharges are imposed in accordance with 40 CFR Part 423 – Steam Electric Power Generation Point Source Category Effluent Limitations Guidelines and 25 Pa. Code § 92a.47 regarding secondary treatment requirements for sewage discharges.

Clean Water Act Section 316(b) – Cooling Water Intake Structures

The Station has a cooling water intake structure on the Ohio River that supplies the Station with water used for cooling and other purposes. Section 316(b) of the Clean Water Act requires the use of Best Technology Available to minimize adverse environmental impact, which includes the minimization of impingement mortality and entrainment of all life stages of fish and shellfish at cooling water intake structures for power-generating and manufacturing facilities.

Approve	Deny	Signatures	Date
✓		Ryan C. Decker, P.E. / Environmental Engineer	January 22, 2024
X		Michael E. Fifth, P.E. / Environmental Engineer Manager	January 23, 2024

Summary of Review

On August 15, 2014, EPA promulgated regulations to implement Section 316(b) of Clean Water Act for cooling water intake structures. The Final Rule took effect on October 14, 2014. Regulations implementing the 2014 Final Rule (and the previously promulgated Phase I Rule) are provided in 40 CFR Part 125, Subparts I and J for new facilities and existing facilities, respectively. Associated NPDES permit application requirements for facilities with cooling water intake structures are provided in 40 CFR Part 122, Subpart B – Permit Application and Special NPDES Program Requirements (§ 122.21(r)).

The cooling water intake structure at the Station meets the applicability criteria for requirements under 40 CFR Part 125, Subpart J, §§ 125.94 through 125.99, which are implemented as part of this permit. The BTA standard for minimizing impingement mortality and entrainment at the Station will be identified in the permit as operation of a closed-cycle recirculating system. However, to support that determination and address comments on the application from the Pennsylvania Fish and Boat Commission, the permit will require the collection of one peak season of entrainment data.

Public Participation

DEP will publish notice of the receipt of the NPDES permit application and a tentative decision to issue the individual NPDES permit in the *Pennsylvania Bulletin* in accordance with 25 Pa. Code § 92a.82. Upon publication in the *Pennsylvania Bulletin*, DEP will accept written comments from interested persons for a 30-day period (which may be extended for one additional 15-day period at DEP's discretion), which will be considered in making a final decision on the application. Any person may request or petition for a public hearing with respect to the application. A public hearing may be held if DEP determines that there is significant public interest in holding a hearing. If a hearing is held, notice of the hearing will be published in the *Pennsylvania Bulletin* at least 30 days prior to the hearing and in at least one newspaper of general circulation within the geographical area of the discharge.

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	2.862; 0.123 (avg) 0.487 (max)†
Latitude	40° 27' 29.0"	Longitude	-80° 02' 27.0"
Quad Name	Pittsburgh West	Quad Code	1505
Wastewater Description:	Cooling tower blowdown and sources monitored at IMPs 201 and 301		

Receiving Waters	Ohio River (WWF) (main channel)	Stream Code	32317
NHD Com ID	99686060	RMI	978.1
Drainage Area	19,100	Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pltn. Ctrl. Stds.
Elevation (ft)	710 (normal pool)	Slope (ft/ft)	0.0001
Watershed No.	20-F	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	Dioxins, PCB, Pathogens		
Source(s) of Impairment	Sources Unknown		
TMDL Status	Final (EPA Approved 4/9/2001)	Name	Ohio River TMDL

Background/Ambient Data		Data Source
pH (SU)	7.5	WQN Station 902 (1998 – 2020) – Median
Temperature (°F)	21.55 (Warm)	WQN Station 902 (1998 – 2020) – Avg (May 1 – Sept. 30)
Temperature (°F)	7.03 (Cold)	WQN Station 902 (1998 – 2020) – Avg (Oct 1 – April 30)
Hardness (mg/L)	100	WQN Station 902 (1998 – 2020) – Average
Other:		

Nearest Downstream Public Water Supply Intake		West View Borough Municipal Authority – Neville Island	
PWS ID	5020043	PWS Withdrawal (MGD)	40.0
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	976.1	Distance from Outfall (mi)	2.0

IMP No.	201	Design Flow (MGD)	0.126; 0.047 (avg.); 0.119 (max) †
Latitude	40° 27' 29.71"	Longitude	-80° 2' 34.58"
Wastewater Description:	Boiler blowdown, boiler drains, 19% aqueous ammonia tank containment sump drain (uncontaminated runoff)		

IMP No.	301	Design Flow (MGD)	0.108; 0.024 (avg.); 0.043 (max) †
Latitude	40° 27' 27.89"	Longitude	-80° 2' 32.26"
Wastewater Description:	Coagulation and filter system backwash, ultrafiltration backwashes, reverse osmosis rejects, and chemical lab drains		

† Design Flow; Average Flow During Production/Operation; Maximum Flow During Production/Operation

Changes Since Last Permit Issuance: None

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	002	Design Flow (MGD)	0.03; 0.0009 (avg); 0.0015 (max) †
Latitude	40° 27' 33.0"	Longitude	-80° 02' 32.0"
Quad Name	Pittsburgh West	Quad Code	1505
Wastewater Description:	Treated sewage from an onsite sewage treatment plant		
Receiving Waters	Ohio River (WWF) (back channel)	Stream Code	32317
NHD Com ID	99686060	RMI	979.1
Drainage Area	19,100	Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pltn. Ctrl. Stds.
Elevation (ft)	710 (normal pool)	Slope (ft/ft)	0.0001
Watershed No.	20-F	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	Dioxins, PCB, Pathogens		
Source(s) of Impairment	Sources Unknown		
TMDL Status	Final (EPA Approved 4/9/2001)	Name	Ohio River TMDL

Background/Ambient Data		Data Source
pH (SU)	7.5	WQN Station 902 (1998 – 2020) – Median
Temperature (°F)	21.55 (Warm)	WQN Station 902 (1998 – 2020) – Avg (May 1 – Sept. 30)
Temperature (°F)	7.03 (Cold)	WQN Station 902 (1998 – 2020) – Avg (Oct 1 – April 30)
Hardness (mg/L)	100	WQN Station 902 (1998 – 2020) – Average
Other:		

Nearest Downstream Public Water Supply Intake	West View Borough Municipal Authority – Neville Island		
PWS ID	5020043	PWS Withdrawal (MGD)	40.0
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	976.1	Distance from Outfall (mi)	3.0

† Design Flow; Average Flow During Production/Operation; Maximum Flow During Production/Operation

Changes Since Last Permit Issuance: None

Discharge, Receiving Waters and Water Supply Information

Outfall No.	003	Design Flow (MGD)	0.432; 0.0013 (avg); 0.037 (max) †
Latitude	40° 27' 41.0"	Longitude	-80° 02' 22.0"
Quad Name	Pittsburgh West	Quad Code	1505
Wastewater Description:	Storm water runoff from fuel storage area, barge unloading equipment sump, cooling tower drains, fuel skid drain, and turbine building floor drains		

Receiving Waters	Ohio River (WWF) (back channel)	Stream Code	32317
NHD Com ID	99686060	RMI	978.85
Drainage Area	19,100	Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pltn. Ctrl. Stds.
Elevation (ft)	710 (normal pool)	Slope (ft/ft)	0.0001
Watershed No.	20-F	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	Dioxins, PCB, Pathogens		
Source(s) of Impairment	Sources Unknown		
TMDL Status	Final (EPA Approved 4/9/2001)	Name	Ohio River TMDL

Background/Ambient Data		Data Source
pH (SU)	7.5	WQN Station 902 (1998 – 2020) – Median
Temperature (°F)	21.55 (Warm)	WQN Station 902 (1998 – 2020) – Avg (May 1 – Sept. 30)
Temperature (°F)	7.03 (Cold)	WQN Station 902 (1998 – 2020) – Avg (Oct 1 – April 30)
Hardness (mg/L)	100	WQN Station 902 (1998 – 2020) – Average
Other:		

Nearest Downstream Public Water Supply Intake		West View Borough Municipal Authority – Neville Island	
PWS ID	5020043	PWS Withdrawal (MGD)	40.0
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	976.1	Distance from Outfall (mi)	2.75

† Design Flow; Average Flow During Production/Operation; Maximum Flow During Production/Operation

Changes Since Last Permit Issuance: None

Discharge, Receiving Waters and Water Supply Information

Outfall No.	004	Design Flow (MGD)	0.26
Latitude	40° 27' 41.0"	Longitude	-80° 02' 23.0"
Quad Name	Pittsburgh West	Quad Code	1505
Wastewater Description:	Intake traveling screen backwash		
Receiving Waters	Ohio River (WWF) (main channel)	Stream Code	32317
NHD Com ID	99686060	RMI	978.6
Drainage Area	19,100	Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pltn. Ctrl. Stds.
Elevation (ft)	710 (normal pool)	Slope (ft/ft)	0.0001
Watershed No.	20-F	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	Dioxins, PCB, Pathogens		
Source(s) of Impairment	Sources Unknown		
TMDL Status	Final (EPA Approved 4/9/2001)	Name	Ohio River TMDL

Background/Ambient Data		Data Source
pH (SU)	7.5	WQN Station 902 (1998 – 2020) – Median
Temperature (°F)	21.55 (Warm)	WQN Station 902 (1998 – 2020) – Avg (May 1 – Sept. 30)
Temperature (°F)	7.03 (Cold)	WQN Station 902 (1998 – 2020) – Avg (Oct 1 – April 30)
Hardness (mg/L)	100	WQN Station 902 (1998 – 2020) – Average
Other:		

Nearest Downstream Public Water Supply Intake		West View Borough Municipal Authority – Neville Island	
PWS ID	5020043	PWS Withdrawal (MGD)	40.0
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	976.1	Distance from Outfall (mi)	2.5

Changes Since Last Permit Issuance: None

Discharge, Receiving Waters and Water Supply Information

Outfall No.	005	Design Flow (MGD)	Variable
Latitude	40° 27' 55.0"	Longitude	-80° 02' 34.0"
Quad Name	Pittsburgh West	Quad Code	1505
Wastewater Description:	Storm water runoff from building roof drains		
Receiving Waters	Ohio River (WWF) (main channel)	Stream Code	32317
NHD Com ID	99686060	RMI	978.55
Drainage Area	19,100	Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pltn. Ctrl. Stds.
Elevation (ft)	710 (normal pool)	Slope (ft/ft)	0.0001
Watershed No.	20-F	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	Dioxins, PCB, Pathogens		
Source(s) of Impairment	Sources Unknown		
TMDL Status	Final (EPA Approved 4/9/2001)	Name	Ohio River TMDL

Background/Ambient Data		Data Source
pH (SU)	7.5	WQN Station 902 (1998 – 2020) – Median
Temperature (°F)	21.55 (Warm)	WQN Station 902 (1998 – 2020) – Avg (May 1 – Sept. 30)
Temperature (°F)	7.03 (Cold)	WQN Station 902 (1998 – 2020) – Avg (Oct 1 – April 30)
Hardness (mg/L)	100	WQN Station 902 (1998 – 2020) – Average
Other:		

Nearest Downstream Public Water Supply Intake		West View Borough Municipal Authority – Neville Island	
PWS ID	5020043	PWS Withdrawal (MGD)	40.0
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	976.1	Distance from Outfall (mi)	2.45

† Design Flow; Average Flow During Production/Operation; Maximum Flow During Production/Operation

Changes Since Last Permit Issuance: None

Treatment Facility Summary		
Treatment Facility: Sewage Treatment Plant		
WQM Permit No.	**Issuance Date**	**Purpose**
9280-S	06/02/1959	Permit issued to Duquesne Light Company for a 0.0175 MGD onsite sewage treatment plant consisting of a comminutor/bar screen, a combination oxidation and clarification tank, and a 500-gallon chlorine contact tank.
9280-S A-1, T-1	05/01/2000	Transfer from Duquesne Light Company to Orion Power Midwest, LP and amendment for the installation of a chlorine tablet feeder, a tablet feeder for dechlorination, and the replacement of the 500-gallon chlorine contact tank with a two-compartment 1,000-gallon chlorine contact tank.
9280-S A-2	06/15/2010	Installation of a Sequencing Batch Reactor with integral sludge holding and aeration tanks and two new grinder pumps to replace the comminutor/bar screen, the oxidation/clarification tank, and two non-clog pumps.
9280-S T-2	06/01/2011	Transfer from Orion Power Midwest, LP to GenOn Power Midwest, LP
9280-S T-3	01/26/2015	Transfer from GenOn Power Midwest, LP to NRG Power Midwest LP
9280-S T-4	10/10/2019	Transfer from NRG Power Midwest LP to Brunot Island Power LLC
9280-S A-3	06/2/2020	Permit issued to Brunot Island Power LLC for a treated effluent aeration system including a 1.35 scfm blower with an aerator located in the existing chlorine contact tank. This amendment was identified as A-2 but it is actually A-3.

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Secondary	Sequencing Batch Reactor	Sodium Hypochlorite	0.0009

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
0.03	—	Not Overloaded	—	Sanitary Authority

Treatment Facility Summary		
Treatment Facility: Industrial Wastewater Treatment – Intake water clarifier and filter backwash treatment		
WQM Permit No.	**Issuance Date**	**Purpose**
0272201	05/12/1972	Permit issued to Duquesne Light Company for settling and surge tanks for the management of intake water treatment clarifier and filter backwash waste streams.
0272201 T-1	05/01/2000	Permit transferred from Duquesne Light Co. to Orion Power Midwest, LP
0272201 T-2	06/01/2011	Permit transferred from Orion Power Midwest, LP to GenOn Power Midwest, LP
0272201 T-3	01/28/2015	Permit transferred from GenOn Power Midwest, LP to NRG Power Midwest LP
0272201 T-4	10/10/2019	Permit transferred from NRG Power Midwest LP to Brunot Island Power, LLC

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Industrial	Primary	Settling/equalization	N/A	N/A

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
—	N/A	Not Overloaded	N/A	N/A

Treatment Facility Summary		
Treatment Facility: Industrial Wastewater Treatment – Boiler drain water and boiler blowdown treatment		
WQM Permit No.	**Issuance Date**	**Purpose**
0212201	01/16/2013	Permit issued to GenOn Power Midwest, LP for equalization basins, an air-cooled heat exchanger, a carbon dioxide-based pH adjustment system, and cartridge filtration system for boiler drain water and boiler blowdown.
0212201 T-1	09/01/2015	Permit transferred from GenOn Power Midwest, LP to NRG Power Midwest LP
0212201 T-2	10/10/2019	Permit transferred from NRG Power Midwest LP to Brunot Island Power, LLC

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Industrial	Primary	Equalization, heat exchange, neutralization, filtration	N/A	N/A

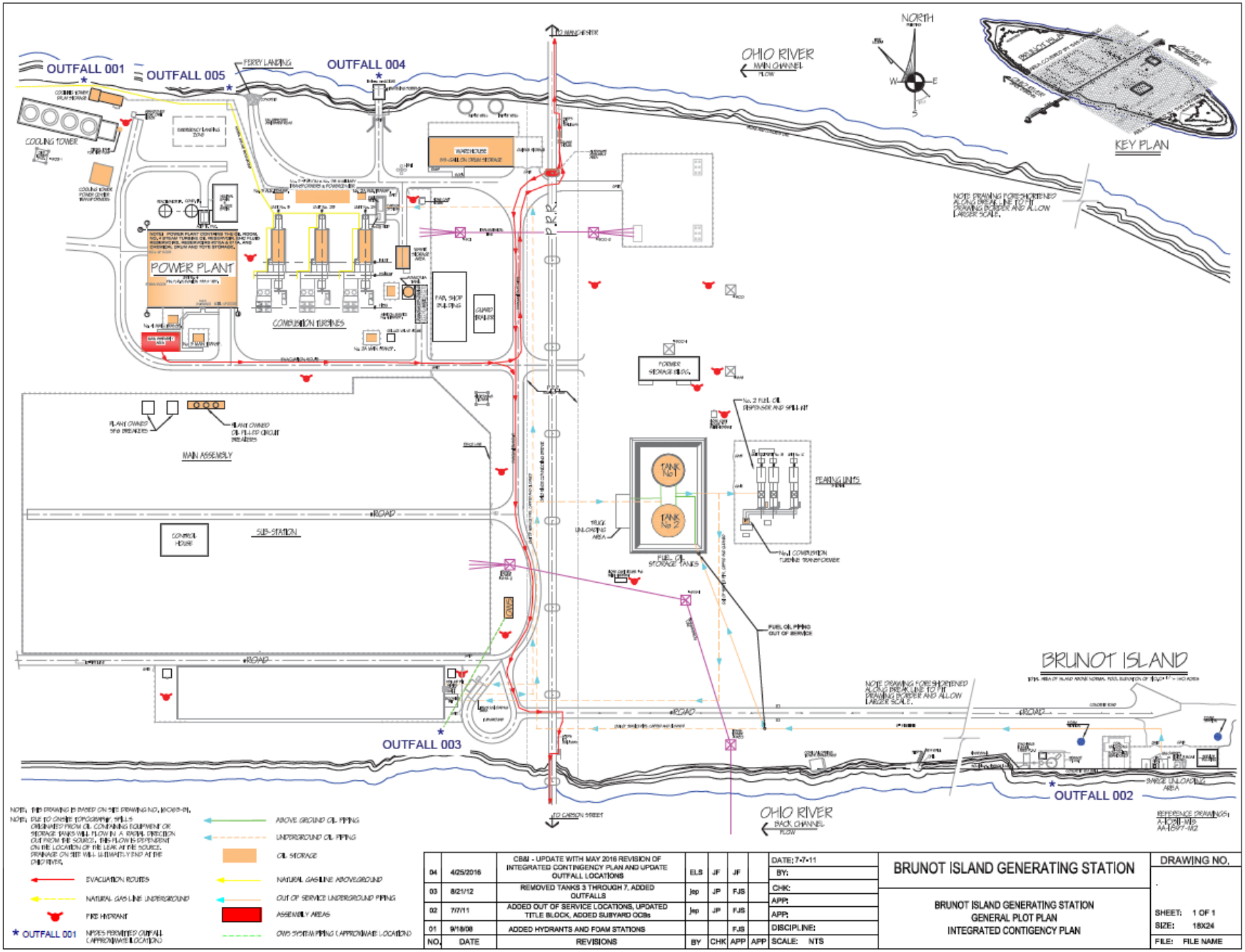
Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
—	N/A	Not Overloaded	N/A	N/A

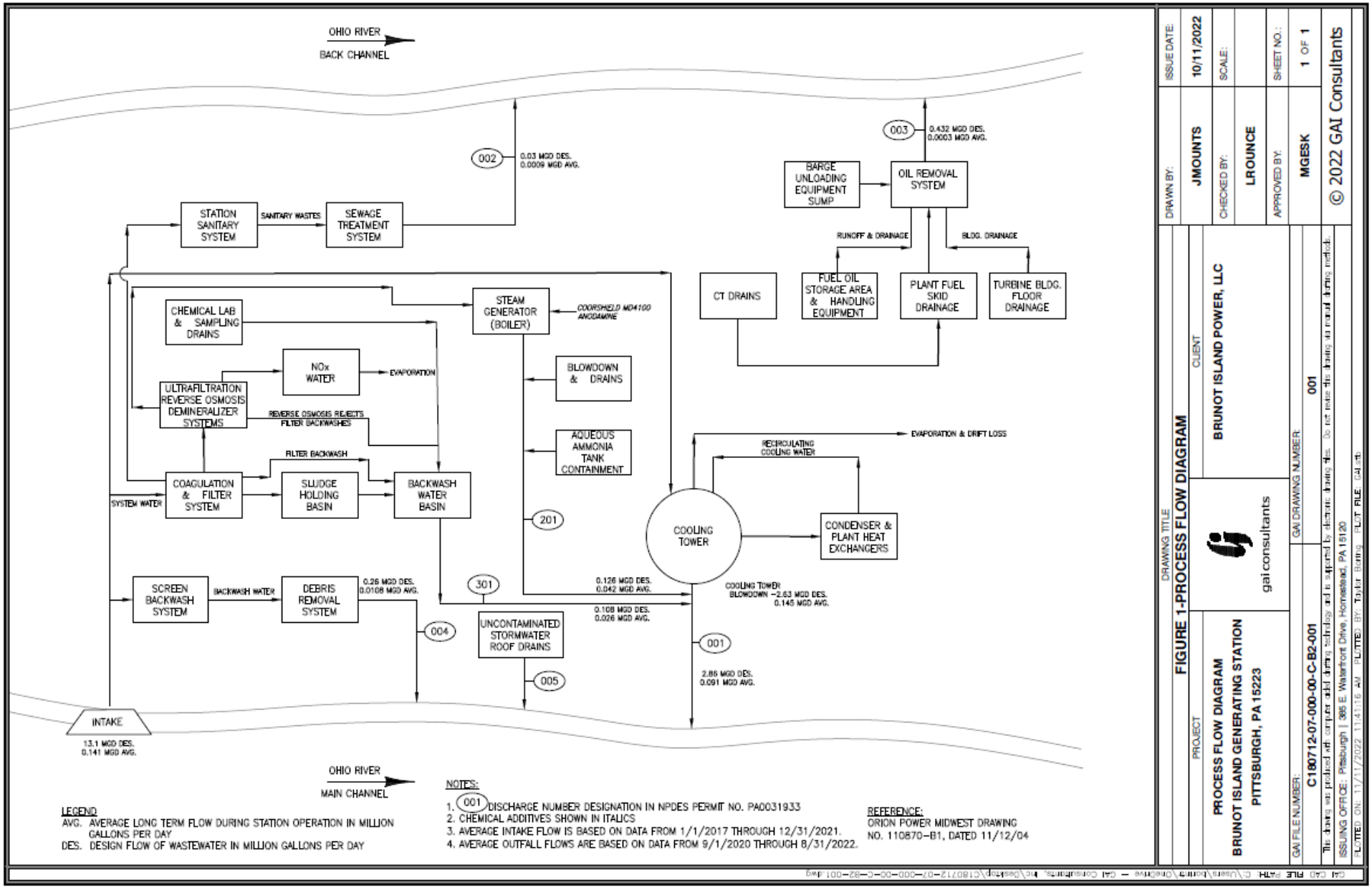
Treatment Facility Summary		
Treatment Facility: Industrial Wastewater Treatment – Demineralizer regeneration water and oil storage tank farm sump wastewater treatment		
WQM Permit No.	**Issuance Date**	**Purpose**
0273218	02/04/1974	Permit issued to Duquesne Light Company for a neutralization basin for demineralizer regeneration water and an API oil/water separator for wastewaters from oil storage tank farms and sumps in the oil unloading and fuel skid areas
0273218 T-1	05/01/2000	Permit transferred from Duquesne Light Co. to Orion Power Midwest, LP
0273218 T-2	06/01/2011	Permit transferred from Orion Power Midwest, LP to GenOn Power Midwest, LP
0273218 T-3	01/28/2015	Permit transferred from GenOn Power Midwest, LP to NRG Power Midwest LP
0273218 T-4	10/10/2019	Permit transferred from NRG Power Midwest LP to Brunot Island Power, LLC

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Industrial	Primary	Neutralization and oil/water separation	N/A	N/A

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
—	N/A	Not Overloaded	N/A	N/A

Changes Since Last Permit Issuance: The WQM permits were transferred to Brunot Island Power, LLC and an effluent aeration system was added to the sewage treatment plant.


OUTFALL 001
OUTFALL 005
FERRY LANDING
OUTFALL 004
OHIO RIVER
MAIN CHANNEL
FLOW
NORTH
KEY PLAN
COOLING TOWER
POWER PLANT
COMBUSTION TURBINES
FAB. SHOP BUILDING
GUARD HOUSE
WAREHOUSE
FORMER STORAGE BLDG.
MAIN ASSEMBLY
SUB-STATION
CONTROL HOUSE
ROAD
TANK NO1
TANK NO2
FUEL OIL STORAGE TANKS
TRUCK UNLOADING AREA
PEAKING UNITS
FUEL OIL PIPING OUT OF SERVICE
BRUNOT ISLAND
OUTFALL 003
OUTFALL 002
TO MANCHESTER
TO CARSON STREET
OHIO RIVER
BACK CHANNEL
FLOW
ABOVE GROUND OIL PIPING
UNDERGROUND OIL PIPING
OIL STORAGE
EVACUATION ROUTES
NATURAL GAS LINE ABOVEGROUND
NATURAL GAS LINE UNDERGROUND
OUT OF SERVICE UNDERGROUND PIPING
FIRE HYDRANT
ASSEMBLY AREAS
OUTFALL 001
NPDES PERMITTED OUTFALL (APPROXIMATE LOCATION)
OHIO SYSTEM PIPING (APPROXIMATE LOCATION)
04 4/25/2016 CB&I - UPDATE WITH MAY 2016 REVISION OF INTEGRATED CONTINGENCY PLAN AND UPDATE OUTFALL LOCATIONS ELS JF JF
03 8/21/12 REMOVED TANKS 3 THROUGH 7, ADDED OUTFALLS Jep JP FJS
02 7/7/11 ADDED OUT OF SERVICE LOCATIONS, UPDATED TITLE BLOCK, ADDED SUBYARD OCBs Jep JP FJS
01 9/18/08 ADDED HYDRANTS AND FOAM STATIONS FJS
NO. DATE REVISIONS BY CHK APP APP
DATE: 7-7-11
BY:
CHK:
APP:
APP:
DISCIPLINE:
SCALE: NTS
BRUNOT ISLAND GENERATING STATION
BRUNOT ISLAND GENERATING STATION
GENERAL PLOT PLAN
INTEGRATED CONTIGENCY PLAN
DRAWING NO.
SHEET: 1 OF 1
SIZE: 18X24
FILE: FILE NAME


OHIO RIVER
BACK CHANNEL
002
0.03 MGD DES.
0.0009 MGD AVG.
003
0.432 MGD DES.
0.0003 MGD AVG.
STATION SANITARY SYSTEM
SANITARY WASTES
SEWAGE TREATMENT SYSTEM
BARGE UNLOADING EQUIPMENT SUMP
OIL REMOVAL SYSTEM
RUNOFF & DRAINAGE
BLDG. DRAINAGE
CT DRAINS
FUEL OIL STORAGE AREA & HANDLING EQUIPMENT
PLANT FUEL SKID DRAINAGE
TURBINE BLDG. FLOOR DRAINAGE
CHEMICAL LAB & SAMPLING DRAINS
STEAM GENERATOR (BOILER)
COORSHIELD MD4100 ANODIAMINE
NOx WATER
EVAPORATION
BLOWDOWN & DRAINS
ULTRAFILTRATION REVERSE OSMOSIS DEMINERALIZER SYSTEMS
REVERSE OSMOSIS REJECTS
FILTER BACKWASHES
AQUEOUS AMMONIA TANK CONTAINMENT
EVAPORATION & DRIFT LOSS
RECIRCULATING COOLING WATER
FILTER BACKWASH
SYSTEM WATER
COAGULATION & FILTER SYSTEM
SLUDGE HOLDING BASIN
BACKWASH WATER BASIN
201
COOLING TOWER
CONDENSER & PLANT HEAT EXCHANGERS
SCREEN BACKWASH SYSTEM
BACKWASH WATER
DEBRIS REMOVAL SYSTEM
0.26 MGD DES.
0.0108 MGD AVG.
301
0.126 MGD DES.
0.042 MGD AVG.
COOLING TOWER BLOWDOWN –2.63 MGD DES.
0.145 MGD AVG.
0.108 MGD DES.
0.026 MGD AVG.
004
UNCONTAMINATED STORMWATER ROOF DRAINS
001
2.86 MGD DES.
0.091 MGD AVG.
005
INTAKE
13.1 MGD DES.
0.141 MGD AVG.
OHIO RIVER
MAIN CHANNEL
LEGEND
AVG. AVERAGE LONG TERM FLOW DURING STATION OPERATION IN MILLION GALLONS PER DAY
DES. DESIGN FLOW OF WASTEWATER IN MILLION GALLONS PER DAY
NOTES:
1. 001 DISCHARGE NUMBER DESIGNATION IN NPDES PERMIT NO. PA0031933
2. CHEMICAL ADDITIVES SHOWN IN ITALICS
3. AVERAGE INTAKE FLOW IS BASED ON DATA FROM 1/1/2017 THROUGH 12/31/2021.
4. AVERAGE OUTFALL FLOWS ARE BASED ON DATA FROM 9/1/2020 THROUGH 8/31/2022.
REFERENCE:
ORION POWER MIDWEST DRAWING NO. 110870–B1, DATED 11/12/04
DRAWN BY: JMOUNTS
ISSUE DATE: 10/11/2022
CHECKED BY: LROUNCE
SCALE:
APPROVED BY: MGESK
SHEET NO.: 1 OF 1
DRAWING TITLE
FIGURE 1-PROCESS FLOW DIAGRAM
CLIENT
BRUNOT ISLAND POWER, LLC
PROJECT
PROCESS FLOW DIAGRAM
BRUNOT ISLAND GENERATING STATION
PITTSBURGH, PA 15223
gai consultants
GAI DRAWING NUMBER: 001
GAI FILE NUMBER: C180712-07-000-00-C-B2-001
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This drawing was produced with computer aided drafting technology and is supplied by electronic drawing files. Do not revise this drawing on manual drafting methods.
ISSUING OFFICE: Pittsburgh | 385 E. Waterfront Drive, Homestead, PA 15120
PLOTTED ON: 11/11/2022 11:41:16 AM PLOTTED BY: Taylor Boring PLOT FILE (Gai.ctb)
GAI CAD FILE PATH: C:\Users\boring\Desktop\C180712-07-000-00-C-B2-001.dwg

Compliance History

DMR Data for Outfall 001 (from December 1, 2022 to November 30, 2023)

Parameter	NOV-23	OCT-23	SEP-23	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23	FEB-23	JAN-23	DEC-22
Flow (MGD) Average Monthly	0.018	0.006	0.050	0.188	0.086	0.003		0.002			0.090	
Flow (MGD) Daily Maximum	0.182	0.139	0.065	0.487	0.089	0.05		0.053			0.090	
pH (S.U.) Instantaneous Minimum	7.2	7.4	7.2	7.0	7.1	7.0		7.1			6.9	
pH (S.U.) Instantaneous Maximum	7.6	8.1	7.8	7.2	7.2	7.0		7.1			6.9	
Free Available Chlorine (lbs/day) Average Monthly	< 0.13	< 0.08	< 0.04	< 0.03	< 0.07	< 0.04		< 0.04			< 0.07	
Free Available Chlorine (lbs/day) Daily Maximum	< 0.13	< 0.12	< 0.05	< 0.04	< 0.07	< 0.04		< 0.04			< 0.07	
Free Available Chlorine (mg/L) Average Monthly	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1			< 0.1	
Free Available Chlorine (mg/L) Daily Maximum	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1			< 0.1	
Temperature (ºF) Daily Maximum	65	78	84	76	70	66		54			52	
Total Chromium (lbs/day) Average Monthly	GG	GG	GG	GG	GG	GG		GG			GG	
Total Chromium (lbs/day) Daily Maximum	GG	GG	GG	GG	GG	GG		GG			GG	
Total Chromium (mg/L) Average Monthly	GG	GG	GG	GG	GG	GG		GG			GG	
Total Chromium (mg/L) Daily Maximum	GG	GG	GG	GG	GG	GG		GG			GG	
Total Zinc (lbs/day) Average Monthly	GG	GG	GG	GG	GG	GG		GG			GG	
Total Zinc (lbs/day) Daily Maximum	GG	GG	GG	GG	GG	GG		GG			GG	

Parameter	NOV-23	OCT-23	SEP-23	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23	FEB-23	JAN-23	DEC-22
Total Zinc (mg/L) Average Monthly	GG	GG	GG	GG	GG	GG		GG			GG	
Total Zinc (mg/L) Daily Maximum	GG	GG	GG	GG	GG	GG		GG			GG	

DMR Data for Outfall 002 (from December 1, 2022 to November 30, 2023)

Parameter	NOV-23	OCT-23	SEP-23	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23	FEB-23	JAN-23	DEC-22
Flow (MGD) Average Monthly	0.00003		0.00002	0.0001		0.00003	0.00002	0.00005	0.00003		0.0001	0.00003
Flow (MGD) Daily Maximum	0.0008		0.0007	0.001		0.0008	0.001	0.001	0.001		0.0007	0.0009
pH (S.U.) Instantaneous Minimum	7.8		7.3	7.1		7.1	7.3	7.7	7.7		7.6	7.8
pH (S.U.) Instantaneous Maximum	7.8		7.3	8.0		7.1	7.3	8.0	7.7		7.8	7.8
DO (mg/L) Instantaneous Minimum	6.7		5.1	4.2		6.1	7.7	8.1	8.5		8.0	8.0
TRC (mg/L) Average Monthly	< 0.1		< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1
TRC (mg/L) Instantaneous Maximum	< 0.1		< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1
CBOD5 (mg/L) Average Monthly	< 3.0		< 3.0	< 3.0		< 3.0	6.1	< 3.0	< 3.0		< 3.8	< 3.0
CBOD5 (mg/L) Instantaneous Maximum	< 3.0		< 3.0	< 3.0		< 3.0	6.1	< 3.0	< 3.0		4.6	< 3.0
TSS (lbs/day) Average Monthly	< 0.02		< 0.02	< 0.03		< 0.02	0.1	< 0.02	< 0.02		0.02	< 0.02
TSS (lbs/day) Daily Maximum	< 0.02		< 0.02	< 0.03		< 0.02	0.1	< 0.02	< 0.02		0.04	< 0.02
TSS (mg/L) Average Monthly	< 3.0		< 3.0	< 3.0		< 3.0	11.0	< 3.0	< 3.0		5.0	< 3.0
TSS (mg/L) Instantaneous Maximum	< 3.0		< 3.0	< 3.0		< 3.0	11.0	< 3.0	< 3.0		6.0	< 3.0
Fecal Coliform (No./100 ml) Geometric Mean	< 1		< 1	< 1		< 1	< 1	< 1	< 1		< 1.0	< 1

Parameter	NOV-23	OCT-23	SEP-23	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23	FEB-23	JAN-23	DEC-22
Fecal Coliform (No./100 ml) Instantaneous Maximum	< 1		< 1	< 1		< 1	< 1	< 1	< 1		< 1.0	< 1

DMR Data for Outfall 003 (from December 1, 2022 to November 30, 2023)

Parameter	NOV-23	OCT-23	SEP-23	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23	FEB-23	JAN-23	DEC-22
Flow (MGD) Average Monthly	0.003	0.0004	0.00005	0.0003	0.001	0.001	0.0004	0.003	0.0005	0.0001	0.001	0.0004
Flow (MGD) Daily Maximum	0.009	0.007	0.0007	0.003	0.010	0.01	0.002	0.003	0.005	0.0007	0.004	0.003
pH (S.U.) Instantaneous Minimum	7.1	6.7	7.0	6.9	7.0	6.9	7.3	7.4	7.3	7.1	7.1	6.8
pH (S.U.) Instantaneous Maximum	7.1	7.2	7.2	7.0	7.1	6.9	7.3	7.4	7.3	7.1	7.4	6.9
TSS (mg/L) Average Monthly	< 3.0	< 3.0	< 3.0	< 3.0	< 4.0	< 3.0	< 3.0	< 3.0	4.5	< 3.0	< 3.0	< 3.0
TSS (mg/L) Daily Maximum	< 3.0	< 3.0	< 3.0	< 3.0	5.0	< 3.0	< 3.0	3.0	5.0	< 3.0	< 3.0	< 3.0
Oil and Grease (mg/L) Average Monthly	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Oil and Grease (mg/L) Daily Maximum	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

DMR Data for Outfall 201 (from December 1, 2022 to November 30, 2023)

Parameter	NOV-23	OCT-23	SEP-23	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23	FEB-23	JAN-23	DEC-22
Flow (MGD) Average Monthly	0.022	0.023	0.038	0.023	0.062	0.027		0.03			0.06	
Flow (MGD) Daily Maximum	0.026	0.023	0.046	0.029	0.065	0.032		0.03			0.06	
pH (S.U.) Instantaneous Minimum	6.8	6.9	7.0	6.8	7.0	6.9		7.0			6.5	
pH (S.U.) Instantaneous Maximum	6.91	6.94	7.03	6.86	7.21	6.9		7.0			6.5	
TSS (mg/L) Average Monthly	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0		< 3.0			< 3.0	
TSS (mg/L) Daily Maximum	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0		< 3.0			< 3.0	

Parameter	NOV-23	OCT-23	SEP-23	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23	FEB-23	JAN-23	DEC-22
Oil and Grease (mg/L) Average Monthly	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0		< 5.0			< 5.0	
Oil and Grease (mg/L) Daily Maximum	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0		< 5.0			< 5.0	

DMR Data for Outfall 301 (from December 1, 2022 to November 30, 2023)

Parameter	NOV-23	OCT-23	SEP-23	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23	FEB-23	JAN-23	DEC-22
Flow (MGD) Average Monthly	0.022	0.03	0.03	0.016	0.024	0.021		0.02			0.03	
Flow (MGD) Daily Maximum	0.023	0.03	0.03	0.018	0.024	0.024		0.02			0.03	
pH (S.U.) Instantaneous Minimum	7.3	7.6	7.3	7.2	7.2	7.1		7.1			7.1	
pH (S.U.) Instantaneous Maximum	7.4	7.6	7.3	7.2	7.2	7.1		7.1			7.1	
TSS (mg/L) Average Monthly	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0		< 3.0			< 3.0	
TSS (mg/L) Daily Maximum	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0		< 3.0			3.0	
Oil and Grease (mg/L) Average Monthly	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0		< 5.0			< 5.0	
Oil and Grease (mg/L) Daily Maximum	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0		< 5.0			< 5.0	

Development of Effluent Limitations

IMP No. 201 **Design Flow (MGD)** 0.126; 0.047 (avg.); 0.119 (max)
Latitude 40° 27' 29.71" **Longitude** -80° 02' 34.58"
Wastewater Description: Boiler blowdown, boiler drains, 19% aqueous ammonia tank containment sump drain (uncontaminated runoff)

Internal Waste Streams

Effluent limits are imposed at IMP 201 rather than another monitoring location because 40 CFR § 125.3(f) prohibits compliance with technology-based treatment requirements using "non-treatment" techniques such as flow augmentation (i.e., dilution). Since the wastewaters monitored at IMP 201 combine with other wastewaters before the next downstream monitoring location (Outfall 001), IMP 201 is the only point at which compliance with applicable effluent limits may be determined without the interference of other wastewaters. This rationale is consistent with 40 CFR § 122.45(h)[1], which allows for the imposition of effluent limitations on internal waste streams in these circumstances.

Current Effluent Limits and Monitoring Requirements / Anti-backsliding

Discharges monitored at IMP 201 are currently subject to the following effluent limits and monitoring requirements.

Table 1. Current Effluent Limits and Monitoring Requirements for IMP 201

Parameter	Mass (lbs/day)		Concentration (mg/L)			Measurement Frequency	Sample Type	Basis
	Avg. Mo.	Max Daily	Minimum	Avg. Mo.	Max Daily			
Flow (MGD)	Report	Report	—	—	—	2/month	Measured	§ 92.61(d)(1)
pH (S.U.)	—	—	6.0	—	Report	2/month	Grab	40 CFR § 423.12(b)(1)
TSS	—	—	—	30.0	100.0	2/month	Grab	40 CFR § 423.12(b)(3)
Oil and Grease	—	—	—	15.0	20.0	2/month	Grab	40 CFR § 423.12(b)(3)

The effluent limits and monitoring requirements in Table 1 will remain in effect at IMP 201 in the renewed permit pursuant to anti-backsliding requirements under Section 402(o) of the Clean Water Act and/or 40 CFR § 122.44(l) (incorporated by reference at 25 Pa. Code § 92a.44) [2], unless the limits are superseded by more stringent limits developed for this renewal or are relaxed pursuant to the anti-backsliding exceptions listed in Section 402(o) of the Clean Water Act or 40 CFR § 122.44(l).

201.A. Technology-Based Effluent Limitations (TBELs)

Federal Effluent Limitations Guidelines

The wastewaters monitored at IMP 201 are classified as "low volume waste sources" under 40 CFR Part 423 – Steam Electric Power Generating Point Source Category Federal Effluent Limitations Guidelines (ELG). Low volume waste sources are defined in § 423.11 as follows:

> The term *low volume waste sources* means, taken collectively as if from one source, wastewater from all sources except those for which specific limitations or standards are otherwise established in this part. Low volume waste sources include, but are not limited to, the following: Wastewaters from ion exchange water treatment systems, water treatment evaporator blowdown, laboratory and sampling streams, boiler blowdown, floor drains, cooling tower basin cleaning wastes, recirculating house service water systems, and wet scrubber air pollution control systems whose primary purpose is particulate removal. Sanitary wastes, air conditioning wastes, and wastewater from carbon capture or sequestration systems are not included in this definition.

[1] 40 CFR § 122.45(h)(1): "When permit effluent limitations or standards imposed at the point of discharge are impractical or infeasible, effluent limitations or standards for discharges of pollutants may be imposed on internal waste streams before mixing with other waste streams or cooling water streams."

[2] *Reissued permits.* (1) Except as provided in paragraph (l)(2) of this section when a permit is renewed or reissued, interim effluent limitations, standards or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit (unless the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued and would constitute cause for permit modification or revocation and reissuance under § 122.62.)

Low volume waste sources are subject to the most stringent TBELs and narrative limitations from § 423.12(b) paragraphs (1), (2) and (3) for Best Practicable Control Technology Currently Available (BPT) and § 423.13(a) for Best Available Technology Economically Achievable (BAT). There are no numerical TBELs for low volume waste sources under the BAT level of control because the ELG only limits conventional pollutants in low volume waste sources and BAT does not limit conventional pollutants. BCT limits are reserved under § 423.14 and the § 423.13(a) BAT restriction on PCBs is the same as that given by BPT under § 423.12(b)(2), so BPT TBELs will control the pollutants regulated at IMP 201.

Table 2. 40 CFR Part 423 – Steam Electric BPT Effluent Limitations for IMP 201

Pollutant	Average of daily values for 30 consecutive days (mg/L)	Maximum for any 1 day (mg/L)	Basis
TSS	30.0	100.0	40 CFR § 423.12(b)(3)
Oil and Grease	15.0	20.0	40 CFR § 423.12(b)(3)
pH (standard units)	within the range of 6.0 to 9.0		40 CFR § 423.12(b)(1)
There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.			40 CFR § 423.12(b)(2) & 40 CFR § 423.13(a)

In comments on a draft permit from 2005 that was not finalized, the permittee requested that either pH limits be removed from IMP 201 or that the then existing maximum pH limit of 12.4 s.u. (the highest pH of an aqueous waste that is not classified as hazardous waste) be kept rather than the 9.0 maximum pH limit from § 423.12(b)(1). The permittee stated that the pH of boiler water is characteristically elevated and that pH levels decrease to within the 6.0 to 9.0 range at Outfall 001.

To address the permittee's request, the maximum pH limit was replaced with a pH reporting requirement. The 6.0 minimum pH limit remained in effect. This regulatory scheme for pH at IMP 201 was maintained in the permit reissued in 2018 and will be maintained for the forthcoming renewal.

201.B. Water Quality-Based Effluent Limitations (WQBELs)

WQBELs generally are not evaluated at internal monitoring points. WQBELs are designed to protect water quality by ensuring that water quality standards are met in the receiving water and IMP 201 is not a final stream discharge location to waters of the Commonwealth. Therefore, WQBELs will be evaluated at Outfall 001 where IMP 201's low volume waste sources and other effluent sources combine and discharge to waters of the Commonwealth.

201.C. Effluent Limitations and Monitoring Requirements for IMP 201

In accordance with 25 Pa. Code §§ 92a.12 and 92a.61 and anti-backsliding requirements under Section 402(o) of the Clean Water Act and 40 CFR § 122.44(l) (incorporated in Pennsylvania's regulations at 25 Pa. Code § 92a.44), effluent limits at IMP 201 are the more stringent of TBELs, WQBELs, regulatory effluent standards, and monitoring requirements developed for this permit renewal, as applicable; and effluent limits and monitoring requirements from the previous permit subject to any exceptions to anti-backsliding discussed previously in this Fact Sheet. Effluent limits and monitoring requirements for IMP 201 are summarized in the table below.

Table 3. Effluent Limits and Monitoring Requirements for IMP 201

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant. Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(d)(1)
Total Suspended Solids	—	—	30.0	100.0	—	40 CFR § 423.12(b)(3)
Oil and Grease	—	—	15.0	20.0	—	40 CFR § 423.12(b)(3)
pH	—	—	6.0 (Min)	—	Report (Max)	40 CFR § 423.12(b)(1)

Narrative limits from 40 CFR Part 423 will be imposed as conditions in Part C of the permit.

Existing monitoring frequencies and sample types for TSS, oil and grease, and pH (2/month grab sampling) will be maintained at IMP 201. Flow must be measured 2/month.

Development of Effluent Limitations

IMP No. 301 **Design Flow (MGD)** 0.108; 0.024 (avg.); 0.043 (max)
Latitude 40° 27' 27.89" **Longitude** -80° 02' 32.26"
Wastewater Description: Coagulation and filter system backwash, ultrafiltration backwashes, reverse osmosis reject, and chemical lab drains

Effluent limits are imposed at IMP 301 rather than another monitoring location pursuant to 40 CFR § 122.45(h) regarding the imposition of effluent limits on internal waste streams.

Current Effluent Limits and Monitoring Requirements / Anti-backsliding

Discharges monitored at IMP 301 are currently subject to the following effluent limits and monitoring requirements.

Table 4. Current Effluent Limits and Monitoring Requirements for IMP 301

Parameter	Mass (lbs/day)		Concentration (mg/L)			Measurement Frequency	Sample Type	Limit Basis
	Avg. Mo.	Max Daily	Minimum	Avg. Mo.	Max Daily			
Flow (MGD)	Report	Report	—	—	—	2/month	Measured	§ 92.61(d)(1)
pH (S.U.)	—	—	6.0	—	9.0	2/month	Grab	40 CFR § 423.12(b)(1)
TSS	—	—	—	30.0	100.0	2/month	Grab	40 CFR § 423.12(b)(3)
Oil and Grease	—	—	—	15.0	20.0	2/month	Grab	40 CFR § 423.12(b)(3)

The effluent limits and monitoring requirements in Table 4 will remain in effect at IMP 301 in the renewed permit pursuant to anti-backsliding requirements under Section 402(o) of the Clean Water Act and/or 40 CFR § 122.44(l) (incorporated by reference at 25 Pa. Code § 92a.44), unless the limits are superseded by more stringent limits developed for this renewal or are relaxed pursuant to the anti-backsliding exceptions listed in Section 402(o) of the Clean Water Act or 40 CFR § 122.44(l).

301.A. Technology-Based Effluent Limitations (TBELs)

Federal Effluent Limitations Guidelines

Wastewaters at IMP 301 are low volume waste sources, which are subject to the same ELG as IMP 201.

Table 5. 40 CFR Part 423 – Steam Electric BPT Effluent Limitations for IMP 301

Pollutant	Average of daily values for 30 consecutive days (mg/L)	Maximum for any 1 day (mg/L)	Basis
TSS	30.0	100.0	40 CFR § 423.12(b)(3)
Oil and Grease	15.0	20.0	40 CFR § 423.12(b)(3)
pH	within the range of 6.0 to 9.0		40 CFR § 423.12(b)(1)
There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.			40 CFR § 423.12(b)(2) & 40 CFR § 423.13(a)

The pH of the wastewaters regulated at IMP 301 is not characteristically elevated like IMP 201's boiler blowdown. Therefore, the minimum and maximum pH limits from 40 CFR § 423.12(b)(1) are imposed at this monitoring location.

301.B. Water Quality-Based Effluent Limitations (WQBELs)

WQBELs will be evaluated at Outfall 001 for the combined discharge of IMP 201's and IMP 301's low volume waste sources and cooling tower blowdown.

301.C. Effluent Limitations and Monitoring Requirements for IMP 301

In accordance with 25 Pa. Code §§ 92a.12 and 92a.61 and anti-backsliding requirements under Section 402(o) of the Clean Water Act and 40 CFR § 122.44(l) (incorporated in Pennsylvania's regulations at 25 Pa. Code § 92a.44), effluent limits at IMP 301 are the more stringent of TBELs, WQBELs, regulatory effluent standards, and monitoring requirements developed for this permit renewal, as applicable; and effluent limits and monitoring requirements from the previous permit subject to

any exceptions to anti-backsliding discussed previously in this Fact Sheet. Effluent limits and monitoring requirements are summarized in the table below.

Table 6. Effluent Limits and Monitoring Requirements for IMP 301

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(d)(1)
Total Suspended Solids	—	—	30.0	100.0	—	40 CFR § 423.12(b)(3)
Oil and Grease	—	—	15.0	20.0	—	40 CFR § 423.12(b)(3)
pH	within the range of 6.0 to 9.0					40 CFR § 423.12(b)(1)

Existing monitoring frequencies and sample types for TSS, oil and grease, and pH (2/month grab sampling) will be maintained at IMP 301. Flow must be measured 2/month.

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** 2.862; 0.123 (avg) 0.487 (max)†
Latitude 40° 27' 29.0" **Longitude** -80° 02' 27.0"
Wastewater Description: Cooling tower blowdown and sources monitored at IMPs 201 and 301

Current Effluent Limits and Monitoring Requirements / Anti-backsliding

Discharges monitored at Outfall 001 are currently subject to the following effluent limits and monitoring requirements.

Table 7. Current Effluent Limits and Monitoring Requirements for Outfall 001

Parameter	Mass (lbs/day)		Concentration (mg/L)			Measurement Frequency	Sample Type	Limit Basis
	Avg. Mo.	Max Daily	Minimum	Avg. Mo.	Max Daily			
Flow (MGD)	Report	Report	—	—	—	Weekly when discharging	Measured	25 Pa. Code § 92.61(d)(1)
pH (S.U.)	—	—	6.0	—	9.0 (IMAX)	Weekly when discharging	Grab	40 CFR § 423.12(b)(1)
Free Available Chlorine	0.83	2.09	—	Report	Report	2/month	Grab	40 CFR § 423.12(b)(7)
Chromium, Total	0.83	0.83	—	Report	Report	Weekly when discharging	24-Hr Composite	40 CFR § 423.13(d)(1)
Zinc, Total	4.17	4.17	—	Report	Report	Weekly when discharging	24-Hr Composite	40 CFR § 423.13(d)(1)
Temperature (°F)	—	—	—	—	110	Weekly when discharging	I-S	25 Pa. Code § 93.6(a)

The effluent limits and monitoring requirements in Table 7 will remain in effect at Outfall 001 in the renewed permit pursuant to anti-backsliding requirements under Section 402(o) of the Clean Water Act and/or 40 CFR § 122.44(l) (incorporated by reference at 25 Pa. Code § 92a.44), unless the limits are superseded by more stringent limits developed for this renewal or are relaxed pursuant to the anti-backsliding exceptions listed in Section 402(o) of the Clean Water Act or 40 CFR § 122.44(l).

001.A. Technology-Based Effluent Limitations (TBELs)

Federal Effluent Limitations Guidelines

Cooling tower blowdown discharged from Outfall 001 is subject to the most stringent TBELs and narrative limitations from 40 CFR § 423.12(b) paragraphs (1), (2), (7) and (8) for Best Practicable Control Technology Currently Available (BPT) and § 423.13 paragraphs (a), (d)(1), and (d)(2) for Best Available Technology Economically Achievable (BAT). TBELs based on the use of Best Conventional Pollutant Control Technology (BCT) are reserved under § 423.14, so BPT limits will control conventional pollutants. The applicable limits are summarized in Tables 8 and 9.

Table 8. 40 CFR Part 423 – Steam Electric BPT Effluent Limitations for Outfall 001

Pollutant	Average Concentration (mg/L)	Maximum Concentration (mg/L)	Basis
Free Available Chlorine	0.2	0.5	40 CFR § 423.12(b)(7)
pH	within the range of 6.0 to 9.0		40 CFR § 423.12(b)(1)
There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.			40 CFR § 423.12(b)(2)
Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator or State, if the State has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.			40 CFR § 423.12(b)(8)

Table 9. 40 CFR Part 423 – Steam Electric BAT Effluent Limitations for Outfall 001

Pollutant	Average Concentration (mg/L)	Maximum Concentration (mg/L)	Basis
Free Available Chlorine	0.2	0.5	40 CFR § 423.13(d)(1)

Table 9 (cont'd). 40 CFR Part 423 – Steam Electric BAT Effluent Limitations for Outfall 001

Pollutant	Average of daily values for 30 consecutive days (mg/L)	Maximum for any 1 day (mg/L)	Basis
Chromium, Total	0.2	0.2	40 CFR § 423.13(d)(1)
Zinc, Total	1.0	1.0	40 CFR § 423.13(d)(1)
The 126 priority pollutants contained in chemicals added for cooling tower maintenance	No detectable amount	No detectable amount	40 CFR § 423.13(d)(1)
There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.			40 CFR § 423.13(a)
Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator or State, if the State has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.			40 CFR § 423.13(d)(2)

The most stringent TBELs from the BPT and BAT levels of control include the pH limits from Table 8 and all limits from Table 9. DEP typically invokes 40 CFR §§ 423.12(b)(12) and § 423.13(m) to impose concentration limits. Those sections state:

- § 423.12(b)(12): "At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as a concentration limitation instead of the mass-based limitations specified in paragraphs (b)(3) through (b)(7), and (b)(11), of this section. Concentration limitations shall be those concentrations specified in this section."

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

Concentration limits for pollutants regulated in cooling tower blowdown were imposed in permits pre-dating the 2018 permit. Despite the availability of that option, concentration limits that apply to cooling tower blowdown cannot be imposed at Outfall 001. Sections 423.12(b)(13) and 423.13(n) state:

- § 423.12(b)(13): "In the event that wastestreams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (b)(1) through (b)(12) of this section attributable to each controlled waste source shall not exceed the specified limitations for that waste source."

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

EPA explained what those citations mean in the October 1974 *Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Steam Electric Power Generation Point Source Category* (p. 93)

> …the industry has been categorized for chemical waste characteristics by individual waste sources. The basis of evaluation of plants in the industry will be a combination of the appropriate waste sources for a particular powerplant. Guidelines will be established for each waste source, and can then be applied and utilized in the manner of a building-block concept. Waste streams may be combined, and in many cases this would have obvious advantages, and the appropriate guidelines would then also be combined for application to the new waste stream.

And on pages 414 and 417 of the Development Document:

> The effluent limitations for a powerplant are determined based on the existing or planned flow rates of the individual waste sources at the plant and the effluent limitations corresponding to each of the waste sources. […]

> In each case, the effluent limitations for a particular waste water source are based on the wastewater flow emanating from that source, regardless of the subsequent reuse, recycling, or combination of the wastewater with other streams, and regardless of the source of the water used by that source.

Outfall 001 consists of cooling tower blowdown (not limited separately) and low volume waste sources limited at IMPs 201 and 301. Imposing concentration limits for free available chlorine, chromium, and zinc at Outfall 001 would not control cooling tower blowdown at the level of the specified limitation for that individual waste source because other sources are present at Outfall 001. Therefore, mass limits for cooling tower blowdown are calculated by multiplying the flow of cooling tower blowdown by the concentrations listed in Tables 8 and 9.

The flow used to calculate mass limits for flow-normalized ELGs is a single estimate of the actual daily flow rate that can reasonably be expected to prevail during the next term of the permit. The cooling tower blowdown flow rate used to calculate the Station's cooling tower blowdown mass limits for this permit renewal is the highest maximum daily flow at Outfall 001 reported within the last five years minus the highest maximum daily flow at IMPs 201 and 301 during that same period. The calculated discharge flow rate of cooling tower blowdown is 0.487 MGD – 0.119 MGD – 0.054 MGD = 0.314 MGD. Mass limits are calculated as follows:

> Flow (MGD) × Concentration Limit (mg/L) × 8.3435 [unit conversion] = Mass Limit (pounds/day)

Table 10. 40 CFR Part 423 – Mass Limits for Cooling Tower Blowdown at Outfall 001

Pollutant	Avg. Concentration (lb/day)	Max Concentration (lb/day)
Free Available Chlorine	0.524	1.31
Chromium, Total	0.524	0.524
Zinc, Total	2.62	2.62

The current permit includes a condition whereby chromium and zinc are only sampled when chromium and zinc compounds are added to the cooling water. Based on the 1974 Development Document for the Steam Electric ELGs, chromium and zinc were identified as pollutants of concern for discharges of cooling tower blowdown due to the widespread use of chromium and zinc-based corrosion inhibitors at the time the Steam Electric ELGs were promulgated. The Station does not use chromium or zinc-based additives, so the existing condition limiting chromium and zinc sampling to times when such additives are used will be maintained in the renewed permit. The existing permit condition requiring the Station to sample free available chlorine when the cooling water system is being chlorinated—or during the next discharge of blowdown because blowdown discharges are intermittent and do not necessarily coincide with chlorination events—will be maintained. Narrative limits from §§ 423.12 & 423.13 will be imposed as conditions in Part C of the permit.

Thermal TBELs for Heated Discharges

No TBELs are developed to control thermal pollution. However, a maximum temperature limit of 110°F will be imposed if thermal WQBELs do not apply to Outfall 001 due to residual heat from cooling tower blowdown (refer to Section 001.B, below). The 110°F temperature limit is imposed to protect human health caused by exposure resulting from water contact pursuant to the requirements of ORSANCO's Pollution Control Standards, the recommendations of DEP's "Implementation Guidance for Temperature Criteria", and as an implementation of general water quality criteria under 25 Pa. Code § 93.6(a), which states that "[w]ater may not contain substances attributable to point or nonpoint source discharges in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life."

001.B. Water Quality-Based Effluent Limitations (WQBELs)

WQBELs are evaluated for the combined discharge of low volume waste sources and cooling tower blowdown.

ORSANCO Pollution Control Standards

The Ohio River Valley Water Sanitation Commission (ORSANCO) is an interstate commission established by interstate compact that sets water quality standards (Pollution Control Standards) for the Ohio River. The Ohio River is a water of the Commonwealth and is the receiving water for discharges from the Station. DEP implements ORSANCO's Standards pursuant to 25 Pa. Code § 92.12(b), which states:

> When interstate or international agencies under an interstate compact or international agreement establish applicable effluent limitations or standards for dischargers of this Commonwealth to surface waters that are more stringent than those required by this title, the more stringent standards and limitations apply.

Toxics Management Spreadsheet Water Quality Modeling Program and Procedures for Evaluating Reasonable Potential

WQBELs are developed pursuant to Section 301(b)(1)(C) of the Clean Water Act and, per 40 CFR § 122.44(d)(1)(i), are imposed to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) that are or may be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality." The Department of Environmental Protection developed the DEP Toxics Management Spreadsheet (TMS) to facilitate calculations necessary to complete a reasonable potential (RP) analysis and determine WQBELs for discharges of toxic and some nonconventional pollutants.

The TMS is a single discharge, mass-balance water quality modeling program for Microsoft Excel® that considers mixing, first-order decay, and other factors to determine WQBELs for toxic and nonconventional pollutants. Required input data including stream code, river mile index, elevation, drainage area, discharge flow rate, low-flow yield, and the hardness and pH of both the discharge and the receiving stream are entered into the TMS to establish site-specific discharge conditions. Other data such as reach dimensions, partial mix factors, and the background concentrations of pollutants in the stream also may be entered to further characterize the discharge and receiving stream. The pollutants to be analyzed by the model are identified by inputting the maximum concentration reported in the permit application or Discharge Monitoring Reports, or by inputting an Average Monthly Effluent Concentration (AMEC) calculated using DEP's TOXCONC.xls spreadsheet for datasets of 10 or more effluent samples. Pollutants with no entered concentration data and pollutants for which numeric water quality criteria in 25 Pa. Code Chapter 93 have not been promulgated are excluded from the modeling. If warranted, ammonia-nitrogen, CBOD-5, and dissolved oxygen are analyzed separately using DEP's WQM 7.0 model.

The TMS evaluates each pollutant by computing a wasteload allocation for each applicable criterion, determining the most stringent governing WQBEL, and comparing that governing WQBEL to the input discharge concentration to determine whether permit requirements apply in accordance with the following RP thresholds:

- Establish limits in the permit where the maximum reported effluent concentration or calculated AMEC equals or exceeds 50% of the WQBEL. Use the average monthly, maximum daily, and instantaneous maximum (IMAX) limits for the permit as recommended by the TMS (or, if appropriate, use a multiplier of 2 times the average monthly limit for the maximum daily limit and 2.5 times the average monthly limit for IMAX).
- For non-conservative pollutants, establish monitoring requirements where the maximum reported effluent concentration or calculated AMEC is between 25% - 50% of the WQBEL.
- For conservative pollutants, establish monitoring requirements where the maximum reported effluent concentration or calculated AMEC is between 10% - 50% of the WQBEL.

In most cases, pollutants with effluent concentrations that are not detectable at the level of DEP's Target Quantitation Limits are eliminated as candidates for WQBELs and water quality-based monitoring requirements.

Reasonable Potential Analysis and WQBEL Development for Outfall 001

Table 11. TMS Inputs for 001

Parameter	**Value**
River Mile Index	978.1
Discharge Flow (MGD)	0.487
Basin/Stream Characteristics	
Parameter	**Value**
Area in Square Miles	19,100
Q_{7-10} (cfs)	2,365
Low-flow yield (cfs/mi^2)	0.25
Elevation (ft)	710.0
Slope	0.0001
Stream Width (ft)	550; 1150
Stream Depth (ft)	12.0
Stream pH (s.u.)	7.5

Discharges from Outfall 001 are evaluated based on the maximum concentrations reported on the permit renewal application. The TMS model is run for Outfall 001 with the modeled discharge and receiving stream characteristics shown in Table 11. Pollutants for which water quality criteria have not been promulgated (e.g., TSS, Oil and Grease, etc.) are excluded from the modeling.

The Ohio River's flow splits at Brunot Island with about 50% of the river flowing in the main channel and 50% of the river flowing in the back channel. Pursuant to Section 5.2 and Appendix C of ORSANCO's 2019 Pollution Control Standards regarding critical flow values used to develop effluent limitations for discharges to the Ohio River, the Q_{7-10} flow of the Ohio River from Mile Point 0.0 (RMI 981.0) to Mile Point 31.7 (RMI 949.3) is 4,730 cfs. Outfall 001 discharges to the main channel at RMI 978.1, so the baseline Q_{7-10} for Outfall 001's water quality modeling is 50% of 4,730 cfs or 2,365 cfs. In addition, a partial mix factor of 0.5 is used for the chronic fish criteria (CFC), threshold human health (THH), and cancer risk level (CRL) analyses in the TMS. Partial mix factors (PMFs) represent the fractional portion of the receiving stream that mixes with a discharge at design conditions. A PMF of 0.5 provides the Station with 50% of the Q_{7-10} flow for mixing and dilution (i.e., 50% of 2,365 cfs). The PMF is manually input because, as a single discharge model, the TMS allocates high percentages of stream flow to individual discharges, which often results in those discharges being modeled with most

or all of a receiving stream's assimilative capacity. This would leave little or no assimilative capacity for other dischargers to the same receiving stream.

Output from the TMS model is included in **Attachment A** to this Fact Sheet. As explained previously, the TMS compares the input discharge concentrations to the calculated WQBELs using DEP's Reasonable Potential thresholds to evaluate the need to impose WQBELs or monitoring requirements in the permit. The results of the modeling indicate that no WQBELs are needed for Outfall 001's discharges.

Thermal Limits

Thermal WQBELs are evaluated using a DEP program called "Thermal Discharge Limit Calculation Spreadsheet" created with Microsoft Excel® for Windows. The program calculates temperature wasteload allocations (WLAs) through the application of a heat transfer equation, which takes two forms in the program depending on the source of the facility's cooling water. In Case 1, intake water to a facility is from the receiving stream upstream of the discharge location. In Case 2, intake water is from a source other than the receiving stream (e.g., municipal water supply). The determination of which case applies to a given discharge is made based on the input data which include the receiving stream flow rate ($Q_{7\text{-}10}$), the stream intake flow rate, external source intake flow rates, consumptive flow rates, and site-specific ambient stream temperatures. Case 1 limits are generally expressed as heat rejection rates while Case 2 limits are usually expressed as temperatures.

DEP's *Implementation Guidance for Temperature Criteria* directs permit writers to assume instantaneous complete mixing of the discharge with the receiving stream when calculating thermal effluent limits unless adverse factors exist. One such factor listed in the guidance is that the "discharge is to a receiving water that is very wide, resulting in restricted dispersion of the plume, and horizontal stratification of the plume." Since wastewaters from Outfall 001 discharge to the Ohio River, the dispersion of the discharge plume is likely to be limited and instantaneous complete mixing will not occur. Therefore, a PMF of 0.5 is applied to the receiving stream's (back channel's) low flow for the thermal limit analysis (0.5 × 2,365 cfs).

The Station obtains its water directly from the Ohio River, so the discharge is analyzed as Case 1 and is modeled using the maximum reported discharge flow rate at Outfall 001, 0.487 MGD, as directed by the *Implementation Guidance for Temperature Criteria* for Case 1 scenarios.

The results of the thermal discharge analysis using the Thermal Discharge Limit Calculation Spreadsheet (see **Attachment C**) show that allowable heat rejection rates are high for the Station. Although Case 1 situations generally require the expression of limits as heat rejection rates, the allowable thermal loadings would exceed the 110°F effluent standard if the limits were expressed as temperatures. Therefore, a maximum daily temperature limit of 110°F will be imposed at Outfall 001 pursuant to ORSANCO's Pollution Control Standards, DEP's implementation guidance, and 25 Pa. Code § 93.6(a).

Ohio River Use Impairments and TMDL

The Ohio River has two use impairments: 1) recreational use impairment caused by pathogens (listed in 2004); and 2) fish consumption use impairment caused by PCBs, chlordane, and dioxins (listed in 1996). There is a final TMDL addressing PCBs and chlordane impairment dated April 9, 2001. There is no final TMDL for the other impairment causes.

The Station does not discharge PCBs, chlordane, or dioxins, so the facility will not contribute to the fish consumption use impairment. However, to ensure the permit reflects the requirements of the Ohio River TMDL with its 'zero' wasteload allocations for PCBs and chlordane, the following narrative limitation will be included as a condition in Part C of the permit.

> There shall be no point source discharges of Polychlorinated Biphenyls (PCBs) or Chlordane to the Ohio River.

The condition does not impose monitoring obligations on Brunot Island Power. However, it does allow DEP (or Brunot Island Power) to analyze effluent samples for PCBs and chlordane at DEP's discretion to determine whether the Station complies with the TMDL. The condition also allows DEP to require Brunot Island Power to implement corrective actions to comply with the permit condition and, by extension, the TMDL's wasteload allocations if PCBs and chlordane are detected in point source discharges from the Station.

There should be no contribution of pathogens to the river from Outfall 001. Fecal coliform counts in Outfall 001's discharges were low (maximum of 39/100mL), so no permit requirements relating to the recreational use impairment are imposed.

001.C. Effluent Limitations and Monitoring Requirements for Outfall 001

In accordance with 25 Pa. Code §§ 92a.12 and 92a.61 and anti-backsliding requirements under 40 CFR § 122.44(l) (incorporated by reference in Pennsylvania regulations at 25 Pa. Code § 92a.44), effluent limits at Outfall 001 are the more stringent of TBELs, WQBELs, regulatory effluent standards, and monitoring requirements developed for this permit renewal; and effluent limits and monitoring requirements from the previous permit, subject to any exceptions to anti-backsliding discussed previously in this Fact Sheet. Applicable effluent limits and monitoring requirements are summarized in the table below.

Table 12. Effluent Limits and Monitoring Requirements for Outfall 001

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(d)(1)
Free Available Chlorine	0.259	0.646	Report	Report	—	40 CFR § 423.13(d)(1)
Chromium, Total	0.259	0.259	Report	Report	—	40 CFR § 423.13(d)(1)
Zinc, Total	1.29	1.29	Report	Report	—	40 CFR § 423.13(d)(1)
Temperature (°F)	—	—	—	110	—	ORSANCO Pollution Ctrl Stds.
pH	within the range of 6.0 to 9.0					40 CFR § 423.12(b)(1)

Existing monitoring frequencies and sample types will be maintained. Blowdown is discharged continuously on an intermittent basis. Boiler blowdown and boiler drain discharges occur intermittently only when the plant is operating. The Station's operating practice restricts discharges of boiler blowdown and boiler drain water to times when cooling tower blowdown is discharged to ensure adequate cooling of the boiler blowdown and drain water prior to discharge. Since discharges are intermittent, sampling for Flow, pH, Total Chromium, Total Zinc, and Temperature is "weekly when discharging". Flow must be measured; temperature must be sampled using immersion-stabilization sampling; chromium and zinc require 24-hour composite sampling—only if chromium and zinc-based additives are used; and pH must be sampled using grab sampling.

Free Available Chlorine must be sampled 2/month using grab sampling. If blowdown is discharged when the cooling water is undergoing chlorination, then the discharge shall be sampled for Free Available Chlorine during chlorination. Otherwise, the first discharge of blowdown following chlorination shall be sampled for Free Available Chlorine.

Development of Effluent Limitations

Outfall No. 002 **Design Flow (MGD)** 0.0009
Latitude 40° 27' 33.0" **Longitude** -80° 02' 32.0"
Wastewater Description: Treated sewage from an onsite sewage treatment plant

Current Effluent Limits and Monitoring Requirements / Anti-backsliding

Discharges monitored at Outfall 002 are currently subject to the following effluent limits and monitoring requirements.

Table 13. Current Effluent Limits and Monitoring Requirements for Outfall 002

Parameter	Mass (lbs/day)		Concentration (mg/L)			Measurement Frequency	Sample Type	Limit Basis
	Avg. Mo.	Max Daily	Minimum	Avg. Mo.	IMAX			
Flow (MGD)	Report	Report	—	—	—	1/week	Measured	25 Pa. Code § 92.61(d)(1)
pH (S.U.)	—	—	6.0	—	9.0	Daily when discharging	Grab	25 Pa. Code § 92a.47(a)(7)
Dissolved Oxygen	—	—	4.0	—	—	Daily when discharging	Grab	25 Pa. Code § 92a.48(a)(3)
TRC	—	—	—	0.5	1.6	Daily when discharging	Grab	25 Pa. Code § 92a.47(a)(8)
CBOD5	—	—	—	25.0	50.0	2/month	Grab	25 Pa. Code § 92a.47(a)(1)
TSS	—	—	—	30.0	60.0	2/month	Grab	25 Pa. Code § 92a.47(a)(1)
Fecal Coliform Apr 1 – Oct 31	—	—	—	200	400	2/month	Grab	25 Pa. Code § 92a.47(a)(4) & ORSANCO
Fecal Coliform Nov 1 – Mar 31	—	—	—	2,000	10,000	2/month	Grab	25 Pa. Code § 92a.47(a)(5) & ORSANCO

The effluent limits and monitoring requirements in Table 13 will remain in effect at Outfall 002 in the renewed permit pursuant to anti-backsliding requirements under Section 402(o) of the Clean Water Act and/or 40 CFR § 122.44(l) (incorporated by reference at 25 Pa. Code § 92a.44), unless the limits are superseded by more stringent limits developed for this renewal or are relaxed pursuant to the anti-backsliding exceptions listed in Section 402(o) of the Clean Water Act or 40 CFR § 122.44(l).

002.A. Technology-Based Effluent Limitations (TBELs)

25 Pa. Code § 92a.47 and the Ohio River Valley Water Sanitation Commission's (ORSANCO) *Pollution Control Standards for Discharges to the Ohio River* specify TBELs and effluent standards that apply to sewage discharges.

25 Pa. Code § 92a.47 – Sewage permits

Section 92a.47(a) requires that sewage be given a minimum of secondary treatment with significant biological treatment that achieves the following:

Table 14. TBELs for Sanitary Wastewater

Parameter	Monthly Average (mg/L)	Instant. Maximum (mg/L)	Basis
$CBOD_5$	25	50†	25 Pa. Code § 92a.47(a)(1)
Total Suspended Solids	30	60†	25 Pa. Code § 92a.47(a)(1)
Fecal Coliform (No./100 mL) May 1 – September 30	200 (Geometric Mean)	1,000	25 Pa. Code § 92a.47(a)(4)
Fecal Coliform (No./100 mL) October 1 – April 30	2,000 (Geometric Mean)	10,000	25 Pa. Code § 92a.47(a)(5)
Total Residual Chlorine	0.5 (or facility-specific)	1.6 (or facility-specific)	25 Pa. Code § 92a.47(a)(8)
pH (s.u.)	not less than 6.0 and not greater than 9.0		25 Pa. Code § 92a.47(a)(7)

†Value is calculated as two times the monthly average in accordance with Chapter 2 of DEP's "Technical Guidance for the Development and Specification of Effluent Limitations".

The CBOD5, TSS, and pH limits in § 92a.47(a) are the same as those in EPA's secondary treatment regulation (40 CFR § 133.102). Outfall 002 is currently subject to more stringent fecal coliform limits as discussed in the following section.

ORSANCO Pollution Control Standards

As explained in Section 001.B of this Fact Sheet, DEP implements ORSANCO's Pollution Control Standards pursuant to 25 Pa. Code § 92.12(b). Chapter 5.4.A of ORSANCO's 2019 Pollution Control Standards (the current version) requires the following level of treatment for sewage discharges to the Ohio River:

Table 15. ORSANCO TBELs and Effluent Standards for Sewage Discharges

Parameter	Monthly Average (mg/L)	Instant. Max. (mg/L)	Basis
Total Suspended Solids	30	45	Section 5.4(A)(2)
$CBOD_5$	25	40	Section 5.4(A)(1)(ii)
Fecal Coliform (No. /100mL)	2,000 (Geometric Mean)	—	Section 5.4(A)(4)(i)
E.coli (No. /100mL) April 1 – October 31	130 (90-day Geometric Mean)	240 (in 25% of samples)	Section 5.4(A)(4)(ii)
pH	not less than 6.0 and not greater than 9.0 s.u.		Section 5.4(A)(3)

The effluent standards given by ORSANCO are similar to those required by 25 Pa. Code § 92a.47(a) except for the application of *E. coli* limits from April 1 through October 31 and a fecal coliform limit of 2,000/100mL as a 30-day geometric mean that applies year-round. ORSCANO's fecal coliform effluent standard is already superseded by the effluent standards of § 92a.47(a)(4) and (a)(5) because the same 2,000/100mL fecal coliform limit as ORSANCO's applies to sewage discharges between October 1 and April 30 and a more stringent limit (200/100mL) applies during the rest of the year.

With respect to ORSANCO's *E. coli* limit, DEP previously determined that the fecal coliform limits currently in effect at Outfall 002 are more stringent than the *E. coli* effluent standards given by ORSANCO. That determination was based on calculations performed using a correlation equation developed by Ohio EPA that converts between the numbers of fecal coliform and *E. coli* bacteria present in a sample.[3] For reference, the calculations are shown below.

Ohio EPA: Fecal Coliform to *E. coli* Conversion Equation

$$E.coli = 0.403 \times (Fecal\ Coliform)^{1.028}$$

$$Fecal\ Coliform = \sqrt[1.028]{\frac{E.coli}{0.403}}$$

Fecal Coliform Equivalent of 130/100mL *E. coli* (90-Day Geometric Mean)

$$Fecal\ Coliform = \sqrt[1.028]{\frac{130}{0.403}} \approx 275/100mL$$

Fecal Coliform Equivalent of 240/100mL *E. coli* (in 25% of Samples)

$$Fecal\ Coliform = \sqrt[1.028]{\frac{240}{0.403}} \approx 500/100mL$$

Outfall 002's existing fecal coliform limit of 200/100mL as a 30-day geometric mean is more stringent than the 275/100mL fecal coliform equivalent of ORSANCO's *E. coli* limit of 130/100mL as a 90-day geometric mean. That is, the Station is already obligated by its existing permit limits to achieve a higher level of disinfection over a shorter timeframe (30 days instead of 90 days) than ORSANCO requires. Additionally, the Station's existing instantaneous maximum fecal coliform limit of 400/100mL is more stringent than the 500/100mL fecal coliform equivalent of ORSANCO's *E. coli* limit of 240/100mL in 25% of samples. That is, the Station is already obligated by its existing permit limits to achieve a higher level of disinfection in all samples than ORSANCO requires in only 25% of samples.

[3] "Ohio EPA Bacterial TMDL Correlation Equations for Converting Between Fecal Coliform and *E. Coli*" (December 2006).

Since the existing fecal coliform limits are more stringent than the fecal coliform equivalents of ORSANCO's *E. coli* effluent standards, the *E. coli* effluent standards from ORSANCO are not imposed at Outfall 002.

As with the previous permit, the months during which Outfall 002's fecal coliform limits are in effect are modified from the time periods given in § 92a.47(a)(4) and (a)(5) to match the months during which ORSANCO's *E. coli* limits apply, which is necessary to maintain equivalent (or greater) stringency between Outfall 002's fecal coliform requirements and ORSANCO's *E. coli* requirements. As a result, the 200/100mL and 400/100mL limits apply from April 1 through October 31 (one month earlier and one month later than § 92a.47(a)(4) requires). The months during which Outfall 002's 2,000/100mL and 10,000/100mL limits apply are reduced accordingly to November 1 through March 31.

Pursuant to the above discussion and 40 CFR § 122.44(l) (regarding anti-backsliding) Outfall 002's existing fecal coliform limits will be maintained in the renewed permit.

Chapter 5.1.B of ORSANCO's Pollution Control Standards also requires each holder of an individual NPDES permit to post a permanent marker on the stream bank at each outfall discharging directly to the Ohio River. That requirement will be included as a condition of the permit.

Other Effluent Limits and Monitoring Requirements

The average monthly flow will be limited to the design flow of the sewage treatment plant (0.0009 MGD) with a reporting requirement for the maximum daily flow pursuant to 25 Pa. Code § 92a.61. A minimum dissolved oxygen concentration of 4.0 mg/L also will be imposed as a technology-based limit that is achievable by extended aeration sewage treatment plants. The Station is already subject to those limits and monitoring requirements.

002.B. Water Quality-Based Effluent Limitations (WQBELs)

WQM 7.0 Water Quality Modeling Program

WQM 7.0 is a water quality modeling program for Windows that determines Waste Load Allocations ("WLAs") and effluent limitations for carbonaceous biochemical oxygen demand ("CBOD5"), ammonia-nitrogen, and dissolved oxygen ("D.O.") for single and multiple point-source discharge scenarios. To accomplish this, the model simulates two basic processes. In the ammonia-nitrogen module, the model simulates the mixing and degradation of ammonia-nitrogen in the stream and compares calculated instream ammonia-nitrogen concentrations to ammonia-nitrogen water quality criteria. In the D.O. module, the model simulates the mixing and consumption of D.O. in the stream due to the degradation of CBOD5 and ammonia-nitrogen and compares calculated instream D.O. concentrations to D.O. water quality criteria. WQM 7.0 then determines the highest pollutant loadings that the stream can assimilate while still meeting water quality criteria under design conditions.

Water Quality Modeling with WQM 7.0

DEP did not run its WQM 7.0 water quality modeling program for Outfall 002's discharges for the previous permit. The model was run for the permit issued two permit cycles ago after an amendment to Water Quality Management Permit 9280-S (Amendment No. 2) was issued on June 15, 2010 for the installation of a new Sequencing Batch Reactor for sewage treatment at the Station. That upgrade allowed NRG Power Midwest to downsize the treatment plant to optimize its performance. Since DEP determined that a reasonable potential to violate water quality criteria did not exist for the downsized system based on the low design flow rate (0.0009 MGD) and the significant dilution afforded by the Ohio River, WQM 7.0 modeling was not performed for the last renewal.

The sewage treatment plant was modified in 2020 to add a treated effluent aeration system to comply with a new 4.0 mg/L D.O. limit, but there were no changes to the system's design flow and the regulated minimum flow of the Ohio River has not changed. While that would lead DEP to the same conclusion that WQM 7.0 modeling is not necessary, specific water quality criteria in Chapter 93 were updated in October 2020, including more stringent criteria for ammonia-nitrogen. The Chapter 93 updates were approved by the U.S. EPA in March 2021. Since water quality criteria have changed, the WQM 7.0 model is run to confirm that WQBELs for CBOD5 and Ammonia-Nitrogen are not required. Input values for the WQM 7.0 model are shown in Table 16.

DEP's modeling for sewage discharges is a two-step process. First, a discharge is modeled for the summer period (May through October) using warm temperatures for the discharge and the receiving stream. Modeling for the summer period is done first because allowable ammonia concentrations in a discharge are lower at higher temperatures (i.e., warm

temperatures are more likely to result in critical loading conditions). Reduced D.O. levels also appear to increase ammonia toxicity and the maximum concentration of D.O. in water is lower at higher temperatures.

Table 16. 002 WQM 7.0 Inputs

Discharge Characteristics	
Parameter	**Value**
River Mile Index (RMI)	979.1
Discharge Flow (MGD)	0.03
Discharge Temp. (°C)	22.5
Basin/Stream Characteristics	
Parameter	**Value**
Drainage Area (sq. mi.)	19,100
Q_{7-10} (cfs)	2,365
Elevation (ft)	710
Slope (ft/ft)	0.0001
Stream Width (ft)	550; 1150
Stream Depth (ft)	12.0
Stream Temp. (°C) (Summer)	21.55
Stream pH (s.u.)	7.5

The second step is to evaluate WQBELs for the winter period, but only if modeling shows that WQBELs are needed for the summer period. For the summer period, pursuant to DEP's "Implementation Guidance of Section 93.7 Ammonia Criteria" [Doc. No. 391-2000-013] (Ammonia Guidance) and in the absence of site-specific data, the discharge temperature is assumed to be 20°C. According to that same guidance, the site-specific stream temperature is 21.55°C based on the median temperature from July through September at *Water Quality Network (WQN) Station 902 – Monongahela River at Charleroi* for the period of record lasting from October 1998 through March 2020. The site-specific stream pH is 7.5 s.u., which is the median pH from that same period of record at WQN Station 902.

Outfall 002 discharges to the back channel (western leg) of the Ohio River behind Brunot Island, so the Q_{7-10} flow at Outfall 002 is 2,365 cfs—half of the 4,730 cfs critical flow value given in Appendix C of ORSANCO's 2019 Pollution Control Standards for the Ohio River segment extending from RMI 981.0 at Pittsburgh to RMI 949.3 at the Montgomery Dam. The downstream node that identifies the end of the modeled segment of the river is entered at RMI 976.1 for West View Borough Municipal Authority's intake near the southern end of Neville Island with the full regulated minimum flow of the river available at that location.

To ensure that mixing conditions are properly represented in WQM 7.0, the reach width and reach depth of the Ohio River back channel are approximated as 550 feet and 12 feet, respectively. The width and depth of the river at the downstream node (after flows in the main channel and back channel of the river combine downstream of Brunot Island) are estimated as 1,150 feet and 12 feet, respectively.

The discharge flow used for modeling is the average design flow of the onsite sewage treatment plant (0.0009 MGD). The input discharge concentrations of CBOD5 and ammonia-nitrogen are the model's defaults: 25 mg/L for both CBOD5 and ammonia-nitrogen. The D.O. of the discharge is input as 4.0 mg/L, which is the minimum D.O. limit at Outfall 001.

WQM 7.0 modeling (see **Attachment B**) returns the input discharge concentrations as the recommended limits, which means that WQBELs are not needed for CBOD5 or ammonia-nitrogen. Winter limits are not evaluated. Pursuant to DEP's "Standard Operating Procedure for Clean Water Program Establishing Effluent Limitations for Individual Sewage Permits", for existing dischargers where modeling results for summer indicate that an average monthly limit of 25 mg/L for ammonia-nitrogen is acceptable, year-round monitoring requirements are established for ammonia-nitrogen, at a minimum.

Total Residual Chlorine

To determine if WQBELs are required for discharges containing total residual chlorine (TRC), a discharge evaluation is performed using a DEP program called TRC_CALC created with Microsoft Excel for Windows. TRC_CALC calculates TRC Waste Load Allocations (WLAs) through the application of a mass balance model which considers TRC losses due to stream and discharge chlorine demands and first-order chlorine decay. Input values for the program include flow rates and chlorine demands for the receiving stream and the discharge, the number of samples taken per month, coefficients of TRC variability, partial mix factors, and an optional factor of safety. The mass balance model calculates WLAs for acute and chronic criteria that are then converted to long term averages using calculated multipliers. The multipliers are functions of the number of samples taken per month and the TRC variability coefficients (normally kept at default values unless site specific information is available). The most stringent limitation between the acute and chronic long-term averages is converted to an average monthly limit for comparison to the BAT average monthly limit of 0.5 mg/l from 25 Pa. Code § 92a.48(b)(2). The more stringent of these average monthly TRC limitations is imposed in the permit.

The results of the modeling, included in **Attachment D**, indicate that no WQBELs are required for TRC, which is consistent with DEP's determinations for previous permits that WQBELs are not necessary for the Station's sewage discharges. Technology-based limits from 25 Pa. Code § 92a.47(a)(8) will control TRC.

Ohio River Use Impairments

The Station does not discharge PCBs, chlordane, or dioxins, so the facility will not contribute to the fish consumption use impairment. There should be no contribution of pathogens to the river from the wastewaters discharged at Outfall 002 because the sewage is disinfected prior to discharge.

002.C. Effluent Limitations and Monitoring Requirements for Outfall 002

In accordance with 25 Pa. Code §§ 92a.12 and 92a.61 and anti-backsliding requirements under 40 CFR § 122.44(l) (incorporated by reference in Pennsylvania regulations at 25 Pa. Code § 92a.44), effluent limits at Outfall 002 are the more stringent of TBELs, WQBELs, regulatory effluent standards, and monitoring requirements developed for this permit renewal; and effluent limits and monitoring requirements from the previous permit, subject to any exceptions to anti-backsliding discussed previously in this Fact Sheet. Applicable effluent limits and monitoring requirements are summarized in the table below.

Table 17. Effluent Limits and Monitoring Requirements for Outfall 002

Parameter	Mass (pounds)		Concentration (mg/L)		Basis
	Average Monthly	Daily Maximum	Average Monthly	Instant Maximum	
Flow (MGD)	0.0009	Report	—	—	25 Pa. Code § 92a.61(d)(1)
$CBOD_5$	—	—	25.0	50.0	25 Pa. Code § 92a.47(a)(1)
Total Suspended Solids	—	—	30.0	60.0	25 Pa. Code § 92a.47(a)(1)
Dissolved Oxygen	—	—	4.0 Minimum	—	BPJ of BAT
Fecal Coliform (No. /100mL) April 1 – October 31	—	—	200 (Geo. Mean)	400	25 Pa. Code § 92a.47(a)(4) ORSANCO Poll. Ctrl. Stds.
Fecal Coliform (No. /100mL) November 1 – March 31	—	—	2,000 (Geo. Mean)	10,000	25 Pa. Code § 92a.47(a)(5)
Ammonia-Nitrogen	—	—	Report	Report	25 Pa. Code § 92a.61(b)
Total Residual Chlorine	—	—	0.5	1.6	25 Pa. Code § 92a.47(a)(8)
pH (s.u.)	not less than 6.0 nor greater than 9.0 standard units				25 Pa. Code § 92a.47(a)(7)

Consistent with Table 6-3 “Self-Monitoring Requirements for Sewage Discharges” in DEP’s *Technical Guidance for the Development and Specification of Effluent Limitations*: flow must be measured weekly; ammonia-nitrogen, $CBOD_5$, TSS, and fecal coliform must be sampled 2/month using grab samples; and TRC, dissolved oxygen, and pH must be sampled 1/day using grab samples. Grab samples should be representative of the effluent and are to be taken at a time when the normal daily maximum flow would reach the sampling point.

Development of Effluent Limitations

Outfall No. 003 **Design Flow (MGD)** 0.026 (avg.); 0.09 (max)
Latitude 40° 27' 41.0" **Longitude** -80° 02' 22.0"
Wastewater Description: Storm water runoff from fuel storage area, barge unloading equipment sump, cooling tower drains, fuel skid drain, and turbine building floor drains

Current Effluent Limits and Monitoring Requirements / Anti-backsliding

Discharges monitored at Outfall 003 are currently subject to the following effluent limits and monitoring requirements.

Table 18. Current Effluent Limits and Monitoring Requirements for Outfall 003

Parameter	Mass (lbs/day)		Concentration (mg/L)			Measurement Frequency	Sample Type	Limit Basis
	Avg. Mo.	Max Daily	Minimum	Avg. Mo.	Max Daily			
Flow (MGD)	Report	Report	—	—	—	2/month	Measured	§ 92.61(d)(1)
pH (S.U.)	—	—	6.0	—	9.0	2/month	Grab	40 CFR § 423.12(b)(1)
TSS	—	—	—	30.0	100.0	2/month	Grab	40 CFR § 423.12(b)(3)
Oil and Grease	—	—	—	15.0	20.0	2/month	Grab	40 CFR § 423.12(b)(3)

The effluent limits and monitoring requirements in Table 18 will remain in effect at Outfall 003 in the renewed permit pursuant to anti-backsliding requirements under Section 402(o) of the Clean Water Act and/or 40 CFR § 122.44(l) (incorporated by reference at 25 Pa. Code § 92a.44), unless the limits are superseded by more stringent limits developed for this renewal or are relaxed pursuant to the anti-backsliding exceptions listed in Section 402(o) of the Clean Water Act or 40 CFR § 122.44(l).

003.A. Technology-Based Effluent Limitations (TBELs)

Federal Effluent Limitations Guidelines

Wastewaters at Outfall 003 are identified as low volume waste sources, which are subject to the same TBELs as IMPs 201 and 301.

Table 19. 40 CFR Part 423 – Steam Electric BPT Effluent Limitations for Outfall 003

Pollutant	Average of daily values for 30 consecutive days (mg/L)	Maximum for any 1 day (mg/L)	Basis
TSS	30.0	100.0	40 CFR § 423.12(b)(3)
Oil and Grease	15.0	20.0	40 CFR § 423.12(b)(3)
pH	within the range of 6.0 to 9.0		40 CFR § 423.12(b)(1)
There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.			40 CFR § 423.12(b)(2) & 40 CFR § 423.13(a)

Flow monitoring will be required in accordance with 25 Pa. Code § 92a.61(d)(1).

Storm Water

Storm water runoff from the fuel storage area may contain pollutants such as oil and grease. However, the low volume waste source limits in Table 19 will ensure that pollutants that may be present in storm water are controlled.

003.B. Water Quality-Based Effluent Limitations (WQBELs)

Reasonable Potential Analysis and WQBEL Development for Outfall 003

Discharges from Outfall 003 are evaluated based on concentrations reported on the application. The TMS model is run for Outfall 003 with the modeled discharge and receiving stream characteristics shown in Table 20.

Table 20. TMS Inputs for 003

Parameter	Value
River Mile Index	978.85
Discharge Flow (MGD)	0.026 (avg)
Basin/Stream Characteristics	
Parameter	**Value**
Area in Square Miles	19,099
Q_{7-10} (cfs)	2,635
Low-flow yield (cfs/mi^2)	0.25
Width (ft)	550
Depth (ft)	12.0
Elevation (ft)	710.01
Slope	0.0001

For the reasons explained in Section 001.B of this Fact Sheet, a partial mix factor of 0.50 is used for the chronic fish criteria (CRC), threshold human health (THH) and cancer risk level (CRL) analyses in the TMS.

Output from the TMS model run is included in **Attachment A**. Based on the results of the TMS modeling, WQBELs are required for chlordane. The chlordane WQBELs are the result of the applicant's attainment of analytical reporting limits that are higher than DEP's Target QLs. Even though the results were reported as less than laboratory reporting limits, those reporting limits are too high to rule out the possibility that discharges will result in excursions above Pennsylvania's water quality criteria.

Notwithstanding the TMS's derivation of WQBELs for chlordane, the Ohio River TMDL does not allow any point source discharges of chlordane. As explained in Section 001.B of this Fact Sheet, the TMDL's wasteload allocations for point source discharges of chlordane are zero. There are no analytical methods that can quantify chlordane at a level of 0.0 pounds/day, so a condition will be included in Part C of the NPDES permit requiring Brunot Island Power to demonstrate compliance with chlordane limits of zero by reporting non-detect values at the level of DEP's Target QL for chlordane (i.e., reporting chlordane as "<1.0 µg/L"). No schedule of compliance is included because chlordane is not expected to the present in the discharge. Consequently, the only limitation on the Station's ability to comply is finding a laboratory that has reporting limits for chlordane equal to or less than DEP's Target QL for chlordane.

Alternatively, before the permit is renewed, Brunot Island Power can collect additional samples at Outfall 003 and analyze those samples for chlordane using methods with reporting limits equal to or less than DEP's 1.0 µg/L Target QL for chlordane. New analytical results allow DEP to reevaluate whether reasonable potential exists with the possibility of removing the numerical chlordane limits and monitoring requirements before the permit is renewed. The narrative prohibition would remain in the permit.

003.C. Effluent Limitations and Monitoring Requirements for Outfall 003

In accordance with 25 Pa. Code §§ 92a.12 and 92a.61 and anti-backsliding requirements under 40 CFR § 122.44(l) (incorporated by reference in Pennsylvania regulations at 25 Pa. Code § 92a.44), effluent limits at Outfall 003 are the more stringent of TBELs, WQBELs, regulatory effluent standards, and monitoring requirements developed for this permit renewal; and effluent limits and monitoring requirements from the previous permit, subject to any exceptions to anti-backsliding discussed previously in this Fact Sheet. Applicable effluent limits and monitoring requirements are summarized in the table below.

Table 21. Effluent Limits and Monitoring Requirements for Outfall 003

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(d)(1)
Total Suspended Solids	—	—	30.0	100.0	—	40 CFR § 423.12(b)(3)
Oil and Grease	—	—	15.0	20.0	—	40 CFR § 423.12(b)(3)
Chlordane	—	—	0.0	0.0	—	WQBELs; 25 Pa. Code § 92a.12
pH	within the range of 6.0 to 9.0					40 CFR § 423.12(b)(1)

Existing monitoring frequencies and sample types for TSS, oil and grease, chlordane, and pH (2/month grab sampling) will be maintained at Outfall 003. Flow should be measured 2/month.

Development of Effluent Limitations

Outfall No.	004	**Design Flow (MGD)**	0.011 (avg.); 0.043 (max)
Latitude	40° 27' 41.0"	**Longitude**	-80° 02' 23.0"

Wastewater Description: Intake traveling screen backwash

004.A. Technology-Based Effluent Limitations (TBELs)

The backwash water for the intake screen consists solely of water from the Ohio River. No pollutants are expected to be introduced to Outfall 004's effluent by the Station other than debris that may collect on the intake screen, which the facility is not permitted to return to the river (refer to Section 004.B of this Fact Sheet). There are no federal ELGs that apply to discharges of intake screen backwash water and no other TBELs are developed for discharges from this outfall.

Clean Water Act § 316(b) – Cooling Water Intake Structures

On August 15, 2014, EPA promulgated Clean Water Act Section 316(b) regulations applicable to cooling water intake structures (CWIS). The regulations established best technology available (BTA) standards to reduce impingement mortality and entrainment of all life stages of fish and shellfish at existing power-generating and manufacturing facilities. The Final Rule took effect on October 14, 2014. Regulations implementing the 2014 Final Rule (and the previously promulgated Phase I Rule for new facilities) are provided in 40 CFR Part 125, Subparts I and J for new facilities and existing facilities, respectively. Associated NPDES permit application requirements for facilities with cooling water intake structures are provided in 40 CFR Part 122, Subpart B – Permit Application and Special NPDES Program Requirements (§ 122.21(r)).

Notification Requirements

40 CFR § 125.98(h) requires that all permit applications for facilities subject to 40 CFR Part 125, Subpart J be transmitted to the appropriate Field Office of the U.S. Fish and Wildlife Service (USFWS) and/or Regional Office of the National Marine Fisheries Service upon receipt for a 60-day review prior to public notice of the draft or proposed permit. DEP also sends permit applications for facilities with CWIS to the Pennsylvania Fish and Boat Commission (PFBC) for review and comment.

On January 24, 2023, application information pertaining to the Station's CWIS was transmitted to the USFWS's Pennsylvania Field Office, the National Marine Fisheries Service, and the PFBC. The 60-day review period expired on March 25, 2023.

On March 24, 2023, PFBC submitted the following comments on the application:

> The Pennsylvania Fish and Boat Commission (PFBC) has reviewed information pertaining to the application (Permit Application No. PA0031933) by Brunot Island Power LLC to renew a National Pollution Discharge Elimination System (NPDES) permit for the Brunot Island Generating Station, located in the City of Pittsburgh, Allegheny County, Pennsylvania. The comments below are provided regarding aquatic resource concerns resulting from proposed activities at the Brunot Island Generating Station.
>
> The PFBC's primary concern with this NPDES permit renewal is the potential for impingement and entrainment (I&E) of aquatic species at this facility's cooling water intake structure (CWIS). The PFBC acknowledges that best technology available (BTA) standards, including the implementation of a closed-cycle recirculating cooling water system, and a CWIS with a maximum through screen velocity of <0.5 ft/s are being utilized to reduce impingement mortality to the maximum extent possible. On the contrary, the facility's CWIS screen sizing is larger (3/8") than the PFBC's recommendations – 3/16" for floating and 1/10" for submerged intakes. Additionally, the period of operation for this facility, intermittently from late spring through fall, overlaps with the period when eggs, larval fishes, and juvenile fishes would be in highest abundance in the Ohio River. These life stages tend to be the most susceptible to impingement and entrainment even after measures are taken to reduce these effects at CWIS intakes and other similar structures.
>
> Although a Pennsylvania Natural Diversity Inventory (PNDI) review has indicated that there are no State or Federally listed species documented in the immediate vicinity of the facility's CWIS, the review has indicated that several Pennsylvania State Endangered aquatic species are known to be present downstream (4 fish and 1 freshwater mussel species) of the facility's location in reaches of the PA portion of the Ohio River and upstream (1 freshwater mussel species) of the facility's location in the lower reaches of the Allegheny River. The lack of an environmental review polygon for sensitive species in the PNDI review tool does not rule out the presence of sensitive species in

a particular area, especially when sensitive species are located upstream and downstream of a location of interest and are hydrologically connected.

The absence of an environmental review polygon for sensitive species in a given area could be an artifact of that area not being sampled, the species-preferred habitat type not being sampled, or the sampling gear applied not being effective at capturing a particular species. For similar reasons, the characterization of the fish community in this report may not fully represent the fish community present at the CWIS. Data used to represent the fish community relied solely on the collection of fish via boat electrofishing. Not all fish species present in the Emsworth Pool of the Ohio River fish community may recruit to (are effectively sampled by) this gear type, and therefore this may underrepresent the actual fish community present. Full characterization of the fish community present at the CWIS would require sampling with a variety of gear types at various times throughout the year.

Furthermore, there are many recreationally important sportfish species present within the Emsworth Pool, including but not limited to Smallmouth Bass, *Micropterus dolomieu*, Largemouth Bass, *M. salmoides*, Spotted Bass, *M. punctulatus*, Rock Bass, *Ambloplites rupestris*, Walleye, *Sander vitreus*, Sauger, *S. canadensis*, Channel Catfish, *Ictalurus punctatus*, and Flathead Catfish, *Pylodictis olivaris*, among others. In addition to supporting recreational angling opportunities, these species serve as host species that contribute to maintaining freshwater mussel populations and redistributing mussel species into historically occupied habitats. Based on the potential direct and indirect effects on Pennsylvania State Endangered species, recreationally important fish species, and freshwater mussel host fish species we believe monitoring entrainment effects at this facility's CWIS would be beneficial.

Impingement and entrainment data are lacking from permitted intake facilities on the Ohio River. Despite BTA for reducing I&E impacts being claimed by the applicant, there has been no biologically relevant data collected and distributed by the applicant to support a claim that I&E impacts are negligible at their CWIS. The PFBC's recommendation to conduct an entrainment study as soon as feasible during the period of facility operation will arm the applicant with biologically relevant data to support that I&E impacts are negligible, or it could provide the data necessary to fully assess impacts to further inform the avoidance, minimization, and/or mitigation of the impacts to the aquatic community.

On May 25, 2023, the USFWS submitted untimely comments on the application and determined that the Station was not likely to adversely affect federally listed clubshell, northern riffleshell, or rayed bean mussels because the habitat at the project site is not conducive to those mussels.

The National Marine Fisheries Service did not respond.

Brunot Island Power's Cooling Water Intake Structure Characteristics and Flows

Brunot Island Power operates a CWIS on the Ohio River. Brunot Island Power described the characteristics of the intake structure in the permit application as follows:

The Station's single CWIS is a near-shoreline surface water intake structure and is situated on the main channel of the Ohio River.

The top of the CWIS is located at Elevation 733'-6". The bottom of the CWIS is located at Elevation 700'-0". The maximum High Water Level (HWL) is at elevation 730'-0"; Normal HWL is at elevation 725'-0", and Low Water Level is at elevation 710'-0".

Raw water from the Ohio River flows into two separate wells of a concrete intake structure after first passing through separate intake screens. The water then flows through traveling screens in each well (two traveling water screens total), which are designed to filter out the smaller debris to prevent it from entering the raw water system. The traveling screens are each 3 feet wide by 2 feet high with 3/8-inch square opening screen mesh. The water depth at the screenwell at minimum river elevation is 10 feet.

Two raw water pumps each deliver 4550 gpm equating to a Design Intake Flow of 13.1 MGD. The two raw water pumps, each taking suction from a separate well, discharge into a common 16-inch discharge header. At the north end of the cooling tower, the raw water flows through [a] level control valve and into the cooling tower basin for makeup. An 8-inch line supplying water to the water pretreatment clarifier and a 3-inch line supplying water to the chlorination booster pumps suction header [is] supplied from the 16-inch header. Each raw water pump discharge line is also equipped with a minimum flow recirculation line and control valve that directs water back to the intake structure when system flow demand is low.

> The CWIS supplies makeup water to the [closed-cycle recirculating system], and to the ultrafiltration and deionized water systems. Over the past 5 years, the CWIS has been in operation between 19 and 64 days per year (average operation days per year is 35). Brunot Island is a peaking Station and operates more [frequently] during late spring, summer, and early fall.
>
> Brunot Island has a four cell Marley cooling tower. The Marley four cell cross flow cooling towers was originally built in 1973. The distribution system consists of a hot water deck with 640 nozzles per 1/2 cell. The fill media in [each] cooling tower is a PVC V-bar splash fill. The fill supports are constructed PVC wire grid hanging from [a] two by four. The drift eliminators are installed in the plenum section of the tower just inboard of the fill material.

The Actual Intake Flow (AIF) reported on the permit application is 0.141 MGD. About 76% of the water withdrawn by the CWIS is used for cooling purposes.

Applicability Criteria of 40 CFR Part 125, Subpart J

The Station is an "existing facility" as defined in 40 CFR § 125.92(k).[4] Existing facilities are subject to 40 CFR Part 125, Subpart J – Requirements Applicable to Cooling Water Intake Structures for Existing Facilities Under Section 316(b) of the Clean Water Act if they meet the applicability criteria given by § 125.91(a), as follows:

(a) The owner or operator of an existing facility, as defined in §125.92(k), is subject to the requirements at §§125.94 through 125.99 if:

(1) The facility is a point source;

(2) The facility uses or proposes to use one or more cooling water intake structures with a cumulative design intake flow (DIF) of greater than 2 million gallons per day (mgd) to withdraw water from waters of the United States; and

(3) Twenty-five percent or more of the water the facility withdraws on an actual intake flow basis is used exclusively for cooling purposes.

The Station is a point source and uses a cooling water intake structure with a design intake flow of 13.1 MGD, which is greater than the 2 MGD threshold. Approximately 76% of the water withdrawn by the Station is used for cooling purposes, which exceeds the 25% applicability threshold. The Station meets all the applicability criteria, so it is subject to the requirements of §§ 125.94 through 125.99.

The Station variously claims to meet BTA standards for impingement mortality by operating a CWIS with a 0.5-feet-per-second through-screen design velocity and by operating a closed-cycle recirculating system. The Station submitted drawings and some information about the intake screens, but did not include calculations to demonstrate that the maximum design intake velocity as water passes through the structural components of the screen measured perpendicular to the screen mesh does not exceed 0.5 feet per second. Therefore, BTA for impingement mortality will be identified as operation of a closed-cycle recirculating system pursuant to the BTA option under 40 CFR § 125.94(c)(1).

Under 40 CFR § 125.94(d), the Director (i.e., DEP as the delegated state permitting authority) must establish BTA standards for entrainment for each intake on a site-specific basis (no threshold). The standards must reflect the Director's determination of the maximum reduction in entrainment warranted after consideration of the relevant factors as specified in § 125.98(f). According to § 125.98(f)(2), a Director's proposed determination must be based on consideration of any additional information required by the Director at § 125.98(i) and the following factors: (i) numbers and types of organisms entrained; (ii) impact of changes in particulate emissions or other pollutants associated with entrainment technologies; (iii) land availability as it relates to the feasibility of entrainment technology; (iv) remaining useful life of the plant; and (v) quantified and qualitative social benefits and costs of available entrainment technologies when such information on both factors is of sufficient rigor to make a decision.

Based on the Department's review of information submitted with the permit application, BTA for entrainment will be operation of a closed-cycle recirculating system. However, considering PFBC's comments, and since there are no existing entrainment data for this facility's intake structure, DEP will require one peak season of entrainment sampling during this permit cycle to gather information on the "numbers and types of organisms entrained".

[4] *Existing facility* means any facility that commenced construction as described in 40 CFR 122.29(b)(4) on or before January 17, 2002 (or July 17, 2006 for an offshore oil and gas extraction facility) and any modification of, or any addition of a unit at such a facility. A facility built adjacent to another facility would be a new facility while the original facility would remain as an existing facility for purposes of this subpart. A facility cannot both be an existing facility and a new facility as defined at §125.83.

Notwithstanding the Station's operation of a closed-cycle recirculating system, the Station's typical period of operation—intermittently from late spring through fall—overlaps with the period when eggs, larval fishes, and juvenile fishes are in highest abundance in the river. Those are the life stages that tend to be the most susceptible to entrainment. Additionally, as PFBC's comments state, data used to represent the fish community relied solely on the collection of fish via boat electrofishing. Electrofishing surveys effectively capture certain species but not others, which is especially true in larger bodies of water. In addition, such surveys do not do well detecting the presence of rare species, or species that are more likely to stay near the bottom of a waterbody. Electrofishing also targets adult fish and may not generate data representing the presence or vulnerability of eggs or larval fish. Based on those factors, DEP considers entrainment sampling to be the best way to determine the impacts of the intake, and the best way to evaluate whether the intake affects state-listed species that have been observed upstream and downstream of the facility.

The CWIS requirements that will be imposed in the permit pursuant to Section 316(b) of the Clean Water Act and 40 CFR Part 125, Subpart J are as follows:

A. Nothing in this permit authorizes a take of endangered or threatened species under the Endangered Species Act.

B. Technology and operational measures currently employed at the cooling water intake structure(s) must be operated in a way that minimizes impingement mortality and entrainment to the fullest extent possible.

C. The permittee shall not alter the location, design, construction or capacity of the intake structure(s) without prior approval of DEP.

D. Best Technology Available (BTA) Requirements

   To meet BTA requirements to minimize adverse impacts from impingement and entrainment, the permittee shall utilize a closed-cycle recirculating cooling system. To comply with these BTA requirements the permittee shall:

   1. Operate a closed cycle recirculating system as defined at 40 CFR § 125.92(c).

   2. Monitor the actual intake flows at a minimum frequency of daily, including measurements of cooling water withdrawals, make-up water and blow down volume or alternatively monitor cycles of concentration at a minimum frequency of daily.

   3. Submit the results of monitoring in paragraph D.2 above on the Cooling Water Intake Monitoring Supplemental Report (3800-FM-BCW0010) as an attachment to monthly DMRs.

E. If DEP determines the methods to meet impingement and entrainment BTA requirements are not sufficient, the permittee shall employ additional controls to reduce adverse impacts from impingement and entrainment.

F. The permittee shall, on an annual basis, submit a report describing any modifications to the operation of any unit at the facility that impacts cooling water withdrawals or operation of the cooling water intake structure(s) during a calendar year. If not applicable, the permittee shall submit a statement certifying that no modifications have occurred in lieu of a report. The annual report or statement is due by January 28 of each year.

G. If the permittee wishes to submit a request for a reduction in permit application requirements as specified in 40 CFR § 125.95(c), the request must be submitted to DEP at least two years and six months before the permit expiration date.

H. The permittee shall retain data and other records for any information developed pursuant to Section 316(b) of the Clean Water Act for a minimum of ten years.

I. New Units.

   The permittee must submit applicable information in 40 CFR § 122.21(r) at least 180 days prior to the planned commencement of cooling water withdrawals associated with the operation of a new unit (as defined in 40 CFR § 125.92(u)).

J. The permittee shall submit results of entrainment monitoring obtained during each calendar year to the DEP Regional Office that issued the permit and to DEP's Bureau of Clean Water by January 28 following the end of the monitoring period.

K. Within one (1) year of the Permit Effective Date, the permittee shall submit to DEP a plan and schedule ("Sampling Plan") to conduct entrainment sampling during one (1) peak entrainment period (generally late spring through early fall) during the permit term. DEP shall review and approve the Sampling Plan and the permittee shall implement the approved Sampling Plan in accordance with the approved schedule.

Within six (6) months of completing the entrainment sampling, the permittee shall submit to DEP a report summarizing the results of the entrainment sampling.

004.B. Water Quality-Based Effluent Limitations (WQBELs)

As stated above, other than debris that collects on the intake screen, no other pollutants are expected to be introduced to Outfall 004's effluent by NRG. Therefore, no reasonable potential to cause or contribute to excursions above water quality standards is presumed to exist.

Notwithstanding a lack of reasonable potential for backwash discharges to cause or contribute to excursions above numerical water quality standards, any discharges containing debris from the intake screen would violate narrative water quality criteria and corresponding prohibitions under 25 Pa. Code §§ 93.6 and 92a.41(c), respectively, which state:

§ 93.6. General water quality criteria

(a) Water may not contain substances attributable to point or nonpoint source discharges in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life.

(b) In addition to other substances listed within or addressed by this chapter, specific substances to be controlled include, but are not limited to, floating materials, oil, grease, scum and substances that produce color, tastes, odors, turbidity or settle to form deposits.

§ 92a.41. Conditions applicable to all permits.

(c) The discharger may not discharge floating materials, scum, sheen, or substances that result in deposits in the receiving water. Except as provided for in the permit, the discharger may not discharge foam, oil, grease, or substances that produce an observable change in the color, taste, odor or turbidity of the receiving water.

Based on these requirements, the following permit condition (in addition to the § 92a.41(c) condition cited above, which is included in all NPDES permits) will be imposed at Outfall 004 to ensure compliance with narrative water quality criteria:

" Debris collected on the intake racks shall not be returned to the waterway."

004.C. Effluent Limitations and Monitoring Requirements for Outfall 004

There are no TBELs or WQBELs applicable to discharges from Outfall 004. Therefore, the narrative condition regarding collected debris will be imposed.

Table 22. Effluent Limits and Monitoring Requirements for Outfall 004

Pollutant	Mass (pounds)		Concentration (mg/L)			Basis
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant Maximum	
Debris collected on the intake racks shall not be returned to the waterway.						25 Pa. Code §§ 92a.41(c) & 93.6

Development of Effluent Limitations

Outfall No.	005	**Design Flow (MGD)**	Variable
Latitude	40° 27' 55.0"	**Longitude**	-80° 02' 34.0"

Wastewater Description: Storm water runoff from building roof drains

005.A. Technology-Based Effluent Limitations (TBELs)

In the permit renewal application, Brunot Island Power identified Outfall 005 as a storm water outfall that is not exposed to industrial activities. The conditional exclusion for 'no exposure' of industrial activities and materials to storm water is given by 40 CFR § 122.26(g), which is incorporated by reference in DEP's regulations at 25 Pa. Code § 92a.32(a).[5]

The conditional exclusion from the requirement for an NPDES permit is available on a facility-wide basis, but the regulations (40 CFR § 122.26(g)(3)(ii)) state "[i]f a facility has some discharges of storm water that would otherwise be "no exposure" discharges, individual permit requirements should be adjusted accordingly." Pursuant to 40 CFR § 122.26(g)(3)(ii), DEP allows 'no exposure' certifications on an outfall-by-outfall basis in individual NPDES permits. Qualifying for "no exposure" requires a facility operator to submit a signed certification stating that there are no discharges of storm water contaminated by exposure to industrial materials and activities. For DEP's purposes, the "No Exposure?" checkbox on Module 1 submitted with a signed application operates as the permittee's signed certification for each "no exposure" outfall. Permittees also are required to provide corroborating analytical results for each outfall.

The instructions for Module 1 of the "NPDES Application for Individual Permit to Discharge Industrial Wastewater" identify thresholds that are indicative of "no exposure" conditions. Table 23 summarizes the analytical results for Outfall 005 and DEP's "no exposure" thresholds and PAG-03 benchmark values.

Table 23. Storm Water Analytical Results Reported on Application for Outfall 005

Parameter	Reported Concentration (mg/L)	No Exposure Threshold	PAG-03 Benchmark Value
Oil and Grease	<5	≤5.0	30
Biochemical Oxygen Demand (5-day)	3.3	≤10	—
Chemical Oxygen Demand	14.3	≤30	120
Total Suspended Solids	<3	≤30	100
Total Kjeldahl Nitrogen	<1.2	≤2	—
Total Phosphorus	<0.1	≤1	—
pH (s.u.)	6.57	—	—
Total Iron	0.30	—	—

Based on the reported storm water concentrations, Outfall 005 qualifies for "no exposure" certification. Consistent with the outfall's "no exposure" status, no monitoring requirements are imposed at Outfall 005.

Even though no limits or monitoring requirements are imposed at Outfall 005, the Station must ensure that no exposure conditions are maintained within the drainage area of the outfall and that storm water sources remain free of contaminants by implementing any necessary BMPs. If there is any change to the status of Outfall 005's storm water discharges, then those changes must be reported to DEP.

[5] 40 CFR 122.26(g): *Conditional exclusion for "no exposure" of industrial activities and materials to storm water*. Discharges composed entirely of storm water are not storm water discharges associated with industrial activity if there is "no exposure" of industrial materials and activities to rain, snow, snowmelt and/or runoff, and the discharger satisfies the conditions in paragraphs (g)(1) through (g)(4) of this section. "No exposure" means that all industrial materials and activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste products. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product or waste product.

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

ATTACHMENT A

Toxics Management Spreadsheet Modeling Results for Outfalls 001 and 003

OUTFALL 001

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Toxics Management Spreadsheet
Version 1.4, May 2023

Discharge Information

Instructions | Discharge | Stream

Facility: **Brunot Island Generating Station** NPDES Permit No.: **PA0031933** Outfall No.: **001**

Evaluation Type: **Major Sewage / Industrial Waste** Wastewater Description: **Cooling tower blowdown & low vol. wastes**

Discharge Characteristics								
Design Flow (MGD)*	Hardness (mg/l)*	pH (SU)*	Partial Mix Factors (PMFs)				Complete Mix Times (min)	
			AFC	CFC	THH	CRL	Q_{7-10}	Q_h
0.487	72.1	7.31		0.5	0.5	0.5		

					0 if left blank		0.5 if left blank		0 if left blank			1 if left blank	
	Discharge Pollutant	Units	Max Discharge Conc		Trib Conc	Stream Conc	Daily CV	Hourly CV	Stream CV	Fate Coeff	FOS	Criteria Mod	Chem Transl
Group 1	Total Dissolved Solids (PWS)	mg/L		172									
	Chloride (PWS)	mg/L		19.5									
	Bromide	mg/L	<	0.1									
	Sulfate (PWS)	mg/L		62									
	Fluoride (PWS)	mg/L	<	0.2									
Group 2	Total Aluminum	µg/L		61.7									
	Total Antimony	µg/L	<	2									
	Total Arsenic	µg/L	<	2									
	Total Barium	µg/L		37.5									
	Total Beryllium	µg/L	<	1									
	Total Boron	µg/L	<	100									
	Total Cadmium	µg/L	<	0.2									
	Total Chromium (III)	µg/L	<	2									
	Hexavalent Chromium	µg/L		0.2									
	Total Cobalt	µg/L	<	1									
	Total Copper	µg/L		6									
	Free Cyanide	µg/L											
	Total Cyanide	µg/L		8									
	Dissolved Iron	µg/L		30									
	Total Iron	µg/L		100									
	Total Lead	µg/L	<	1									
	Total Manganese	µg/L		59.5									
	Total Mercury	µg/L	<	0.0005									
	Total Nickel	µg/L	<	2									
	Total Phenols (Phenolics) (PWS)	µg/L	<	50									
	Total Selenium	µg/L	<	5									
	Total Silver	µg/L	<	0.4									
	Total Thallium	µg/L	<	2									
	Total Zinc	µg/L	<	5									
	Total Molybdenum	µg/L		15.8									
	Acrolein	µg/L	<										
	Acrylamide	µg/L	<										
	Acrylonitrile	µg/L	<										
	Benzene	µg/L	<										
	Bromoform	µg/L	<										

Group 3	Carbon Tetrachloride	µg/L	<										
	Chlorobenzene	µg/L											
	Chlorodibromomethane	µg/L	<										
	Chloroethane	µg/L	<										
	2-Chloroethyl Vinyl Ether	µg/L	<										
	Chloroform	µg/L	<										
	Dichlorobromomethane	µg/L	<										
	1,1-Dichloroethane	µg/L	<										
	1,2-Dichloroethane	µg/L	<										
	1,1-Dichloroethylene	µg/L	<										
	1,2-Dichloropropane	µg/L	<										
	1,3-Dichloropropylene	µg/L	<										
	1,4-Dioxane	µg/L	<										
	Ethylbenzene	µg/L	<										
	Methyl Bromide	µg/L	<										
	Methyl Chloride	µg/L	<										
	Methylene Chloride	µg/L	<										
	1,1,2,2-Tetrachloroethane	µg/L	<										
	Tetrachloroethylene	µg/L	<										
	Toluene	µg/L	<										
	1,2-trans-Dichloroethylene	µg/L	<										
	1,1,1-Trichloroethane	µg/L	<										
	1,1,2-Trichloroethane	µg/L	<										
	Trichloroethylene	µg/L	<										
	Vinyl Chloride	µg/L	<										
Group 4	2-Chlorophenol	µg/L	<										
	2,4-Dichlorophenol	µg/L	<										
	2,4-Dimethylphenol	µg/L	<										
	4,6-Dinitro-o-Cresol	µg/L	<										
	2,4-Dinitrophenol	µg/L	<										
	2-Nitrophenol	µg/L	<										
	4-Nitrophenol	µg/L	<										
	p-Chloro-m-Cresol	µg/L	<										
	Pentachlorophenol	µg/L	<										
	Phenol	µg/L	<										
	2,4,6-Trichlorophenol	µg/L	<										
Group 5	Acenaphthene	µg/L	<										
	Acenaphthylene	µg/L	<										
	Anthracene	µg/L	<										
	Benzidine	µg/L	<										
	Benzo(a)Anthracene	µg/L	<										
	Benzo(a)Pyrene	µg/L	<										
	3,4-Benzofluoranthene	µg/L	<										
	Benzo(ghi)Perylene	µg/L	<										
	Benzo(k)Fluoranthene	µg/L	<										
	Bis(2-Chloroethoxy)Methane	µg/L	<										
	Bis(2-Chloroethyl)Ether	µg/L	<										
	Bis(2-Chloroisopropyl)Ether	µg/L	<										
	Bis(2-Ethylhexyl)Phthalate	µg/L	<										
	4-Bromophenyl Phenyl Ether	µg/L	<										
	Butyl Benzyl Phthalate	µg/L	<										
	2-Chloronaphthalene	µg/L	<										
	4-Chlorophenyl Phenyl Ether	µg/L	<										
	Chrysene	µg/L	<										
	Dibenzo(a,h)Anthrancene	µg/L	<										
	1,2-Dichlorobenzene	µg/L	<										
	1,3-Dichlorobenzene	µg/L	<										
	1,4-Dichlorobenzene	µg/L	<										
	3,3-Dichlorobenzidine	µg/L	<										
	Diethyl Phthalate	µg/L	<										
	Dimethyl Phthalate	µg/L	<										
	Di-n-Butyl Phthalate	µg/L	<										
	2,4-Dinitrotoluene	µg/L	<										

	2,6-Dinitrotoluene	µg/L	<											
	Di-n-Octyl Phthalate	µg/L	<											
	1,2-Diphenylhydrazine	µg/L	<											
	Fluoranthene	µg/L	<											
	Fluorene	µg/L	<											
	Hexachlorobenzene	µg/L	<											
	Hexachlorobutadiene	µg/L	<											
	Hexachlorocyclopentadiene	µg/L	<											
	Hexachloroethane	µg/L	<											
	Indeno(1,2,3-cd)Pyrene	µg/L	<											
	Isophorone	µg/L	<											
	Naphthalene	µg/L	<											
	Nitrobenzene	µg/L	<											
	n-Nitrosodimethylamine	µg/L	<											
	n-Nitrosodi-n-Propylamine	µg/L	<											
	n-Nitrosodiphenylamine	µg/L	<											
	Phenanthrene	µg/L	<											
	Pyrene	µg/L	<											
	1,2,4-Trichlorobenzene	µg/L	<											
Group 6	Aldrin	µg/L	<											
	alpha-BHC	µg/L	<											
	beta-BHC	µg/L	<											
	gamma-BHC	µg/L	<											
	delta BHC	µg/L	<											
	Chlordane	µg/L	<											
	4,4-DDT	µg/L	<											
	4,4-DDE	µg/L	<											
	4,4-DDD	µg/L	<											
	Dieldrin	µg/L	<											
	alpha-Endosulfan	µg/L	<											
	beta-Endosulfan	µg/L	<											
	Endosulfan Sulfate	µg/L	<											
	Endrin	µg/L	<											
	Endrin Aldehyde	µg/L	<											
	Heptachlor	µg/L	<											
	Heptachlor Epoxide	µg/L	<											
	PCB-1016	µg/L	<											
	PCB-1221	µg/L	<											
	PCB-1232	µg/L	<											
	PCB-1242	µg/L	<											
	PCB-1248	µg/L	<											
	PCB-1254	µg/L	<											
	PCB-1260	µg/L	<											
	PCBs, Total	µg/L	<											
	Toxaphene	µg/L	<											
	2,3,7,8-TCDD	ng/L	<											
Group 7	Gross Alpha	pCi/L												
	Total Beta	pCi/L	<											
	Radium 226/228	pCi/L	<											
	Total Strontium	µg/L	<											
	Total Uranium	µg/L	<											
	Osmotic Pressure	mOs/kg												

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Toxics Management Spreadsheet
Version 1.4, May 2023

Stream / Surface Water Information

Brunot Island Generating Station, NPDES Permit No. PA0031933, Outfall 001

Instructions | Discharge | Stream

Receiving Surface Water Name: Ohio River

No. Reaches to Model: 1

- (●) Statewide Criteria
- ( ) Great Lakes Criteria
- ( ) ORSANCO Criteria

Location	Stream Code*	RMI*	Elevation (ft)*	DA (mi²)*	Slope (ft/ft)	PWS Withdrawal (MGD)	Apply Fish Criteria*
Point of Discharge	032317	978.1	710	19100	0.0001		Yes
End of Reach 1	032317	977.1	709.9	19101	0.0001		Yes

$Q_{7\text{-}10}$

Location	RMI	LFY (cfs/mi²)*	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time (days)	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness*	pH*	Hardness	pH
Point of Discharge	978.1	0.25	2365			550	12					100	7.5		
End of Reach 1	977.1	0.25	2365			1150	12								

Q_h

Location	RMI	LFY (cfs/mi²)	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time (days)	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness	pH	Hardness	pH
Point of Discharge	978.1														
End of Reach 1	977.1														

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Toxics Management Spreadsheet
Version 1.4, May 2023

Model Results

Brunot Island Generating Station, NPDES Permit No. PA0031933, Outfall 001

Instructions | Results | RETURN TO INPUTS | SAVE AS PDF | PRINT | ◉ All ○ Inputs ○ Results ○ Limits

☑ ***Hydrodynamics***

$Q_{7\text{-}10}$

RMI	Stream Flow (cfs)	PWS Withdrawal (cfs)	Net Stream Flow (cfs)	Discharge Analysis Flow (cfs)	Slope (ft/ft)	Depth (ft)	Width (ft)	W/D Ratio	Velocity (fps)	Travel Time (days)	Complete Mix Time (min)
978.1	2,365		2,365	0.753	0.0001	12.	550.	45.833	0.358	0.17	996.792
977.1	2,365		2,365								

Q_h

RMI	Stream Flow (cfs)	PWS Withdrawal (cfs)	Net Stream Flow (cfs)	Discharge Analysis Flow (cfs)	Slope (ft/ft)	Depth (ft)	Width (ft)	W/D Ratio	Velocity (fps)	Travel Time (days)	Complete Mix Time (min)
978.1	6602.63		6602.63	0.753	0.0001	18.851	550.	29.176	0.637	0.096	506.472
977.1	6602.634		6602.63								

☑ ***Wasteload Allocations***

☑ *AFC* CCT (min): 15 PMF: 0.123 Analysis Hardness (mg/l): 99.928 Analysis pH: 7.50

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	750	750	289,563	
Total Antimony	0	0		0	1,100	1,100	424,692	
Total Arsenic	0	0		0	340	340	131,268	Chem Translator of 1 applied
Total Barium	0	0		0	21,000	21,000	8,107,760	
Total Boron	0	0		0	8,100	8,100	3,127,279	
Total Cadmium	0	0		0	2.012	2.13	823	Chem Translator of 0.944 applied
Total Chromium (III)	0	0		0	569.426	1,802	695,716	Chem Translator of 0.316 applied
Hexavalent Chromium	0	0		0	16	16.3	6,291	Chem Translator of 0.982 applied
Total Cobalt	0	0		0	95	95.0	36,678	
Total Copper	0	0		0	13.430	14.0	5,401	Chem Translator of 0.96 applied

Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	64.531	81.6	31,493	Chem Translator of 0.791 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	1.400	1.65	636	Chem Translator of 0.85 applied
Total Nickel	0	0		0	467.950	469	181,030	Chem Translator of 0.998 applied
Total Phenols (Phenolics) (PWS)	0	0		0	N/A	N/A	N/A	
Total Selenium	0	0		0	N/A	N/A	N/A	Chem Translator of 0.922 applied
Total Silver	0	0		0	3.213	3.78	1,459	Chem Translator of 0.85 applied
Total Thallium	0	0		0	65	65.0	25,095	
Total Zinc	0	0		0	117.109	120	46,231	Chem Translator of 0.978 applied

☑ ***CFC*** CCT (min): 720 PMF: 0.500 Analysis Hardness (mg/l): 99.982 Analysis pH: 7.50

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	220	220	345,526	
Total Arsenic	0	0		0	150	150	235,586	Chem Translator of 1 applied
Total Barium	0	0		0	4,100	4,100	6,439,355	
Total Boron	0	0		0	1,600	1,600	2,512,919	
Total Cadmium	0	0		0	0.246	0.27	425	Chem Translator of 0.909 applied
Total Chromium (III)	0	0		0	74.104	86.2	135,332	Chem Translator of 0.86 applied
Hexavalent Chromium	0	0		0	10	10.4	16,326	Chem Translator of 0.962 applied
Total Cobalt	0	0		0	19	19.0	29,841	
Total Copper	0	0		0	8.954	9.33	14,650	Chem Translator of 0.96 applied
Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	1,500	1,500	4,710,223	WQC = 30 day average; PMF = 1
Total Lead	0	0		0	2.516	3.18	4,996	Chem Translator of 0.791 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	0.770	0.91	1,423	Chem Translator of 0.85 applied
Total Nickel	0	0		0	51.999	52.2	81,914	Chem Translator of 0.997 applied
Total Phenols (Phenolics) (PWS)	0	0		0	N/A	N/A	N/A	
Total Selenium	0	0		0	4.600	4.99	7,836	Chem Translator of 0.922 applied
Total Silver	0	0		0	N/A	N/A	N/A	Chem Translator of 1 applied
Total Thallium	0	0		0	13	13.0	20,417	
Total Zinc	0	0		0	118.121	120	188,152	Chem Translator of 0.986 applied

☑ ***THH*** CCT (min): 720 PMF: 0.500 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments

Total Dissolved Solids (PWS)	0	0		0	500,000	500,000	N/A	
Chloride (PWS)	0	0		0	250,000	250,000	N/A	
Sulfate (PWS)	0	0		0	250,000	250,000	N/A	
Fluoride (PWS)	0	0		0	2,000	2,000	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	5.6	5.6	8,795	
Total Arsenic	0	0		0	10	10.0	15,706	
Total Barium	0	0		0	2,400	2,400	3,769,378	
Total Boron	0	0		0	3,100	3,100	4,868,780	
Total Cadmium	0	0		0	N/A	N/A	N/A	
Total Chromium (III)	0	0		0	N/A	N/A	N/A	
Hexavalent Chromium	0	0		0	N/A	N/A	N/A	
Total Cobalt	0	0		0	N/A	N/A	N/A	
Total Copper	0	0		0	N/A	N/A	N/A	
Dissolved Iron	0	0		0	300	300	471,172	
Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	N/A	N/A	N/A	
Total Manganese	0	0		0	1,000	1,000	1,570,574	
Total Mercury	0	0		0	0.050	0.05	78.5	
Total Nickel	0	0		0	610	610	958,050	
Total Phenols (Phenolics) (PWS)	0	0		0	5	5.0	N/A	
Total Selenium	0	0		0	N/A	N/A	N/A	
Total Silver	0	0		0	N/A	N/A	N/A	
Total Thallium	0	0		0	0.24	0.24	377	
Total Zinc	0	0		0	N/A	N/A	N/A	

☑ *CRL* CCT (min): ###### PMF: 0.500 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	N/A	N/A	N/A	
Total Arsenic	0	0		0	N/A	N/A	N/A	
Total Barium	0	0		0	N/A	N/A	N/A	
Total Boron	0	0		0	N/A	N/A	N/A	
Total Cadmium	0	0		0	N/A	N/A	N/A	
Total Chromium (III)	0	0		0	N/A	N/A	N/A	
Hexavalent Chromium	0	0		0	N/A	N/A	N/A	
Total Cobalt	0	0		0	N/A	N/A	N/A	
Total Copper	0	0		0	N/A	N/A	N/A	
Dissolved Iron	0	0		0	N/A	N/A	N/A	

Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	N/A	N/A	N/A	
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	N/A	N/A	N/A	
Total Nickel	0	0		0	N/A	N/A	N/A	
Total Phenols (Phenolics) (PWS)	0	0		0	N/A	N/A	N/A	
Total Selenium	0	0		0	N/A	N/A	N/A	
Total Silver	0	0		0	N/A	N/A	N/A	
Total Thallium	0	0		0	N/A	N/A	N/A	
Total Zinc	0	0		0	N/A	N/A	N/A	

☑ ***Recommended WQBELs & Monitoring Requirements***

No. Samples/Month: 4

	Mass Limits		*Concentration Limits*						
Pollutants	AML (lbs/day)	MDL (lbs/day)	AML	MDL	IMAX	Units	Governing WQBEL	WQBEL Basis	Comments

☑ ***Other Pollutants without Limits or Monitoring***

The following pollutants do not require effluent limits or monitoring based on water quality because reasonable potential to exceed water quality criteria was not determined and the discharge concentration was less than thresholds for monitoring, or the pollutant was not detected and a sufficiently sensitive analytical method was used (e.g., <= Target QL).

Pollutants	Governing WQBEL	Units	Comments
Total Dissolved Solids (PWS)	N/A	N/A	PWS Not Applicable
Chloride (PWS)	N/A	N/A	PWS Not Applicable
Bromide	N/A	N/A	No WQS
Sulfate (PWS)	N/A	N/A	PWS Not Applicable
Fluoride (PWS)	N/A	N/A	Discharge Conc < TQL
Total Aluminum	185,598	µg/L	Discharge Conc ≤ 10% WQBEL
Total Antimony	N/A	N/A	Discharge Conc < TQL
Total Arsenic	N/A	N/A	Discharge Conc < TQL
Total Barium	3,769,378	µg/L	Discharge Conc ≤ 10% WQBEL
Total Beryllium	N/A	N/A	No WQS
Total Boron	2,004,460	µg/L	Discharge Conc < TQL
Total Cadmium	425	µg/L	Discharge Conc < TQL
Total Chromium (III)	135,332	µg/L	Discharge Conc < TQL
Hexavalent Chromium	4,032	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cobalt	23,509	µg/L	Discharge Conc < TQL
Total Copper	3,462	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cyanide	N/A	N/A	No WQS
Dissolved Iron	471,172	µg/L	Discharge Conc ≤ 10% WQBEL
Total Iron	4,710,223	µg/L	Discharge Conc ≤ 10% WQBEL

Total Lead	4,996	µg/L	Discharge Conc < TQL
Total Manganese	1,570,574	µg/L	Discharge Conc ≤ 10% WQBEL
Total Mercury	78.5	µg/L	Discharge Conc < TQL
Total Nickel	81,914	µg/L	Discharge Conc < TQL
Total Phenols (Phenolics) (PWS)		µg/L	PWS Not Applicable
Total Selenium	7,836	µg/L	Discharge Conc < TQL
Total Silver	935	µg/L	Discharge Conc < TQL
Total Thallium	377	µg/L	Discharge Conc < TQL
Total Zinc	29,632	µg/L	Discharge Conc < TQL
Total Molybdenum	N/A	N/A	No WQS

OUTFALL 003

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.4, May 2023

Discharge Information

Instructions | Discharge | Stream

Facility: **Brunot Island Generating Station** NPDES Permit No.: **PA0031933** Outfall No.: **003**

Evaluation Type: **Major Sewage / Industrial Waste** Wastewater Description: **Low volume waste sources**

Discharge Characteristics								
Design Flow (MGD)*	Hardness (mg/l)*	pH (SU)*	Partial Mix Factors (PMFs)				Complete Mix Times (min)	
			AFC	CFC	THH	CRL	Q_{7-10}	Q_h
0.026	83.1	7.16		0.5	0.5	0.5		

	Discharge Pollutant	Units	Max Discharge Conc		0 if left blank: Trib Conc	0 if left blank: Stream Conc	0.5 if left blank: Daily CV	0.5 if left blank: Hourly CV	0 if left blank: Strea m CV	0 if left blank: Fate Coeff	0 if left blank: FOS	1 if left blank: Criteri a Mod	1 if left blank: Chem Transl
Group 1	Total Dissolved Solids (PWS)	mg/L		494									
	Chloride (PWS)	mg/L		18.6									
	Bromide	mg/L	<	0.1									
	Sulfate (PWS)	mg/L		61.9									
	Fluoride (PWS)	mg/L	<	0.2									
Group 2	Total Aluminum	µg/L		33.3									
	Total Antimony	µg/L	<	2									
	Total Arsenic	µg/L	<	2									
	Total Barium	µg/L		43.3									
	Total Beryllium	µg/L	<	1									
	Total Boron	µg/L	<	100									
	Total Cadmium	µg/L	<	0.2									
	Total Chromium (III)	µg/L	<	2									
	Hexavalent Chromium	µg/L		0.37									
	Total Cobalt	µg/L	<	1									
	Total Copper	µg/L		16									
	Free Cyanide	µg/L											
	Total Cyanide	µg/L		214									
	Dissolved Iron	µg/L		40									
	Total Iron	µg/L		220									
	Total Lead	µg/L	<	1									
	Total Manganese	µg/L		34.1									
	Total Mercury	µg/L		0.0008									
	Total Nickel	µg/L	<	4.54									
	Total Phenols (Phenolics) (PWS)	µg/L	<	50									
	Total Selenium	µg/L	<	5									
	Total Silver	µg/L	<	0.4									
	Total Thallium	µg/L	<	2									
	Total Zinc	µg/L	<	5									
	Total Molybdenum	µg/L		35.6									
	Acrolein	µg/L	<	2									
	Acrylamide	µg/L	<										
	Acrylonitrile	µg/L	<	0.5									
	Benzene	µg/L	<	0.04									
	Bromoform	µg/L	<	0.1									

Group 3	Carbon Tetrachloride	µg/L	<	0.1										
	Chlorobenzene	µg/L		0.07										
	Chlorodibromomethane	µg/L	<	0.08										
	Chloroethane	µg/L	<	0.06										
	2-Chloroethyl Vinyl Ether	µg/L	<	0.1										
	Chloroform	µg/L	<	0.09										
	Dichlorobromomethane	µg/L	<	0.08										
	1,1-Dichloroethane	µg/L	<	0.06										
	1,2-Dichloroethane	µg/L	<	0.08										
	1,1-Dichloroethylene	µg/L	<	0.07										
	1,2-Dichloropropane	µg/L	<	0.1										
	1,3-Dichloropropylene	µg/L	<	0.06										
	1,4-Dioxane	µg/L	<	2.1										
	Ethylbenzene	µg/L		0.08										
	Methyl Bromide	µg/L	<	0.1										
	Methyl Chloride	µg/L	<	0.09										
	Methylene Chloride	µg/L	<	0.1										
	1,1,2,2-Tetrachloroethane	µg/L	<	0.1										
	Tetrachloroethylene	µg/L	<	0.09										
	Toluene	µg/L	<	0.06										
	1,2-trans-Dichloroethylene	µg/L	<	0.1										
	1,1,1-Trichloroethane	µg/L	<	0.06										
	1,1,2-Trichloroethane	µg/L	<	0.08										
	Trichloroethylene	µg/L	<	0.1										
	Vinyl Chloride	µg/L	<	0.1										
Group 4	2-Chlorophenol	µg/L	<	0.179										
	2,4-Dichlorophenol	µg/L	<	0.223										
	2,4-Dimethylphenol	µg/L		0.701										
	4,6-Dinitro-o-Cresol	µg/L	<	1.21										
	2,4-Dinitrophenol	µg/L	<	1.88										
	2-Nitrophenol	µg/L	<	0.229										
	4-Nitrophenol	µg/L	<	1.41										
	p-Chloro-m-Cresol	µg/L	<	2.58										
	Pentachlorophenol	µg/L	<	0.499										
	Phenol	µg/L	<	0.2										
	2,4,6-Trichlorophenol	µg/L	<	0.227										
Group 5	Acenaphthene	µg/L	<	0.351										
	Acenaphthylene	µg/L	<	0.349										
	Anthracene	µg/L	<	0.327										
	Benzidine	µg/L	<	0.61										
	Benzo(a)Anthracene	µg/L	<	0.271										
	Benzo(a)Pyrene	µg/L	<	0.249										
	3,4-Benzofluoranthene	µg/L	<	0.271										
	Benzo(ghi)Perylene	µg/L	<	0.411										
	Benzo(k)Fluoranthene	µg/L	<	0.334										
	Bis(2-Chloroethoxy)Methane	µg/L	<	0.234										
	Bis(2-Chloroethyl)Ether	µg/L	<	0.27										
	Bis(2-Chloroisopropyl)Ether	µg/L	<	0.27										
	Bis(2-Ethylhexyl)Phthalate	µg/L	<	1.58										
	4-Bromophenyl Phenyl Ether	µg/L	<	0.395										
	Butyl Benzyl Phthalate	µg/L	<	1.04										
	2-Chloronaphthalene	µg/L	<	0.352										
	4-Chlorophenyl Phenyl Ether	µg/L	<	0.341										
	Chrysene	µg/L	<	0.51										
	Dibenzo(a,h)Anthrancene	µg/L	<	0.414										
	1,2-Dichlorobenzene	µg/L	<	0.195										
	1,3-Dichlorobenzene	µg/L	<	0.427										
	1,4-Dichlorobenzene	µg/L	<	0.467										
	3,3-Dichlorobenzidine	µg/L	<	0.745										
	Diethyl Phthalate	µg/L	<	0.85										
	Dimethyl Phthalate	µg/L	<	0.511										
	Di-n-Butyl Phthalate	µg/L	<	2.71										
	2,4-Dinitrotoluene	µg/L	<	0.465										

	2,6-Dinitrotoluene	µg/L	<	0.448
	Di-n-Octyl Phthalate	µg/L	<	0.368
	1,2-Diphenylhydrazine	µg/L	<	0.527
	Fluoranthene	µg/L	<	0.627
	Fluorene	µg/L	<	0.31
	Hexachlorobenzene	µg/L	<	0.418
	Hexachlorobutadiene	µg/L	<	0.266
	Hexachlorocyclopentadiene	µg/L	<	0.403
	Hexachloroethane	µg/L	<	0.474
	Indeno(1,2,3-cd)Pyrene	µg/L	<	0.392
	Isophorone	µg/L	<	0.256
	Naphthalene	µg/L	<	0.256
	Nitrobenzene	µg/L	<	0.243
	n-Nitrosodimethylamine	µg/L	<	0.24
	n-Nitrosodi-n-Propylamine	µg/L	<	0.422
	n-Nitrosodiphenylamine	µg/L	<	0.37
	Phenanthrene	µg/L	<	0.421
	Pyrene	µg/L	<	0.59
	1,2,4-Trichlorobenzene	µg/L	<	0.273
Group 6	Aldrin	µg/L	<	
	alpha-BHC	µg/L	<	
	beta-BHC	µg/L	<	
	gamma-BHC	µg/L	<	
	delta BHC	µg/L	<	
	Chlordane	µg/L	<	2.53
	4,4-DDT	µg/L	<	
	4,4-DDE	µg/L	<	
	4,4-DDD	µg/L	<	
	Dieldrin	µg/L	<	
	alpha-Endosulfan	µg/L	<	
	beta-Endosulfan	µg/L	<	
	Endosulfan Sulfate	µg/L	<	
	Endrin	µg/L	<	
	Endrin Aldehyde	µg/L	<	
	Heptachlor	µg/L	<	
	Heptachlor Epoxide	µg/L	<	
	PCB-1016	µg/L	<	0.2
	PCB-1221	µg/L	<	0.2
	PCB-1232	µg/L	<	0.2
	PCB-1242	µg/L	<	0.2
	PCB-1248	µg/L	<	0.2
	PCB-1254	µg/L	<	0.2
	PCB-1260	µg/L	<	0.2
	PCBs, Total	µg/L	<	1.4
	Toxaphene	µg/L	<	
	2,3,7,8-TCDD	ng/L	<	
Group 7	Gross Alpha	pCi/L		
	Total Beta	pCi/L	<	
	Radium 226/228	pCi/L	<	
	Total Strontium	µg/L	<	
	Total Uranium	µg/L	<	
	Osmotic Pressure	mOs/kg		

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Toxics Management Spreadsheet
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Stream / Surface Water Information

Brunot Island Generating Station, NPDES Permit No. PA0031933, Outfall 003

Instructions | Discharge | Stream

Receiving Surface Water Name: Ohio River

No. Reaches to Model: 1

- ○ Statewide Criteria
- ○ Great Lakes Criteria
- ◉ ORSANCO Criteria

Location	Stream Code*	RMI*	Elevation (ft)*	DA (mi^2)*	Slope (ft/ft)	PWS Withdrawal (MGD)	Apply Fish Criteria*
Point of Discharge	032317	987.85	710.01	19099	0.0001		Yes
End of Reach 1	032317	977.1	709.9	19101	0.0001		Yes

$Q_{7\text{-}10}$

Location	RMI	LFY (cfs/mi^2)*	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time (days)	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness*	pH*	Hardness	pH
Point of Discharge	987.85	0.25	2365			550	12					100	7.5		
End of Reach 1	977.1	0.25	2365			1150	12								

Q_h

Location	RMI	LFY (cfs/mi^2)	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time (days)	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness	pH	Hardness	pH
Point of Discharge	987.85														
End of Reach 1	977.1														

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Model Results

Brunot Island Generating Station, NPDES Permit No. PA0031933, Outfall 003

Instructions | Results | RETURN TO INPUTS | SAVE AS PDF | PRINT | (●) All | ( ) Inputs | ( ) Results | ( ) Limits

☑ ***Hydrodynamics***

$Q_{7\text{-}10}$

RMI	Stream Flow (cfs)	PWS Withdrawal (cfs)	Net Stream Flow (cfs)	Discharge Analysis Flow (cfs)	Slope (ft/ft)	Depth (ft)	Width (ft)	W/D Ratio	Velocity (fps)	Travel Time (days)	Complete Mix Time (min)
987.85	2,365		2,365	0.04	0.0001	12.	550.	45.833	0.358	1.833	997.393
977.1	2,365		2,365								

Q_h

RMI	Stream Flow (cfs)	PWS Withdrawal (cfs)	Net Stream Flow (cfs)	Discharge Analysis Flow (cfs)	Slope (ft/ft)	Depth (ft)	Width (ft)	W/D Ratio	Velocity (fps)	Travel Time (days)	Complete Mix Time (min)
987.85	6602.63		6602.63	0.04	0.0001	18.853	550.	29.174	0.637	1.032	506.517
977.1	6602.634		6602.63								

☑ ***Wasteload Allocations***

☑ ***AFC*** CCT (min): 15 PMF: 0.123 Analysis Hardness (mg/l): 99.998 Analysis pH: 7.50

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	750	750	5,408,806	
Total Antimony	0	0		0	1,100	1,100	7,932,916	
Total Arsenic	0	0		0	340	340	2,451,992	Chem Translator of 1 applied
Total Barium	0	0		0	21,000	21,000	##########	
Total Boron	0	0		0	8,100	8,100	58,415,109	
Total Cadmium	0	0		0	2.014	2.13	15,384	Chem Translator of 0.944 applied
Total Chromium (III)	0	0		0	569.753	1,803	13,002,874	Chem Translator of 0.316 applied
Hexavalent Chromium	0	0		0	16	16.3	117,503	Chem Translator of 0.982 applied
Total Cobalt	0	0		0	95	95.0	685,115	
Total Copper	0	0		0	13.439	14.0	100,955	Chem Translator of 0.96 applied

Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	64.580	81.6	588,786	Chem Translator of 0.791 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	1.400	1.65	11,878	Chem Translator of 0.85 applied
Total Nickel	0	0		0	468.226	469	3,383,496	Chem Translator of 0.998 applied
Total Phenols (Phenolics) (PWS)	0	0		0	N/A	N/A	N/A	
Total Selenium	0	0		0	N/A	N/A	N/A	Chem Translator of 0.922 applied
Total Silver	0	0		0	3.217	3.78	27,291	Chem Translator of 0.85 applied
Total Thallium	0	0		0	65	65.0	468,763	
Total Zinc	0	0		0	117.178	120	864,068	Chem Translator of 0.978 applied
Acrolein	0	0		0	3	3.0	21,635	
Acrylonitrile	0	0		0	650	650	4,687,632	
Benzene	0	0		0	640	640	4,615,515	
Bromoform	0	0		0	1,800	1,800	12,981,135	
Carbon Tetrachloride	0	0		0	2,800	2,800	20,192,877	
Chlorobenzene	0	0		0	1,200	1,200	8,654,090	
Chlorodibromomethane	0	0		0	N/A	N/A	N/A	
2-Chloroethyl Vinyl Ether	0	0		0	18,000	18,000	#########	
Chloroform	0	0		0	1,900	1,900	13,702,309	
Dichlorobromomethane	0	0		0	N/A	N/A	N/A	
1,2-Dichloroethane	0	0		0	15,000	15,000	#########	
1,1-Dichloroethylene	0	0		0	7,500	7,500	54,088,064	
1,2-Dichloropropane	0	0		0	11,000	11,000	79,329,160	
1,3-Dichloropropylene	0	0		0	310	310	2,235,640	
Ethylbenzene	0	0		0	2,900	2,900	20,914,051	
Methyl Bromide	0	0		0	550	550	3,966,458	
Methyl Chloride	0	0		0	28,000	28,000	#########	
Methylene Chloride	0	0		0	12,000	12,000	86,540,902	
1,1,2,2-Tetrachloroethane	0	0		0	1,000	1,000	7,211,742	
Tetrachloroethylene	0	0		0	700	700	5,048,219	
Toluene	0	0		0	1,700	1,700	12,259,961	
1,2-trans-Dichloroethylene	0	0		0	6,800	6,800	49,039,844	
1,1,1-Trichloroethane	0	0		0	3,000	3,000	21,635,225	
1,1,2-Trichloroethane	0	0		0	3,400	3,400	24,519,922	
Trichloroethylene	0	0		0	2,300	2,300	16,587,006	
Vinyl Chloride	0	0		0	N/A	N/A	N/A	
2-Chlorophenol	0	0		0	560	560	4,038,575	
2,4-Dichlorophenol	0	0		0	1,700	1,700	12,259,961	
2,4-Dimethylphenol	0	0		0	660	660	4,759,750	
4,6-Dinitro-o-Cresol	0	0		0	80	80.0	576,939	
2,4-Dinitrophenol	0	0		0	660	660	4,759,750	
2-Nitrophenol	0	0		0	8,000	8,000	57,693,935	
4-Nitrophenol	0	0		0	2,300	2,300	16,587,006	
p-Chloro-m-Cresol	0	0		0	160	160	1,153,879	
Pentachlorophenol	0	0		0	14.417	14.4	103,974	
Phenol	0	0		0	N/A	N/A	N/A	
2,4,6-Trichlorophenol	0	0		0	460	460	3,317,401	

Acenaphthene	0	0		0	83	83.0	598,575	
Anthracene	0	0		0	N/A	N/A	N/A	
Benzidine	0	0		0	300	300	2,163,523	
Benzo(a)Anthracene	0	0		0	0.5	0.5	3,606	
Benzo(a)Pyrene	0	0		0	N/A	N/A	N/A	
3,4-Benzofluoranthene	0	0		0	N/A	N/A	N/A	
Benzo(k)Fluoranthene	0	0		0	N/A	N/A	N/A	
Bis(2-Chloroethyl)Ether	0	0		0	30,000	30,000	#########	
Bis(2-Chloroisopropyl)Ether	0	0		0	N/A	N/A	N/A	
Bis(2-Ethylhexyl)Phthalate	0	0		0	4,500	4,500	32,452,838	
4-Bromophenyl Phenyl Ether	0	0		0	270	270	1,947,170	
Butyl Benzyl Phthalate	0	0		0	140	140	1,009,644	
2-Chloronaphthalene	0	0		0	N/A	N/A	N/A	
Chrysene	0	0		0	N/A	N/A	N/A	
Dibenzo(a,h)Anthrancene	0	0		0	N/A	N/A	N/A	
1,2-Dichlorobenzene	0	0		0	820	820	5,913,628	
1,3-Dichlorobenzene	0	0		0	350	350	2,524,110	
1,4-Dichlorobenzene	0	0		0	730	730	5,264,572	
3,3-Dichlorobenzidine	0	0		0	N/A	N/A	N/A	
Diethyl Phthalate	0	0		0	4,000	4,000	28,846,967	
Dimethyl Phthalate	0	0		0	2,500	2,500	18,029,355	
Di-n-Butyl Phthalate	0	0		0	110	110	793,292	
2,4-Dinitrotoluene	0	0		0	1,600	1,600	11,538,787	
2,6-Dinitrotoluene	0	0		0	990	990	7,139,624	
1,2-Diphenylhydrazine	0	0		0	15	15.0	108,176	
Fluoranthene	0	0		0	200	200	1,442,348	
Fluorene	0	0		0	N/A	N/A	N/A	
Hexachlorobenzene	0	0		0	N/A	N/A	N/A	
Hexachlorobutadiene	0	0		0	10	10.0	72,117	
Hexachlorocyclopentadiene	0	0		0	5	5.0	36,059	
Hexachloroethane	0	0		0	60	60.0	432,705	
Indeno(1,2,3-cd)Pyrene	0	0		0	N/A	N/A	N/A	
Isophorone	0	0		0	10,000	10,000	72,117,418	
Naphthalene	0	0		0	140	140	1,009,644	
Nitrobenzene	0	0		0	4,000	4,000	28,846,967	
n-Nitrosodimethylamine	0	0		0	17,000	17,000	#########	
n-Nitrosodi-n-Propylamine	0	0		0	N/A	N/A	N/A	
n-Nitrosodiphenylamine	0	0		0	300	300	2,163,523	
Phenanthrene	0	0		0	5	5.0	36,059	
Pyrene	0	0		0	N/A	N/A	N/A	
1,2,4-Trichlorobenzene	0	0		0	130	130	937,526	
Chlordane	0	0		0	2.4	2.4	17,308	
PCBs, Total	0	0		0	N/A	N/A	N/A	

☑ *CFC* CCT (min): 720 PMF: 0.500 Analysis Hardness (mg/l): 99.999 Analysis pH: 7.50

Pollutants	Stream Conc	Stream	Trib Conc	Fate	WQC	WQ Obj	WLA (ug/L)	Comments

Pollutants	Conc (µg/L)	CV	(µg/L)	Coef	(µg/L)	(µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	220	220	6,468,073	
Total Arsenic	0	0		0	150	150	4,410,050	Chem Translator of 1 applied
Total Barium	0	0		0	4,100	4,100	##########	
Total Boron	0	0		0	1,600	1,600	47,040,534	
Total Cadmium	0	0		0	0.246	0.27	7,956	Chem Translator of 0.909 applied
Total Chromium (III)	0	0		0	74.114	86.2	2,533,699	Chem Translator of 0.86 applied
Hexavalent Chromium	0	0		0	10	10.4	305,617	Chem Translator of 0.962 applied
Total Cobalt	0	0		0	19	19.0	558,606	
Total Copper	0	0		0	8.956	9.33	274,272	Chem Translator of 0.96 applied
Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	1,500	1,500	88,199,501	WQC = 30 day average; PMF = 1
Total Lead	0	0		0	2.517	3.18	93,539	Chem Translator of 0.791 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	0.770	0.91	26,633	Chem Translator of 0.85 applied
Total Nickel	0	0		0	52.006	52.2	1,533,603	Chem Translator of 0.997 applied
Total Phenols (Phenolics) (PWS)	0	0		0	N/A	N/A	N/A	
Total Selenium	0	0		0	4.600	4.99	146,683	Chem Translator of 0.922 applied
Total Silver	0	0		0	N/A	N/A	N/A	Chem Translator of 1 applied
Total Thallium	0	0		0	13	13.0	382,204	
Total Zinc	0	0		0	118.138	120	3,522,625	Chem Translator of 0.986 applied
Acrolein	0	0		0	3	3.0	88,201	
Acrylonitrile	0	0		0	130	130	3,822,043	
Benzene	0	0		0	130	130	3,822,043	
Bromoform	0	0		0	370	370	10,878,123	
Carbon Tetrachloride	0	0		0	560	560	16,464,187	
Chlorobenzene	0	0		0	240	240	7,056,080	
Chlorodibromomethane	0	0		0	N/A	N/A	N/A	
2-Chloroethyl Vinyl Ether	0	0		0	3,500	3,500	##########	
Chloroform	0	0		0	390	390	11,466,130	
Dichlorobromomethane	0	0		0	N/A	N/A	N/A	
1,2-Dichloroethane	0	0		0	3,100	3,100	91,141,034	
1,1-Dichloroethylene	0	0		0	1,500	1,500	44,100,501	
1,2-Dichloropropane	0	0		0	2,200	2,200	64,680,734	
1,3-Dichloropropylene	0	0		0	61	61.0	1,793,420	
Ethylbenzene	0	0		0	580	580	17,052,194	
Methyl Bromide	0	0		0	110	110	3,234,037	
Methyl Chloride	0	0		0	5,500	5,500	##########	
Methylene Chloride	0	0		0	2,400	2,400	70,560,801	
1,1,2,2-Tetrachloroethane	0	0		0	210	210	6,174,070	

Tetrachloroethylene	0	0		0	140	140	4,116,047	
Toluene	0	0		0	330	330	9,702,110	
1,2-trans-Dichloroethylene	0	0		0	1,400	1,400	41,160,467	
1,1,1-Trichloroethane	0	0		0	610	610	17,934,204	
1,1,2-Trichloroethane	0	0		0	680	680	19,992,227	
Trichloroethylene	0	0		0	450	450	13,230,150	
Vinyl Chloride	0	0		0	N/A	N/A	N/A	
2-Chlorophenol	0	0		0	110	110	3,234,037	
2,4-Dichlorophenol	0	0		0	340	340	9,996,113	
2,4-Dimethylphenol	0	0		0	130	130	3,822,043	
4,6-Dinitro-o-Cresol	0	0		0	16	16.0	470,405	
2,4-Dinitrophenol	0	0		0	130	130	3,822,043	
2-Nitrophenol	0	0		0	1,600	1,600	47,040,534	
4-Nitrophenol	0	0		0	470	470	13,818,157	
p-Chloro-m-Cresol	0	0		0	500	500	14,700,167	
Pentachlorophenol	0	0		0	11.061	11.1	325,198	
Phenol	0	0		0	N/A	N/A	N/A	
2,4,6-Trichlorophenol	0	0		0	91	91.0	2,675,430	
Acenaphthene	0	0		0	17	17.0	499,806	
Anthracene	0	0		0	N/A	N/A	N/A	
Benzidine	0	0		0	59	59.0	1,734,620	
Benzo(a)Anthracene	0	0		0	0.1	0.1	2,940	
Benzo(a)Pyrene	0	0		0	N/A	N/A	N/A	
3,4-Benzofluoranthene	0	0		0	N/A	N/A	N/A	
Benzo(k)Fluoranthene	0	0		0	N/A	N/A	N/A	
Bis(2-Chloroethyl)Ether	0	0		0	6,000	6,000	#########	
Bis(2-Chloroisopropyl)Ether	0	0		0	N/A	N/A	N/A	
Bis(2-Ethylhexyl)Phthalate	0	0		0	910	910	26,754,304	
4-Bromophenyl Phenyl Ether	0	0		0	54	54.0	1,587,618	
Butyl Benzyl Phthalate	0	0		0	35	35.0	1,029,012	
2-Chloronaphthalene	0	0		0	N/A	N/A	N/A	
Chrysene	0	0		0	N/A	N/A	N/A	
Dibenzo(a,h)Anthrancene	0	0		0	N/A	N/A	N/A	
1,2-Dichlorobenzene	0	0		0	160	160	4,704,053	
1,3-Dichlorobenzene	0	0		0	69	69.0	2,028,623	
1,4-Dichlorobenzene	0	0		0	150	150	4,410,050	
3,3-Dichlorobenzidine	0	0		0	N/A	N/A	N/A	
Diethyl Phthalate	0	0		0	800	800	23,520,267	
Dimethyl Phthalate	0	0		0	500	500	14,700,167	
Di-n-Butyl Phthalate	0	0		0	21	21.0	617,407	
2,4-Dinitrotoluene	0	0		0	320	320	9,408,107	
2,6-Dinitrotoluene	0	0		0	200	200	5,880,067	
1,2-Diphenylhydrazine	0	0		0	3	3.0	88,201	
Fluoranthene	0	0		0	40	40.0	1,176,013	
Fluorene	0	0		0	N/A	N/A	N/A	

Hexachlorobenzene	0	0		0	N/A	N/A	N/A	
Hexachlorobutadiene	0	0		0	2	2.0	58,801	
Hexachlorocyclopentadiene	0	0		0	1	1.0	29,400	
Hexachloroethane	0	0		0	12	12.0	352,804	
Indeno(1,2,3-cd)Pyrene	0	0		0	N/A	N/A	N/A	
Isophorone	0	0		0	2,100	2,100	61,740,701	
Naphthalene	0	0		0	43	43.0	1,264,214	
Nitrobenzene	0	0		0	810	810	23,814,270	
n-Nitrosodimethylamine	0	0		0	3,400	3,400	99,961,135	
n-Nitrosodi-n-Propylamine	0	0		0	N/A	N/A	N/A	
n-Nitrosodiphenylamine	0	0		0	59	59.0	1,734,620	
Phenanthrene	0	0		0	1	1.0	29,400	
Pyrene	0	0		0	N/A	N/A	N/A	
1,2,4-Trichlorobenzene	0	0		0	26	26.0	764,409	
Chlordane	0	0		0	0.0043	0.004	126	
PCBs, Total	0	0		0	0.014	0.014	412	

☑ ***THH*** CCT (min): 720 PMF: 0.500 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	500,000	500,000	N/A	
Chloride (PWS)	0	0		0	250,000	250,000	N/A	
Sulfate (PWS)	0	0		0	250,000	250,000	N/A	
Fluoride (PWS)	0	0		0	1,000	1,000	29,400,334	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	5.6	5.6	164,642	
Total Arsenic	0	0		0	10	10.0	294,003	
Total Barium	0	0		0	1,000	1,000	29,400,334	
Total Boron	0	0		0	3,100	3,100	91,141,034	
Total Cadmium	0	0		0	N/A	N/A	N/A	
Total Chromium (III)	0	0		0	N/A	N/A	N/A	
Hexavalent Chromium	0	0		0	N/A	N/A	N/A	
Total Cobalt	0	0		0	N/A	N/A	N/A	
Total Copper	0	0		0	1,300	1,300	38,220,434	
Dissolved Iron	0	0		0	300	300	8,820,100	
Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	N/A	N/A	N/A	
Total Manganese	0	0		0	1,000	1,000	29,400,334	
Total Mercury	0	0		0	0.012	0.012	353	
Total Nickel	0	0		0	610	610	17,934,204	
Total Phenols (Phenolics) (PWS)	0	0		0	5	5.0	N/A	
Total Selenium	0	0		0	N/A	N/A	N/A	
Total Silver	0	0		0	N/A	N/A	N/A	

Total Thallium	0	0		0	0.24	0.24	7,056	
Total Zinc	0	0		0	7,400	7,400	#########	
Acrolein	0	0		0	3	3.0	88,201	
Acrylonitrile	0	0		0	N/A	N/A	N/A	
Benzene	0	0		0	N/A	N/A	N/A	
Bromoform	0	0		0	N/A	N/A	N/A	
Carbon Tetrachloride	0	0		0	N/A	N/A	N/A	
Chlorobenzene	0	0		0	100	100.0	2,940,033	
Chlorodibromomethane	0	0		0	N/A	N/A	N/A	
2-Chloroethyl Vinyl Ether	0	0		0	N/A	N/A	N/A	
Chloroform	0	0		0	5.7	5.7	167,582	
Dichlorobromomethane	0	0		0	N/A	N/A	N/A	
1,2-Dichloroethane	0	0		0	N/A	N/A	N/A	
1,1-Dichloroethylene	0	0		0	33	33.0	970,211	
1,2-Dichloropropane	0	0		0	N/A	N/A	N/A	
1,3-Dichloropropylene	0	0		0	N/A	N/A	N/A	
Ethylbenzene	0	0		0	68	68.0	1,999,223	
Methyl Bromide	0	0		0	47	47.0	1,381,816	
Methyl Chloride	0	0		0	N/A	N/A	N/A	
Methylene Chloride	0	0		0	N/A	N/A	N/A	
1,1,2,2-Tetrachloroethane	0	0		0	N/A	N/A	N/A	
Tetrachloroethylene	0	0		0	N/A	N/A	N/A	
Toluene	0	0		0	57	57.0	1,675,819	
1,2-trans-Dichloroethylene	0	0		0	100	100.0	2,940,033	
1,1,1-Trichloroethane	0	0		0	10,000	10,000	#########	
1,1,2-Trichloroethane	0	0		0	N/A	N/A	N/A	
Trichloroethylene	0	0		0	N/A	N/A	N/A	
Vinyl Chloride	0	0		0	N/A	N/A	N/A	
2-Chlorophenol	0	0		0	30	30.0	882,010	
2,4-Dichlorophenol	0	0		0	10	10.0	294,003	
2,4-Dimethylphenol	0	0		0	100	100.0	2,940,033	
4,6-Dinitro-o-Cresol	0	0		0	2	2.0	58,801	
2,4-Dinitrophenol	0	0		0	10	10.0	294,003	
2-Nitrophenol	0	0		0	N/A	N/A	N/A	
4-Nitrophenol	0	0		0	N/A	N/A	N/A	
p-Chloro-m-Cresol	0	0		0	N/A	N/A	N/A	
Pentachlorophenol	0	0		0	N/A	N/A	N/A	
Phenol	0	0		0	4,000	4,000	#########	
2,4,6-Trichlorophenol	0	0		0	N/A	N/A	N/A	
Acenaphthene	0	0		0	70	70.0	2,058,023	
Anthracene	0	0		0	300	300	8,820,100	
Benzidine	0	0		0	N/A	N/A	N/A	
Benzo(a)Anthracene	0	0		0	N/A	N/A	N/A	
Benzo(a)Pyrene	0	0		0	N/A	N/A	N/A	
3,4-Benzofluoranthene	0	0		0	N/A	N/A	N/A	

Benzo(k)Fluoranthene	0	0		0	N/A	N/A	N/A	
Bis(2-Chloroethyl)Ether	0	0		0	N/A	N/A	N/A	
Bis(2-Chloroisopropyl)Ether	0	0		0	200	200	5,880,067	
Bis(2-Ethylhexyl)Phthalate	0	0		0	N/A	N/A	N/A	
4-Bromophenyl Phenyl Ether	0	0		0	N/A	N/A	N/A	
Butyl Benzyl Phthalate	0	0		0	0.1	0.1	2,940	
2-Chloronaphthalene	0	0		0	800	800	23,520,267	
Chrysene	0	0		0	N/A	N/A	N/A	
Dibenzo(a,h)Anthrancene	0	0		0	N/A	N/A	N/A	
1,2-Dichlorobenzene	0	0		0	420	420	12,348,140	
1,3-Dichlorobenzene	0	0		0	7	7.0	205,802	
1,4-Dichlorobenzene	0	0		0	63	63.0	1,852,221	
3,3-Dichlorobenzidine	0	0		0	N/A	N/A	N/A	
Diethyl Phthalate	0	0		0	600	600	17,640,200	
Dimethyl Phthalate	0	0		0	2,000	2,000	58,800,667	
Di-n-Butyl Phthalate	0	0		0	20	20.0	588,007	
2,4-Dinitrotoluene	0	0		0	N/A	N/A	N/A	
2,6-Dinitrotoluene	0	0		0	N/A	N/A	N/A	
1,2-Diphenylhydrazine	0	0		0	N/A	N/A	N/A	
Fluoranthene	0	0		0	20	20.0	588,007	
Fluorene	0	0		0	50	50.0	1,470,017	
Hexachlorobenzene	0	0		0	N/A	N/A	N/A	
Hexachlorobutadiene	0	0		0	N/A	N/A	N/A	
Hexachlorocyclopentadiene	0	0		0	4	4.0	117,601	
Hexachloroethane	0	0		0	N/A	N/A	N/A	
Indeno(1,2,3-cd)Pyrene	0	0		0	N/A	N/A	N/A	
Isophorone	0	0		0	34	34.0	999,611	
Naphthalene	0	0		0	N/A	N/A	N/A	
Nitrobenzene	0	0		0	10	10.0	294,003	
n-Nitrosodimethylamine	0	0		0	N/A	N/A	N/A	
n-Nitrosodi-n-Propylamine	0	0		0	N/A	N/A	N/A	
n-Nitrosodiphenylamine	0	0		0	N/A	N/A	N/A	
Phenanthrene	0	0		0	N/A	N/A	N/A	
Pyrene	0	0		0	20	20.0	588,007	
1,2,4-Trichlorobenzene	0	0		0	0.07	0.07	2,058	
Chlordane	0	0		0	N/A	N/A	N/A	
PCBs, Total	0	0		0	N/A	N/A	N/A	

☑ *CRL* CCT (min): ####### PMF: 0.500 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	

Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	N/A	N/A	N/A	
Total Arsenic	0	0		0	N/A	N/A	N/A	
Total Barium	0	0		0	N/A	N/A	N/A	
Total Boron	0	0		0	N/A	N/A	N/A	
Total Cadmium	0	0		0	N/A	N/A	N/A	
Total Chromium (III)	0	0		0	N/A	N/A	N/A	
Hexavalent Chromium	0	0		0	N/A	N/A	N/A	
Total Cobalt	0	0		0	N/A	N/A	N/A	
Total Copper	0	0		0	N/A	N/A	N/A	
Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	N/A	N/A	N/A	
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	N/A	N/A	N/A	
Total Nickel	0	0		0	N/A	N/A	N/A	
Total Phenols (Phenolics) (PWS)	0	0		0	N/A	N/A	N/A	
Total Selenium	0	0		0	N/A	N/A	N/A	
Total Silver	0	0		0	50	50.0	4,103,920	
Total Thallium	0	0		0	N/A	N/A	N/A	
Total Zinc	0	0		0	N/A	N/A	N/A	
Acrolein	0	0		0	N/A	N/A	N/A	
Acrylonitrile	0	0		0	0.051	0.051	4,186	
Benzene	0	0		0	0.58	0.58	47,605	
Bromoform	0	0		0	4.3	4.3	352,937	
Carbon Tetrachloride	0	0		0	0.4	0.4	32,831	
Chlorobenzene	0	0		0	N/A	N/A	N/A	
Chlorodibromomethane	0	0		0	0.4	0.4	32,831	
2-Chloroethyl Vinyl Ether	0	0		0	N/A	N/A	N/A	
Chloroform	0	0		0	N/A	N/A	N/A	
Dichlorobromomethane	0	0		0	0.55	0.55	45,143	
1,2-Dichloroethane	0	0		0	0.38	0.38	31,190	
1,1-Dichloroethylene	0	0		0	N/A	N/A	N/A	
1,2-Dichloropropane	0	0		0	0.5	0.5	41,039	
1,3-Dichloropropylene	0	0		0	0.27	0.27	22,161	
Ethylbenzene	0	0		0	N/A	N/A	N/A	
Methyl Bromide	0	0		0	N/A	N/A	N/A	
Methyl Chloride	0	0		0	N/A	N/A	N/A	
Methylene Chloride	0	0		0	4.6	4.6	377,561	
1,1,2,2-Tetrachloroethane	0	0		0	0.17	0.17	13,953	
Tetrachloroethylene	0	0		0	0.69	0.69	56,634	
Toluene	0	0		0	N/A	N/A	N/A	
1,2-trans-Dichloroethylene	0	0		0	N/A	N/A	N/A	

1,1,1-Trichloroethane	0	0		0	N/A	N/A	N/A	
1,1,2-Trichloroethane	0	0		0	0.55	0.55	45,143	
Trichloroethylene	0	0		0	0.6	0.6	49,247	
Vinyl Chloride	0	0		0	0.02	0.02	1,642	
2-Chlorophenol	0	0		0	N/A	N/A	N/A	
2,4-Dichlorophenol	0	0		0	N/A	N/A	N/A	
2,4-Dimethylphenol	0	0		0	N/A	N/A	N/A	
4,6-Dinitro-o-Cresol	0	0		0	N/A	N/A	N/A	
2,4-Dinitrophenol	0	0		0	N/A	N/A	N/A	
2-Nitrophenol	0	0		0	N/A	N/A	N/A	
4-Nitrophenol	0	0		0	N/A	N/A	N/A	
p-Chloro-m-Cresol	0	0		0	N/A	N/A	N/A	
Pentachlorophenol	0	0		0	0.030	0.03	2,462	
Phenol	0	0		0	N/A	N/A	N/A	
2,4,6-Trichlorophenol	0	0		0	1.4	1.4	114,910	
Acenaphthene	0	0		0	N/A	N/A	N/A	
Anthracene	0	0		0	N/A	N/A	N/A	
Benzidine	0	0		0	0.000086	0.00009	7.06	
Benzo(a)Anthracene	0	0		0	0.001	0.001	82.1	
Benzo(a)Pyrene	0	0		0	0.0001	0.0001	8.21	
3,4-Benzofluoranthene	0	0		0	0.001	0.001	82.1	
Benzo(k)Fluoranthene	0	0		0	0.0038	0.004	312	
Bis(2-Chloroethyl)Ether	0	0		0	0.03	0.03	2,462	
Bis(2-Chloroisopropyl)Ether	0	0		0	N/A	N/A	N/A	
Bis(2-Ethylhexyl)Phthalate	0	0		0	0.32	0.32	26,265	
4-Bromophenyl Phenyl Ether	0	0		0	N/A	N/A	N/A	
Butyl Benzyl Phthalate	0	0		0	N/A	N/A	N/A	
2-Chloronaphthalene	0	0		0	N/A	N/A	N/A	
Chrysene	0	0		0	0.0038	0.004	312	
Dibenzo(a,h)Anthrancene	0	0		0	0.0001	0.0001	8.21	
1,2-Dichlorobenzene	0	0		0	N/A	N/A	N/A	
1,3-Dichlorobenzene	0	0		0	N/A	N/A	N/A	
1,4-Dichlorobenzene	0	0		0	N/A	N/A	N/A	
3,3-Dichlorobenzidine	0	0		0	0.021	0.021	1,724	
Diethyl Phthalate	0	0		0	N/A	N/A	N/A	
Dimethyl Phthalate	0	0		0	N/A	N/A	N/A	
Di-n-Butyl Phthalate	0	0		0	N/A	N/A	N/A	
2,4-Dinitrotoluene	0	0		0	0.05	0.05	4,104	
2,6-Dinitrotoluene	0	0		0	0.05	0.05	4,104	
1,2-Diphenylhydrazine	0	0		0	0.03	0.03	2,462	
Fluoranthene	0	0		0	N/A	N/A	N/A	
Fluorene	0	0		0	N/A	N/A	N/A	
Hexachlorobenzene	0	0		0	0.00008	0.00008	6.57	
Hexachlorobutadiene	0	0		0	0.01	0.01	821	
Hexachlorocyclopentadiene	0	0		0	N/A	N/A	N/A	

Hexachloroethane	0	0		0	0.1	0.1	8,208	
Indeno(1,2,3-cd)Pyrene	0	0		0	0.001	0.001	82.1	
Isophorone	0	0		0	N/A	N/A	N/A	
Naphthalene	0	0		0	N/A	N/A	N/A	
Nitrobenzene	0	0		0	N/A	N/A	N/A	
n-Nitrosodimethylamine	0	0		0	0.00069	0.0007	56.6	
n-Nitrosodi-n-Propylamine	0	0		0	0.005	0.005	410	
n-Nitrosodiphenylamine	0	0		0	3.3	3.3	270,859	
Phenanthrene	0	0		0	N/A	N/A	N/A	
Pyrene	0	0		0	N/A	N/A	N/A	
1,2,4-Trichlorobenzene	0	0		0	N/A	N/A	N/A	
Chlordane	0	0		0	0.0003	0.0003	24.6	
PCBs, Total	0	0		0	0.000064	0.00006	5.25	

☑ ***Recommended WQBELs & Monitoring Requirements***

No. Samples/Month: 4

	Mass Limits		*Concentration Limits*						
Pollutants	AML (lbs/day)	MDL (lbs/day)	AML	MDL	IMAX	Units	Governing WQBEL	WQBEL Basis	Comments
Chlordane	6.51E-08	1.01E-07	0.0003	0.0005	0.0008	µg/L	0.0003	CRL	Discharge Conc ≥ 50% WQBEL (RP)

☑ ***Other Pollutants without Limits or Monitoring***

The following pollutants do not require effluent limits or monitoring based on water quality because reasonable potential to exceed water quality criteria was not determined and the discharge concentration was less than thresholds for monitoring, or the pollutant was not detected and a sufficiently sensitive analytical method was used (e.g., <= Target QL).

Pollutants	Governing WQBEL	Units	Comments
Total Dissolved Solids (PWS)	N/A	N/A	PWS Not Applicable
Chloride (PWS)	N/A	N/A	PWS Not Applicable
Bromide	N/A	N/A	No WQS
Sulfate (PWS)	N/A	N/A	PWS Not Applicable
Fluoride (PWS)	N/A	N/A	Discharge Conc < TQL
Total Aluminum	3,466,827	µg/L	Discharge Conc ≤ 10% WQBEL
Total Antimony	N/A	N/A	Discharge Conc < TQL
Total Arsenic	N/A	N/A	Discharge Conc < TQL
Total Barium	29,400,334	µg/L	Discharge Conc ≤ 10% WQBEL
Total Beryllium	N/A	N/A	No WQS
Total Boron	37,441,726	µg/L	Discharge Conc < TQL
Total Cadmium	7,956	µg/L	Discharge Conc < TQL
Total Chromium (III)	2,533,699	µg/L	Discharge Conc < TQL
Hexavalent Chromium	75,315	µg/L	Discharge Conc ≤ 10% WQBEL

Total Cobalt	439,131	µg/L	Discharge Conc < TQL
Total Copper	64,708	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cyanide	N/A	N/A	No WQS
Dissolved Iron	8,820,100	µg/L	Discharge Conc ≤ 10% WQBEL
Total Iron	88,199,501	µg/L	Discharge Conc ≤ 10% WQBEL
Total Lead	93,539	µg/L	Discharge Conc < TQL
Total Manganese	29,400,334	µg/L	Discharge Conc ≤ 10% WQBEL
Total Mercury	0.012	µg/L	Discharge Conc ≤ 10% WQBEL
Total Nickel	1,533,603	µg/L	Discharge Conc ≤ 10% WQBEL
Total Phenols (Phenolics) (PWS)		µg/L	PWS Not Applicable
Total Selenium	146,683	µg/L	Discharge Conc < TQL
Total Silver	17,493	µg/L	Discharge Conc < TQL
Total Thallium	7,056	µg/L	Discharge Conc < TQL
Total Zinc	553,833	µg/L	Discharge Conc < TQL
Total Molybdenum	N/A	N/A	No WQS
Acrolein	13,867	µg/L	Discharge Conc < TQL
Acrylonitrile	4,186	µg/L	Discharge Conc < TQL
Benzene	47,605	µg/L	Discharge Conc < TQL
Bromoform	352,937	µg/L	Discharge Conc < TQL
Carbon Tetrachloride	32,831	µg/L	Discharge Conc < TQL
Chlorobenzene	2,940,033	µg/L	Discharge Conc ≤ 25% WQBEL
Chlorodibromomethane	32,831	µg/L	Discharge Conc < TQL
Chloroethane	N/A	N/A	No WQS
2-Chloroethyl Vinyl Ether	83,203,836	µg/L	Discharge Conc < TQL
Chloroform	167,582	µg/L	Discharge Conc < TQL
Dichlorobromomethane	45,143	µg/L	Discharge Conc < TQL
1,1-Dichloroethane	N/A	N/A	No WQS
1,2-Dichloroethane	31,190	µg/L	Discharge Conc < TQL
1,1-Dichloroethylene	970,211	µg/L	Discharge Conc < TQL
1,2-Dichloropropane	41,039	µg/L	Discharge Conc < TQL
1,3-Dichloropropylene	22,161	µg/L	Discharge Conc < TQL
1,4-Dioxane	N/A	N/A	No WQS
Ethylbenzene	1,999,223	µg/L	Discharge Conc ≤ 25% WQBEL
Methyl Bromide	1,381,816	µg/L	Discharge Conc < TQL
Methyl Chloride	#########	µg/L	Discharge Conc < TQL
Methylene Chloride	377,561	µg/L	Discharge Conc < TQL
1,1,2,2-Tetrachloroethane	13,953	µg/L	Discharge Conc < TQL
Tetrachloroethylene	56,634	µg/L	Discharge Conc < TQL
Toluene	1,675,819	µg/L	Discharge Conc < TQL
1,2-trans-Dichloroethylene	2,940,033	µg/L	Discharge Conc < TQL
1,1,1-Trichloroethane	13,867,306	µg/L	Discharge Conc < TQL
1,1,2-Trichloroethane	45,143	µg/L	Discharge Conc < TQL
Trichloroethylene	49,247	µg/L	Discharge Conc < TQL
Vinyl Chloride	1,642	µg/L	Discharge Conc < TQL
2-Chlorophenol	882,010	µg/L	Discharge Conc < TQL

2,4-Dichlorophenol	294,003	µg/L	Discharge Conc < TQL
2,4-Dimethylphenol	2,940,033	µg/L	Discharge Conc ≤ 25% WQBEL
4,6-Dinitro-o-Cresol	58,801	µg/L	Discharge Conc < TQL
2,4-Dinitrophenol	294,003	µg/L	Discharge Conc < TQL
2-Nitrophenol	36,979,483	µg/L	Discharge Conc < TQL
4-Nitrophenol	10,631,601	µg/L	Discharge Conc < TQL
p-Chloro-m-Cresol	739,590	µg/L	Discharge Conc < TQL
Pentachlorophenol	2,462	µg/L	Discharge Conc < TQL
Phenol	#########	µg/L	Discharge Conc < TQL
2,4,6-Trichlorophenol	114,910	µg/L	Discharge Conc < TQL
Acenaphthene	383,662	µg/L	Discharge Conc < TQL
Acenaphthylene	N/A	N/A	No WQS
Anthracene	8,820,100	µg/L	Discharge Conc < TQL
Benzidine	7.06	µg/L	Discharge Conc < TQL
Benzo(a)Anthracene	82.1	µg/L	Discharge Conc < TQL
Benzo(a)Pyrene	8.21	µg/L	Discharge Conc < TQL
3,4-Benzofluoranthene	82.1	µg/L	Discharge Conc < TQL
Benzo(ghi)Perylene	N/A	N/A	No WQS
Benzo(k)Fluoranthene	312	µg/L	Discharge Conc < TQL
Bis(2-Chloroethoxy)Methane	N/A	N/A	No WQS
Bis(2-Chloroethyl)Ether	2,462	µg/L	Discharge Conc < TQL
Bis(2-Chloroisopropyl)Ether	5,880,067	µg/L	Discharge Conc < TQL
Bis(2-Ethylhexyl)Phthalate	26,265	µg/L	Discharge Conc < TQL
4-Bromophenyl Phenyl Ether	1,248,058	µg/L	Discharge Conc < TQL
Butyl Benzyl Phthalate	2,940	µg/L	Discharge Conc < TQL
2-Chloronaphthalene	23,520,267	µg/L	Discharge Conc < TQL
4-Chlorophenyl Phenyl Ether	N/A	N/A	No WQS
Chrysene	312	µg/L	Discharge Conc < TQL
Dibenzo(a,h)Anthrancene	8.21	µg/L	Discharge Conc < TQL
1,2-Dichlorobenzene	3,790,397	µg/L	Discharge Conc < TQL
1,3-Dichlorobenzene	205,802	µg/L	Discharge Conc < TQL
1,4-Dichlorobenzene	1,852,221	µg/L	Discharge Conc < TQL
3,3-Dichlorobenzidine	1,724	µg/L	Discharge Conc < TQL
Diethyl Phthalate	17,640,200	µg/L	Discharge Conc < TQL
Dimethyl Phthalate	11,556,088	µg/L	Discharge Conc < TQL
Di-n-Butyl Phthalate	508,468	µg/L	Discharge Conc < TQL
2,4-Dinitrotoluene	4,104	µg/L	Discharge Conc < TQL
2,6-Dinitrotoluene	4,104	µg/L	Discharge Conc < TQL
Di-n-Octyl Phthalate	N/A	N/A	No WQS
1,2-Diphenylhydrazine	2,462	µg/L	Discharge Conc < TQL
Fluoranthene	588,007	µg/L	Discharge Conc < TQL
Fluorene	1,470,017	µg/L	Discharge Conc < TQL
Hexachlorobenzene	0.00008	µg/L	Discharge Conc < TQL
Hexachlorobutadiene	0.01	µg/L	Discharge Conc < TQL
Hexachlorocyclopentadiene	23,112	µg/L	Discharge Conc < TQL

Hexachloroethane	8,208	µg/L	Discharge Conc < TQL
Indeno(1,2,3-cd)Pyrene	82.1	µg/L	Discharge Conc < TQL
Isophorone	999,611	µg/L	Discharge Conc < TQL
Naphthalene	647,141	µg/L	Discharge Conc < TQL
Nitrobenzene	294,003	µg/L	Discharge Conc < TQL
n-Nitrosodimethylamine	56.6	µg/L	Discharge Conc < TQL
n-Nitrosodi-n-Propylamine	410	µg/L	Discharge Conc < TQL
n-Nitrosodiphenylamine	270,859	µg/L	Discharge Conc < TQL
Phenanthrene	23,112	µg/L	Discharge Conc < TQL
Pyrene	588,007	µg/L	Discharge Conc < TQL
1,2,4-Trichlorobenzene	2,058	µg/L	Discharge Conc < TQL
PCB-1016	N/A	N/A	No WQS
PCB-1221	N/A	N/A	No WQS
PCB-1232	N/A	N/A	No WQS
PCB-1242	N/A	N/A	No WQS
PCB-1248	N/A	N/A	No WQS
PCB-1254	N/A	N/A	No WQS
PCB-1260	N/A	N/A	No WQS
PCBs, Total	0.00006	µg/L	Discharge Conc < TQL

ATTACHMENT B

WQM 7.0 Modeling Results for Outfall 002

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
20E	32317	OHIO RIVER	979.100	710.00	19100.00	0.00010	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.250	0.00	2365.00	0.000	0.000	0.0	550.00	12.00	21.55	7.50	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
Outfall 002	PA0031933	0.0009	0.0000	0.0000	0.000	22.00	7.35

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	4.00	8.38	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
20E	32317	OHIO RIVER	976.100	709.90	19101.00	0.00010	40.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.250	0.00	4730.00	0.000	0.000	0.0	1150.00	12.00	21.55	7.50	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
		0.0000	0.0000	0.0000	0.000	0.00	7.00

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	3.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

WQM 7.0 Modeling Specifications

Parameters	Both	Use Inputted Q1-10 and Q30-10 Flows	☑
WLA Method	EMPR	Use Inputted W/D Ratio	☐
Q1-10/Q7-10 Ratio	0.64	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.36	Temperature Adjust Kr	☑
D.O. Saturation	90.00%	Use Balanced Technology	☑
D.O. Goal	5		

WQM 7.0 Hydrodynamic Outputs

SWP Basin	Stream Code	Stream Name
20E	32317	OHIO RIVER

RMI	Stream Flow (cfs)	PWS With (cfs)	Net Stream Flow (cfs)	Disc Analysis Flow (cfs)	Reach Slope (ft/ft)	Depth (ft)	Width (ft)	W/D Ratio	Velocity (fps)	Reach Trav Time (days)	Analysis Temp (°C)	Analysis pH
Q7-10 Flow												
979.100	2365.00	0.00	2365.00	.0014	0.00010	12	550	45.83	0.36	0.512	21.55	7.50
Q1-10 Flow												
979.100	1513.60	0.00	1513.60	.0014	0.00010	NA	NA	NA	0.23	0.799	21.55	7.50
Q30-10 Flow												
979.100	3216.40	0.00	3216.40	.0014	0.00010	NA	NA	NA	0.49	0.376	21.55	7.50

WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
20E	32317	OHIO RIVER

NH3-N Acute Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
979.100	Outfall 002	8.12	50	8.12	50	0	0

NH3-N Chronic Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
979.100	Outfall 002	1.26	25	1.26	25	0	0

Dissolved Oxygen Allocations

RMI	Discharge Name	CBOD5		NH3-N		Dissolved Oxygen		Critical Reach	Percent Reduction
		Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)		
979.10	Outfall 002	25	25	25	25	4	4	0	0

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
20E	32317	OHIO RIVER

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
979.100	0.001	21.550	7.500
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
550.000	12.000	45.833	0.358
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
2.00	0.000	0.00	0.789
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
8.380	0.193	O'Connor	5
Reach Travel Time (days)			
0.512			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.051	2.00	0.00	8.01
0.102	2.00	0.00	8.01
0.153	2.00	0.00	8.01
0.205	2.00	0.00	8.01
0.256	2.00	0.00	8.01
0.307	2.00	0.00	8.01
0.358	2.00	0.00	8.01
0.409	2.00	0.00	8.01
0.460	2.00	0.00	8.01
0.512	2.00	0.00	8.01

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
20E	32317	OHIO RIVER

RMI	Name	Permit Number	Disc Flow (mgd)	Parameter	Effl. Limit 30-day Ave. (mg/L)	Effl. Limit Maximum (mg/L)	Effl. Limit Minimum (mg/L)
979.100	Outfall 002	PA0031933	0.001	CBOD5	25		
				NH3-N	25	50	
				Dissolved Oxygen			4

ATTACHMENT C

Temperature Modeling Results for Outfall 001

Facility: **Brunot Island Generating Station**
Permit Number: PA0031933 **PMF**
Stream Name: Ohio River 0.500
Analyst/Engineer: Ryan Decker
Stream Q7-10 (cfs): 2365

	Facility Flows				Stream Flows		
	Intake (Stream) (MGD)	Intake (External) (MGD)	Consumptive Loss (MGD)	Discharge Flow (MGD)	Upstream Stream Flow (cfs)	Adjusted Stream Flow (cfs)	Downstream Stream Flow (cfs)
Jan 1-31	0.487	0	0	0.487	7568.00	3783.62	3784.38
Feb 1-29	0.487	0	0	0.487	8277.50	4138.37	4139.13
Mar 1-31	0.487	0	0	0.487	16555.00	8277.12	8277.88
Apr 1-15	0.487	0	0	0.487	21994.50	10996.87	10997.63
Apr 16-30	0.487	0	0	0.487	21994.50	10996.87	10997.63
May 1-15	0.487	0	0	0.487	12061.50	6030.37	6031.13
May 16-30	0.487	0	0	0.487	12061.50	6030.37	6031.13
Jun 1-15	0.487	0	0	0.487	7095.00	3547.12	3547.88
Jun 16-30	0.487	0	0	0.487	7095.00	3547.12	3547.88
Jul 1-31	0.487	0	0	0.487	4020.50	2009.87	2010.63
Aug 1-15	0.487	0	0	0.487	3311.00	1655.12	1655.88
Aug 16-31	0.487	0	0	0.487	3311.00	1655.12	1655.88
Sep 1-15	0.487	0	0	0.487	2601.50	1300.37	1301.13
Sep 16-30	0.487	0	0	0.487	2601.50	1300.37	1301.13
Oct 1-15	0.487	0	0	0.487	2838.00	1418.62	1419.38
Oct 16-31	0.487	0	0	0.487	2838.00	1418.62	1419.38
Nov 1-15	0.487	0	0	0.487	3784.00	1891.62	1892.38
Nov 16-30	0.487	0	0	0.487	3784.00	1891.62	1892.38
Dec 1-31	0.487	0	0	0.487	5676.00	2837.62	2838.38

Version 2.0 -- 07/01/2005 Reference: Implementation Guidance for Temperature Criteria, DEP-ID: 391-2000-017

NOTE: The user can only edit fields that are blue.

NOTE: MGD x 1.547 = cfs.

Facility: **Shell Chemical Appalachia Petrochemical Complex**
Permit Number: PA0002208
Stream: Ohio River

	WWF Criteria (ºF)	**CWF Criteria** (ºF)	**TSF Criteria** (ºF)	**316 Criteria** (ºF)	**Q7-10 Multipliers** (Used in Analysis)	**Q7-10 Multipliers** (Default - Info Only)
Jan 1-31	40	38	40	0	3.2	3.2
Feb 1-29	40	38	40	0	3.5	3.5
Mar 1-31	46	42	46	0	7	7
Apr 1-15	52	48	52	0	9.3	9.3
Apr 16-30	58	52	58	0	9.3	9.3
May 1-15	64	54	64	0	5.1	5.1
May 16-30	**71.2***	58	68	0	5.1	5.1
Jun 1-15	**78.8***	60	70	0	3	3
Jun 16-30	84	64	72	0	3	3
Jul 1-31	87	66	74	0	1.7	1.7
Aug 1-15	87	66	80	0	1.4	1.4
Aug 16-31	87	66	87	0	1.4	1.4
Sep 1-15	84	64	84	0	1.1	1.1
Sep 16-30	78	60	78	0	1.1	1.1
Oct 1-15	72	54	72	0	1.2	1.2
Oct 16-31	66	50	66	0	1.2	1.2
Nov 1-15	58	46	58	0	1.6	1.6
Nov 16-30	50	42	50	0	1.6	1.6
Dec 1-31	42	40	42	0	2.4	2.4

Notes:
WWF = Warm water fishes
CWF = Cold water fishes
TSF = Trout stocking

*ORSANCO Criteria

Facility: **Brunot Island Generating Station**
Permit Number: PA0031933 **PMF**
Stream: Ohio River 0.50

	WWF Ambient Stream Temperature (ºF) (Default)	Ambient Stream Temperature (ºF) (Site-specific data)	Target Maximum Stream Temp.[1] (ºF)	WWF Daily WLA[2] (Million BTUs/day)	WWF Daily WLA[3] (ºF)	at Discharge Flow (MGD)
Jan 1-31	35	0	40	101,989	110.0	0.487
Feb 1-29	35	0	40	111,549	110.0	0.487
Mar 1-31	40	0	46	267,707	110.0	0.487
Apr 1-15	47	0	52	296,386	110.0	0.487
Apr 16-30	53	0	58	296,386	110.0	0.487
May 1-15	58	0	64	195,047	110.0	0.487
May 16-30	62	0	71.2	299,072	110.0	0.487
Jun 1-15	67	0	78.8	225,652	110.0	0.487
Jun 16-30	71	0	84	248,600	110.0	0.487
Jul 1-31	75	0	87	130,047	110.0	0.487
Aug 1-15	74	0	87	116,027	110.0	0.487
Aug 16-31	74	0	87	116,027	110.0	0.487
Sep 1-15	71	0	84	91,170	110.0	0.487
Sep 16-30	65	0	78	91,170	110.0	0.487
Oct 1-15	60	0	72	91,805	110.0	0.487
Oct 16-31	54	0	66	91,805	110.0	0.487
Nov 1-15	48	0	58	101,999	110.0	0.487
Nov 16-30	42	0	50	81,599	110.0	0.487
Dec 1-31	37	0	42	76,494	110.0	0.487

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

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

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

ATTACHMENT D

TRC Modeling Results for Outfall 002

TRC EVALUATION

2365	= Q stream (cfs)	0.5	= CV Daily
0.0009	= Q discharge (MGD)	0.5	= CV Hourly
4	= no. samples	0.07	= AFC_Partial Mix Factor
0.3	= Chlorine Demand of Stream	0.5	= CFC_Partial Mix Factor
0	= Chlorine Demand of Discharge	15	= AFC_Criteria Compliance Time (min)
0.5	= BAT/BPJ Value	720	= CFC_Criteria Compliance Time (min)
	= % Factor of Safety (FOS)		=Decay Coefficient (K)

Source	Reference	AFC Calculations		Reference	CFC Calculations	
TRC	1.3.2.iii	WLA afc =	37930.386	1.3.2.iii	WLA cfc =	264136.691
PENTOXSD TRG	5.1a	LTAMULT afc =	0.373	5.1c	LTAMULT cfc =	0.581
PENTOXSD TRG	5.1b	LTA_afc=	14133.767	5.1d	LTA_cfc =	153556.681

Source	Reference	Effluent Limit Calculations		
PENTOXSD TRG	5.1f	AML MULT =	1.720	
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) =	0.500	BAT/BPJ
		INST MAX LIMIT (mg/l) =	1.170	

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