pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

SOUTHWEST REGIONAL OFFICE
CLEAN WATER PROGRAM

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

Application Type	**Amendment, Major**	Application No.	**PA0002208 A-1**
Facility Type	**Industrial**	APS ID	**884428**
Major / Minor	**Major**	Authorization ID	**1096515**

Applicant and Facility Information

Applicant Name	**Shell Chemical Appalachia LLC**	Facility Name	**Shell Chemical Appalachia Petrochemicals Complex**
Applicant Address	300 Frankfort Road Monaca, PA 15601	Facility Address	300 Frankfort Road Monaca, PA 15061
Applicant Contact	James Sewell	Facility Contact	***same as applicant***
Applicant Phone	(281) 731-3287	Facility Phone	***same as applicant***
Client ID	311950	Site ID	102360
SIC Code	2821, 2869	Municipality	Potter Township
SIC Description	Plastics Materials, Synthetic Resins and Nonvulcanizable Elastomers; Industrial Organic Chemicals, NEC	County	Beaver
Date Application Received	November 10, 2015	EPA Waived?	No
Date Application Accepted	March 16, 2016	If No, Reason	Major Facility
Purpose of Application	NPDES permit amendment for discharges from Shell's proposed Petrochemicals Complex.		

Summary of Review

Shell Chemical Appalachia LLC (Shell) submitted an application to amend the NPDES permit for Shell's proposed petrochemical plant. The current permit authorizes discharges associated with transitional activities including Act 2 site cleanup, preparation of the site for construction of the future petrochemical plant and construction of the petrochemical plant itself. The permit amendment will also authorize new industrial waste and storm water discharges from the future petrochemical plant, which will be constructed over the course of four to five years.

Even though Shell submitted an amendment application, the NPDES permit will authorize discharges from a completely new facility separate from the previous facility located at the site (the Horsehead Corporation Monaca Zinc Smelter Plant, which was demolished in 2014/2015). The table on page 3 summarizes the discharges authorized by the current permit and the discharges for which Shell seeks authorization under the NPDES permit amendment. Many existing monitoring locations will be eliminated as demolition, earthmoving and construction activities move toward completion. The outfall numbers assigned to the eliminated monitoring locations will be reused for monitoring locations proposed as part of the final site plan for the petrochemical plant (i.e., post-plant construction). The permit amendment will be structured so that all discharges in the existing permit are maintained. Monitoring locations with outfall numbers that will be reused for discharges from the future petrochemical plant will have an interim effective period during which the existing permit limits will be in effect and a final effective period for discharges associated with the petrochemical plant. Only the new sets of limits that are being added under the permit amendment are discussed in this Fact Sheet.

<u>Storm Water Discharges</u>

During the interim period between shutdown of the Horsehead Monaca Zinc Smelter and startup of Shell's petrochemical plant, Shell is required to collect and treat all storm water from the site; this interim period includes demolition, earthmoving and construction activities. Treatment of storm water is required due to legacy contamination remaining at the site from Horsehead Corporation's zinc smelting operations and the potential for transitional activities to expose leftover material (e.g., zinc slag) that may contaminate storm water runoff.

Approve	Return	Deny	Signatures	Date
✓			Ryan Decker, P.E. / Environmental Engineer	8/5/16
✓			Dana Drake, P.E. / Environmental Engineer Manager	8/19/16

Summary of Review

Shell expects that once transitional activities are complete and legacy material remaining at the site is no longer exposed, most of the existing storm water outfalls will be eliminated and any remaining storm water runoff that may be contaminated by operations at the petrochemical plant will be directed to treatment along with the plant's process wastewaters. However, before transitional activities are complete, Shell is seeking a determination from DEP that the site's storm water is "clean," which would eliminate the need to collect and treat storm water before all transitional activities are complete. At this time, the permit amendment will include all outfalls associated with the collection of storm water during site cleanup; however, Shell may request that those outfalls be removed from the permit sometime after the amendment is issued if DEP determines that storm water collection and treatment is no longer necessary.

Transitional Outfalls to be Modified/Eliminated for Post-Plant Construction

Outfalls 007 – 010 are currently used to monitor discharges of storm water. The drainage areas for these outfalls, as identified in the current permit, will be substantially modified as part of Shell's transitional activities, eventually resulting in the elimination of the outfalls and the redirection of storm water to other discharge locations (either clean rainwater ponds or the "Accidentally Contaminated" Pond for contaminated/potentially contaminated storm water associated with the future petrochemical plant). Since the outfalls will be eliminated, the 007 – 010 outfall designations will be reused as described in the "Discharge, Receiving Waters and Water Supply Information" section following this summary.

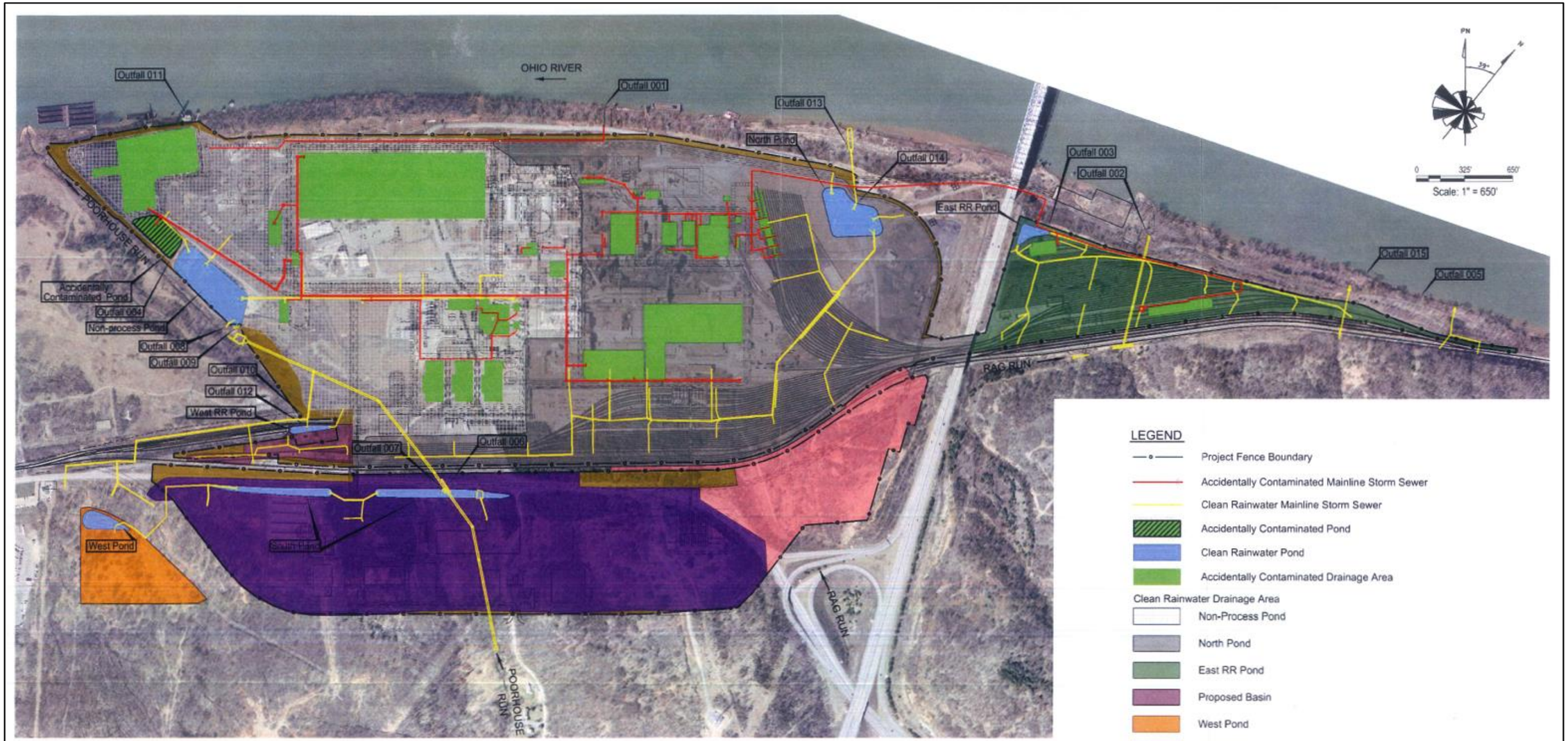
Outfalls 017 – 021, 114, 104 – 604, 713, 813 and Internal Monitoring Point 113 will be maintained in the amended permit as currently permitted. Outfalls 017 – 021 currently authorize discharges of storm water runoff from areas at the site that were not previously associated with Horsehead Corporation's industrial activities. Contamination of storm water runoff at Outfalls 017 – 021 is generally not expected; however, the proximity of those outfalls' drainage areas to Horsehead's former industrial areas has resulted in at least some monitoring for legacy industrial contaminants due to the potential for air deposition of contaminants in areas surrounding the former zinc smelting facility. The remaining outfalls listed above are authorized to discharge storm water that may overflow the temporary collection basins that are used to collect contaminated runoff for treatment by one of Shell's Interim Treatment Systems. Shell expects those outfalls to be eliminated once DEP determines that storm water runoff does not need to be collected and treated. None of the above-listed outfall designations will be reused, so once the effluent sources are eliminated and the outfalls are no longer needed, Shell may request to have those outfalls removed from the permit.

Erosion and Sedimentation (E&S) Control and Post-Construction Storm water Management (PCSM)

In addition to the industrial activities associated with Shell's proposed petrochemical plant, the amended NPDES permit will also cover discharges from construction activities. Therefore, the amended permit will include conditions relating to E&S control and PCSM that would normally be permitted under separate cover (i.e., the PAG-02 General Permit or Individual Permit for Stormwater Discharges Associated with Construction Activities). This is done due to the potential for discharges to contain legacy industrial contaminants during site cleanup under Pennsylvania's Land Recycling Program (Act 2) and/or during construction. DEP's Waterways and Wetlands Program and Beaver County Conservation District reviewed and approved Shell's plans.

	Discharges Authorized by Current Permit	**Discharges Authorized by Amended Permit**		
	Permit Renewed July 1, 2015	**Permit Amended Date: TBD**	**Plant Construction Complete Date: TBD**	**Permit Expires June 30, 2020**
Monitoring Point				
Outfall 001	Treated stormwater monitored at IMP 101	Treated process wastewater monitored at IMP 101 and noncontact cooling water		
IMP 101	Treated storm water runoff from process areas of the plant	Petrochemical plant wastewater treatment plant effluent (ELG Compliance)		
IMP 201		Cooling tower blowdown		
Outfall 002	Treated sanitary wastewater	Storm water from East RR Pond		
Outfall 003	Once through non-contact cooling water	Overflow from East RR Pond		
Outfall 004	Treated storm water runoff from process area of plant	Construction storm water	Overflows from AC Pond	
Outfall 005	Fly ash leachate and storm water runoff	Ground water runoff in Mall Lot 2		
Outfall 006		Storm water from South Ponds		
Outfall 007	Overflow from a storm water runoff collection basin	Construction storm water	Overflows from South Pond	
Outfall 008	Storm water runoff from plant yard areas	Construction storm water	Storm water from CR Pond	
IMP 108		Hydrostatic test water – discharges through CR Pond Outfall 008		
Outfall 009	Overflow from storm water runoff collection basin	Construction storm water	Overflows from CR Pond	
Outfall 010	Storm water runoff from former coal pile area and plant yard areas	Construction storm water	Storm water from West RR Basin	
Outfall 011	Screen back wash from power plant intake	Raw Water Intake Screen Backwash		
Outfall 012		Overflow from West RR Basin		
Outfall 013	Treated storm water runoff from process area of plant from the Storm Water Replacement Pond	Construction storm water	Storm water from North Pond	
Outfall 014		Overflow from North Pond		
Outfall 015		Mall Lot 2 – Seep 1		
Outfall 017	Storm water runoff		These outfalls and their monitoring requirements will remain in the permit until Shell requests that they be removed once the discharges are eliminated. The discharges should be eliminated once construction of the petrochemical plant is complete, but until that time, the existing monitoring requirements will be effective for the entire permit term.	
Outfall 018	Storm water runoff			
Outfall 019	Storm water runoff			
Outfall 020	Storm water runoff			
Outfall 021	Storm water runoff			
IMP 113	Overflows from the Storm Water Replacement Pond		Replaced by Outfall 014. Shell must request to remove IMP 113 from the permit.	
Outfall 114	Overflows from Storm Water West Retention Pond		See Outfalls 008 and 009. Shell must request to remove Outfall 114 from the permit.	
Outfall 104	Overflows of storm water from pump-back basin 1	Outfalls are eliminated pursuant to DEP determination that collection and treatment of storm water runoff is no longer necessary (i.e., storm water should no longer be contaminated by legacy industrial contaminants).		
Outfall 204	Overflows of storm water from pump-back basin 2			
Outfall 304	Overflows of storm water from pump-back basin 3			
Outfall 404	Overflows of storm water from pump-back basin 4			
Outfall 504	Overflows of storm water from pump-back basin 5			
Outfall 604	Overflows of storm water from pump-back basin 6			
Outfall 713	Overflows of storm water from pump-back basin 7			
Outfall 813	Overflows of storm water from pump-back basin 8			

= Monitoring point does not exist or has been eliminated



Drainage Area ID	Area (acres)
Accidentally Contaminated Area	34.8
Non-Process Pond	88.0
North Pond	104.2
East RR Pond	23.6
West RR Pond	3.7
West Pond	8.1
South Pond	74.0
Rag Run	19.8
Area Inside Fence Draining Outside	14.6
Total Area	371

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	3.75
Latitude	40° 40’ 22.996”	Longitude	80° 20’ 18.489”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Treated process water and storm water from the wastewater treatment plant (monitored at IMP 101) and cooling tower blowdown (monitored at IMP 201)		
Receiving Waters	Ohio River	Stream Code	32317
NHD Com ID	99679552	RMI	952.7000
Drainage Area	22,771.80 mi^2	Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pollution Control Standards
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-B	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use	*Add* Navigation	Exceptions to Criteria	See ORSANCO P.C.S.
Assessment Status	Impaired		
Cause(s) of Impairment	Pathogens, PCB, Dioxins		
Source(s) of Impairment	Source Unknown		
TMDL Status	Final, 04/09/2001	Name	Ohio River

Background/Ambient Data		Data Source
pH (SU)	7.33	Mean pH; USGS Gage 03086000 (2000 – 2013)
Temperature (°F)	66.2	Mean temp; USGS Gage 03086000 (2000 – 2013)
Hardness (mg/L)	98	Mean hardness; USGS Gage 03086000 (2000 – 2013)
Other:		

Nearest Downstream Public Water Supply Intake		NOVA Chemicals Corporation	
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.99

Changes Since Last Permit Issuance: Outfall 001 is the former discharge location for process wastewaters from Horsehead Corporation’s demolished zinc smelter. Although the rest of Horsehead’s zinc smelter was demolished, Horsehead’s industrial wastewater treatment plant was temporarily kept to treat contaminated storm water runoff; that treatment plant has since been decommissioned. Therefore, upon issuance, the amended permit will authorize Outfall 001 to discharge treated process wastewater and cooling tower blowdown from the future petrochemical plant.

Discharge, Receiving Waters and Water Supply Information			
IMP No.	101	Design Flow (MGD)	1.28
Latitude	N/A	Longitude	N/A
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Treated process water and storm water from the wastewater treatment plant		
Receiving Waters	Ohio River through Outfall 001	Stream Code	32317

Changes Since Last Permit Issuance: As with Outfall 001, IMP 101 is no longer used by Shell to monitor treated discharges of contaminated storm water runoff. Therefore, effluent limits and monitoring requirements for process wastewaters from the future petrochemical plant will take effect upon issuance of the amended permit.

Discharge, Receiving Waters and Water Supply Information			
IMP No.	201	Design Flow (MGD)	2.47
Latitude	N/A	Longitude	N/A
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Cooling tower blowdown		
Receiving Waters	Ohio River through Outfall 001	Stream Code	32317

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	002	Design Flow (MGD)	Variable
Latitude	40° 40' 36.32"	Longitude	80° 19' 43.83"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water from the East RR Pond		
Receiving Waters	Rag Run	Stream Code	33949
NHD Com ID	99679382	RMI	0.0500
Drainage Area	22,768 mi^2	Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	Siltation		
Source(s) of Impairment	Removal of Vegetation, Road Runoff		
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	1.04

Changes Since Last Permit Issuance: Outfall 002 is currently authorized to discharge treated sanitary wastewater. Shell intends to send sanitary wastewater from the petrochemical plant to the Center Township Sewer Authority's publicly-owned treatment works. Therefore, Outfall 002 will be reused as the designation for discharges from the East Railroad Pond—a storm water pond that will be constructed on the eastern side of Interstate 376. Effluent limits and monitoring requirements applicable to the East RR Pond will take effect upon issuance of the amended permit because there will be no sanitary wastewater discharges from Outfall 002 during Shell's construction activities.

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	003	Design Flow (MGD)	Variable
Latitude	40° 40’ 36.32”	Longitude	80° 19’ 43.51”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows of storm water from the East RR Pond		
Receiving Waters	Rag Run	Stream Code	33949
NHD Com ID	99679382	RMI	0.0500
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	Siltation		
Source(s) of Impairment	Removal of Vegetation, Road Runoff		
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.99

Changes Since Last Permit Issuance: Outfall 003 is currently authorized to discharge once-through non-contact cooling water. Horsehead previously operated an onsite coal-fired power plant, but the plant was decommissioned, so authorization for non-contact cooling water discharges is no longer required at Outfall 003. Therefore, Outfall 003 will be reused as the designation for overflows from the East RR Pond upon issuance of the amended permit.

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	004	Design Flow (MGD)	Variable
Latitude	40° 39' 57.4943"	Longitude	80° 20' 40.5531"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows of storm water from the Accidentally Contaminated (AC) Pond		
Receiving Waters	Poorhouse Run	Stream Code	33932
NHD Com ID	99680192	RMI	0.25
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	

Changes Since Last Permit Issuance: Outfall 004 is currently authorized to discharge treated storm water runoff. Storm water collects in the Storm Water West Retention Pond (one of Horsehead Corporation's former fly ash ponds that Shell retrofitted with a liner) and is then treated through an Interim Treatment System prior to discharge through Outfall 004. The pond itself does not discharge directly to Poorhouse Run.

Once DEP determines that storm water runoff at the site no longer requires treatment, the pond will temporarily function as an erosion and sedimentation control pond that will receive runoff from construction activities during construction of the petrochemical plant. DEP expects that storm water runoff will not be impacted by industrial activities or legacy materials remaining at the site during the construction period—presuming that Act 2 cleanup is complete.

As part of future operations at the petrochemical plant, Shell intends to transition the Storm Water West Retention Pond from a construction storm water pond into an industrial storm water collection pond referred to as the "Accidentally Contaminated" or "AC" Pond. At that time, the pond will be used to collect all process area storm water (and possibly other wastewater sources such as contaminated cooling tower blowdown) from the petrochemical plant that may be accidentally or incidentally contaminated by Shell's industrial activities. The AC Pond normally will not discharge because the storm water collected in the pond will be directed to the petrochemical plant's wastewater treatment system for treatment and discharge through Outfall 001, but Outfall 004 will be maintained for potential overflows from the AC Pond during emergency conditions.

Discharge, Receiving Waters and Water Supply Information

Outfall No.	005	Design Flow (MGD)	Variable
Latitude	40° 40' 50.29"	Longitude	80° 19' 11.14"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Groundwater discharges from Mall Lot 2		
Receiving Waters	Ohio River	Stream Code	32317
NHD Com ID	99679932	RMI	953.7800
Drainage Area	22,763.34 mi^2	Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pollution Control Standards
Elevation (ft)		Slope (ft/ft)	0.0001
Watershed No.	20-B	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use	*Add* Navigation	Exceptions to Criteria	See ORSANCO P.C.S.
Assessment Status	Impaired		
Cause(s) of Impairment	Pathogens, PCB, Dioxins		
Source(s) of Impairment	Source Unknown		
TMDL Status	Final, 04/09/2001	Name	Ohio River

Background/Ambient Data		Data Source
pH (SU)	7.33	Mean pH; USGS Gage 03086000 (2000 – 2013)
Temperature (°F)	66.2	Mean temp; USGS Gage 03086000 (2000 – 2013)
Hardness (mg/L)	98	Mean hardness; USGS Gage 03086000 (2000 – 2013)
Other:		

Nearest Downstream Public Water Supply Intake		NOVA Chemicals Corporation	
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.99

Changes Since Last Permit Issuance: Outfall 005 is currently permitted for fly ash leachate and storm water runoff from a closed fly ash disposal area on the eastern-most portion of the site. Despite the listing of leachate as an effluent source, Outfall 005's discharges do not exhibit elevated levels of TSS or other metals.

There was a seep feeding the pond and there was also storm water runoff from Mall Lot 2. Jacobs did work for CSX that redirected storm water previously culverted under the railroad to a different location; this partially dried up the seepage contributing to the pond. Other earthmoving has resulted in the old pond that discharged to Outfall 005 being mostly filled-in.

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	006	Design Flow (MGD)	Variable
Latitude	40° 39' 57.17"	Longitude	80° 20' 9.11"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water from the South Ponds		
Receiving Waters	Poorhouse Run	Stream Code	33932
NHD Com ID	99680192	RMI	0.74
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.99

Changes Since Last Permit Issuance: Outfall 006 was the monitoring location for discharges from a captive landfill for non-hazardous refractory bricks, fly ash, bottom ash and coal mill rejects from the former onsite power plant, and slag from Horsehead Corporation's secondary zinc smelting facilities. The monitoring location for Horsehead's landfill was removed from the NPDES permit for the smelter plant because Horsehead retained ownership of the landfill whereas Shell acquired and demolished the smelting facilities. The Outfall 006 designation will be reused to identify discharges from the "South Ponds" that will be constructed for the future petrochemical plant.

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	007	Design Flow (MGD)	Variable
Latitude	40° 39' 57.0622"	Longitude	80° 20' 9.1604"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows of storm water from the South Ponds		
Receiving Waters	Poorhouse Run	Stream Code	33932
NHD Com ID	99680192	RMI	0.74
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.99

Changes Since Last Permit Issuance: Outfall 007 is currently authorized to discharge overflows of storm water from an earthen collection basin. Shell will maintain the basin for contaminated storm water collection or, if treatment for legacy contaminants in storm water is no longer required, for erosion and sedimentation control. The earthen basin will eventually be eliminated and Outfall 007 will be reused as the designation for overflows from the petrochemical plant's South Ponds.

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	008	Design Flow (MGD)	Variable
Latitude	40° 39' 56.27"	Longitude	80° 20' 32.18"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water from the Clean Rainwater (CR) Pond; steam condensate		
Receiving Waters	Poorhouse Run	Stream Code	33932
NHD Com ID	99680192	RMI	0.36
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.99

Changes Since Last Permit Issuance: Outfall 008 is currently authorized to discharge storm water from a 19.1-acre area near Outfall 007. The outfall will be maintained for discharges of contaminated storm water runoff during transitional activities or, if treatment for legacy contaminants in storm water is no longer required, for erosion and sedimentation control. The outfall will eventually be eliminated and Outfall 008 will be reused as the designation for discharges from the petrochemical plant's Clean Rainwater Pond.

Discharge, Receiving Waters and Water Supply Information			
IMP No.	108	Design Flow (MGD)	Variable
Latitude	N/A	Longitude	N/A
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Hydrostatic test water		
Receiving Waters	Poorhouse Run through Outfall 008	Stream Code	33932

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	009	Design Flow (MGD)	Variable
Latitude	40° 39' 56.2702"	Longitude	80° 20' 32.187"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows of storm water from the Clean Rainwater (CR) Pond		
Receiving Waters	Poorhouse Run	Stream Code	33932
NHD Com ID	99680192	RMI	0.37
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.99

Changes Since Last Permit Issuance: Outfall 009 is currently authorized to discharge overflows of storm water from an earthen collection basin. Shell will maintain the basin for contaminated storm water collection or, if treatment for legacy contaminants in storm water is no longer required, for erosion and sedimentation control. The earthen basin will eventually be eliminated and Outfall 009 will be reused as the designation for overflows from the petrochemical plant's Clean Rainwater Pond.

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	010	Design Flow (MGD)	Variable
Latitude	40° 39’ 54.71”	Longitude	80° 20’ 22.26”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Storm water from the West RR Basin		
Receiving Waters	Poorhouse Run	Stream Code	33932
NHD Com ID	99680192	RMI	0.50
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.99

Changes Since Last Permit Issuance: Outfall 010 is currently authorized to discharge storm water from a 14.7-acre area in the vicinity of Horsehead Corporation’s former power plant and coal pile storage area. The outfall will be maintained for discharges of contaminated storm water runoff during transitional activities or, if treatment for legacy contaminants in storm water is no longer required, for erosion and sedimentation control. Eventually the outfall will be eliminated and Outfall 010 will be reused as the designation for discharges from the petrochemical plant’s West Railroad Basin.

Discharge, Receiving Waters and Water Supply Information

Outfall No.	011	Design Flow (MGD)	0.69
Latitude	40° 40’ 4.00”	Longitude	80° 20’ 48.00”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Intake screen backwash water		
Receiving Waters	Ohio River	Stream Code	32317
NHD Com ID	99679932	RMI	952.1000
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pollution Control Standards
Elevation (ft)		Slope (ft/ft)	0.0001
Watershed No.	20-B	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use	*Add* Navigation	Exceptions to Criteria	See ORSANCO P.C.S.
Assessment Status	Impaired		
Cause(s) of Impairment	Pathogens, PCB, Dioxins		
Source(s) of Impairment	Source Unknown		
TMDL Status	Final, 04/09/2001	Name	Ohio River

Background/Ambient Data		Data Source
pH (SU)	7.33	Mean pH; USGS Gage 03086000 (2000 – 2013)
Temperature (°F)	66.2	Mean temp; USGS Gage 03086000 (2000 – 2013)
Hardness (mg/L)	98	Mean hardness; USGS Gage 03086000 (2000 – 2013)
Other:		

Nearest Downstream Public Water Supply Intake		NOVA Chemicals Corporation	
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	

Changes Since Last Permit Issuance: Outfall 011 is an existing outfall for screen backwash water from Horsehead Corporation’s power plant intake. The power plant was decommissioned, so the outfall is not currently in use; however, the outfall will be maintained for the same purpose (monitoring of intake screen backwash discharges) in the amended permit because Shell intends to use the intake as a water supply for the petrochemical plant.

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	012	Design Flow (MGD)	Variable
Latitude	40° 39’ 54.3288”	Longitude	80° 20’ 21.869”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows of storm water from the West RR Basin		
Receiving Waters	Poorhouse Run	Stream Code	33932
NHD Com ID	99680192	RMI	0.50
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)		Q_{7-10} Basis	
Elevation (ft)		Slope (ft/ft)	
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	NOVA Chemicals Corporation		
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	0.99

Changes Since Last Permit Issuance: Outfall 012 is not included in the existing permit.

Discharge, Receiving Waters and Water Supply Information

Outfall No.	013	Design Flow (MGD)	Variable
Latitude	40° 40' 36.75"	Longitude	80° 20' 1.37"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	INTERIM: Treated storm water runoff from process areas of the plant and overflows from the Stormwater Replacement Pond FINAL: Storm water from the North Pond; steam condensate		
Receiving Waters	Ohio River	Stream Code	32317
NHD Com ID	99679932	RMI	952.9000
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pollution Control Standards
Elevation (ft)		Slope (ft/ft)	0.0001
Watershed No.	20-B	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use	*Add* Navigation	Exceptions to Criteria	See ORSANCO P.C.S.
Assessment Status	Impaired		
Cause(s) of Impairment	Pathogens, PCB, Dioxins		
Source(s) of Impairment	Source Unknown		
TMDL Status	Final, 04/09/2001	Name	Ohio River

Background/Ambient Data		Data Source
pH (SU)	7.33	Mean pH; USGS Gage 03086000 (2000 – 2013)
Temperature (°F)	66.2	Mean temp; USGS Gage 03086000 (2000 – 2013)
Hardness (mg/L)	98	Mean hardness; USGS Gage 03086000 (2000 – 2013)
Other:		

Nearest Downstream Public Water Supply Intake		NOVA Chemicals Corporation	
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	

Changes Since Last Permit Issuance: Outfall 013 is an existing outfall for treated storm water discharges from Shell's interim Storm Water Replacement Pond. The Storm Water Replacement Pond will be converted into a "clean" rainwater pond (the "North Pond') and will maintain the same primary outfall number. The overflow from the North Pond will be designated as Outfall 014, which is not an outfall number used in the existing permit.

Discharge, Receiving Waters and Water Supply Information

Outfall No.	014	Design Flow (MGD)	Variable
Latitude	40° 40’ 29.23”	Longitude	80° 19’ 58.05”
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Overflows of storm water from the North Pond		
Receiving Waters	Ohio River	Stream Code	32317
NHD Com ID	99679932	RMI	952.9000
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pollution Control Standards
Elevation (ft)		Slope (ft/ft)	0.0001
Watershed No.	20-B	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use	*Add* Navigation	Exceptions to Criteria	See ORSANCO P.C.S.
Assessment Status	Impaired		
Cause(s) of Impairment	Pathogens, PCB, Dioxins		
Source(s) of Impairment	Source Unknown		
TMDL Status	Final, 04/09/2001	Name	Ohio River

Background/Ambient Data		Data Source
pH (SU)	7.33	Mean pH; USGS Gage 03086000 (2000 – 2013)
Temperature (°F)	66.2	Mean temp; USGS Gage 03086000 (2000 – 2013)
Hardness (mg/L)	98	Mean hardness; USGS Gage 03086000 (2000 – 2013)
Other:		

Nearest Downstream Public Water Supply Intake		NOVA Chemicals Corporation	
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	

Changes Since Last Permit Issuance: Outfall 014 is not included in the existing permit.

Discharge, Receiving Waters and Water Supply Information

Outfall No.	015	Design Flow (MGD)	Variable
Latitude	40º 40' 47.53"	Longitude	80º 19' 19.32"
Quad Name	Beaver	Quad Code	1303
Wastewater Description:	Groundwater seep		
Receiving Waters	Ohio River	Stream Code	32317
NHD Com ID	99679932	RMI	953.7000
Drainage Area		Yield (cfs/mi^2)	
Q_{7-10} Flow (cfs)	4,730	Q_{7-10} Basis	ORSANCO Pollution Control Standards
Elevation (ft)		Slope (ft/ft)	0.0001
Watershed No.	20-G	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use	*Add* Navigation	Exceptions to Criteria	See ORSANCO P.C.S.
Assessment Status	Impaired		
Cause(s) of Impairment	Pathogens, PCB, Dioxins		
Source(s) of Impairment	Source Unknown		
TMDL Status	Final, 04/09/2001	Name	Ohio River

Background/Ambient Data		Data Source
pH (SU)	7.33	Mean pH; USGS Gage 03086000 (2000 – 2013)
Temperature (°F)	66.2	Mean temp; USGS Gage 03086000 (2000 – 2013)
Hardness (mg/L)	98	Mean hardness; USGS Gage 03086000 (2000 – 2013)
Other:		

Nearest Downstream Public Water Supply Intake		NOVA Chemicals Corporation	
PWS Waters	Ohio River	Flow at Intake (cfs)	4,730
PWS RMI	951.71	Distance from Outfall (mi)	

Changes Since Last Permit Issuance: Outfall 015 is not included in the existing permit. The groundwater seep that is being permitted under this amendment has existed for some time, but was never included in the NPDES permit for the site.

Development of Effluent Limitations

IMP No.	101	**Design Flow (MGD)**	1.28
Latitude	N/A	**Longitude**	N/A

Wastewater Description: Treated process water and storm water from the wastewater treatment plant

Effluent limits are imposed at IMP 101 rather than another monitoring location because 40 CFR § 125.3(f) prohibits compliance with technology-based treatment requirements through the use of "non-treatment" techniques such as flow augmentation (i.e., dilution). Since the wastewaters monitored at IMP 101 combine with other wastewaters before the next downstream monitoring location (Outfall 001), IMP 101 is the only point at which compliance with applicable Federal Effluent Limitations Guidelines 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. This rationale also applies to IMPs 201 and 108, which are discussed later in this Fact Sheet.

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

Federal Effluent Limitations Guidelines and New Source Determination

Process wastewaters from Shell's proposed petrochemical plant are subject to Federal Effluent Limitations Guidelines (ELGs) under 40 CFR Part 414 – Organic Chemicals, Plastics and Synthetic Fibers (OCPSF) Point Source Category. Shell will produce two types of products: polyethylene and ethylene. Pursuant to the applicability description in 40 CFR § 414.40, polyethylene is a Thermoplastic Resin under Subpart D of the OCPSF ELGs. Pursuant to the applicability description in 40 CFR § 414.60, ethylene is a Commodity Organic Chemical under Subpart F of the OCPSF ELG.

Based on definitions given in 40 CFR §§ 122.2 and 122.29, Shell's proposed petrochemical plant will be a "new source." Classification of the proposed plant as a "new source" is based on 40 CFR § 122.29(b), which states the following:

> (b) Criteria for new source determination.
>
> (1) Except as otherwise provided in an applicable new source performance standard, a source is a "new source" if it meets the definition of "new source" in §122.2, and
>
> (i) It is constructed at a site at which no other source is located; or
>
> (ii) It totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or
>
> (iii) Its processes are substantially independent of an existing source at the same site. In determining whether these processes are substantially independent, the Director shall consider such factors as the extent to which the new facility is integrated with the existing plant; and the extent to which the new facility is engaged in the same general type of activity as the existing source.
>
> (2) A source meeting the requirements of paragraphs (b)(1) (i), (ii), or (iii) of this section is a new source only if a new source performance standard is independently applicable to it. If there is no such independently applicable standard, the source is a new discharger. See §122.2."

As § 122.29(b)(1) states, a source is a new source if it meets the definition of "new source" in § 122.2 and is described by any of the subsections of § 122.29(b)(1) reproduced above. Section 122.2 defines "new source" as:

> *New source* means any building, structure, facility, or installation from which there is or may be a "discharge of pollutants," the construction of which commenced:
>
> (a) After promulgation of standards of performance under section 306 of CWA which are applicable to such source, or
>
> (b) After proposal of standards of performance in accordance with section 306 of CWA which are applicable to such source, but only if the standards are promulgated in accordance with section 306 within 120 days of their proposal.

[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."

To date, Shell has focused on demolition and site preparation activities (e.g., earthmoving), so construction has not yet begun on the facility from which the discharge of OCPSF ELG-regulated pollutants will occur. However, regardless of when Shell proceeds with construction, that construction will have commenced after promulgation of standards of performance applicable to discharges from the proposed plant—those being the New Source Performance Standards under 40 CFR Part 414, which were promulgated in 1987 and updated in 1993. Additionally, pursuant to § 122.2(b)(1), the facility will be constructed at a site where no other source is located. The former Horsehead Monaca Smelter Plant previously located at the site was almost completely demolished prior to submission of the NPDES permit amendment application for the petrochemical plant. For these reasons, the petrochemical plant is considered to be a new source.

Table 1 lists the specific sections of the ELGs that apply to the petrochemical plant's process wastewater streams, which will be generated from four process units including one Ethylene Cracker Unit (ECU) and three Polyethylene Units (PEU).

Table 1. Production Information and Applicable Federal Effluent Limitations Guidelines

Product	Production Rate (million tons/year)	Percentage of Total Production	Applicable Effluent Limitations Guidelines
Ethylene Cracker Unit – SIC Code 2869 Industrial Organic Chemicals, Not Elsewhere Classified			
Ethylene	1.65	48.34%	Subpart F – Commodity Organic Chemicals 40 CFR § 414.64 (and § 414.91 by reference)
Polyethylene Units 1 and 2 – SIC Code 2821 Plastics Materials, Synthetic Resins and Nonvulcanizable Elastomers			
Polyethylene	0.606 (each)	17.76% (each)	Subpart D – Thermoplastic Resins 40 CFR § 414.44 (and § 414.91 by reference)
Polyethylene Unit 3 – SIC Code 2821 Plastics Materials, Synthetic Resins and Nonvulcanizable Elastomers			
Polyethylene	0.551	16.14%	Subpart D – Thermoplastic Resins 40 CFR § 414.44 (and § 414.91 by reference)
Total Production	3.413		

TBELs for Toxic Pollutants

New source performance standards under §§ 414.44(a) and 414.64(a) both refer to Subpart I (§ 414.91) for toxic pollutant effluent limits applicable to "Direct Discharge Point Sources That Use End-of-Pipe Biological Treatment." Shell will use biological treatment to treat its process wastewaters and will discharge the effluent to the Ohio River (after combining the treated process wastewater with cooling tower blowdown), so the direct discharge limits apply. Technology-based mass limits for toxic pollutants are calculated by multiplying the process wastewater flow rate (1.28 MGD) by the concentrations listed in § 414.91. Table 2 summarizes the applicable concentrations and the calculated mass TBELs.

Table 2. Technology-Based Limits for Toxic Pollutants

Parameter	Mass (lbs/day)		Concentration (mg/L)	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Acenaphthene	0.235	0.630	0.022	0.059
Acenaphthylene	0.235	0.630	0.022	0.059
Acrylonitrile	1.03	2.59	0.096	0.242
Anthracene	0.235	0.630	0.022	0.059
Benzene	0.395	1.45	0.037	0.136
Benzo(a)anthracene	0.235	0.630	0.022	0.059
3,4-Benzofluoranthene	0.245	0.651	0.023	0.061
Benzo(k)fluoranthene	0.235	0.630	0.022	0.059
Benzo(a)pyrene	0.245	0.651	0.023	0.061
Bis(2-ethylhexyl) phthalate	1.10	2.98	0.103	0.279
Carbon Tetrachloride	0.192	0.405	0.018	0.038
Chlorobenzene	0.160	0.299	0.015	0.028

Table 2 (continued). Technology-Based Limits for Toxic Pollutants

Parameter	Mass (lbs/day)		Concentration (mg/L)	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Chloroethane	1.11	2.86	0.104	0.268
Chloroform	0.224	0.491	0.021	0.046
2-Chlorophenol	0.331	1.046	0.031	0.098
Chrysene	0.235	0.630	0.022	0.059
Di-n-butyl phthalate	0.288	0.608	0.027	0.057
1,2-Dichlorobenzene	0.822	1.74	0.077	0.163
1,3-Dichlorobenzene	0.331	0.470	0.031	0.044
1,4-Dichlorobenzene	0.160	0.299	0.015	0.028
1,1-Dichloroethane	0.235	0.630	0.022	0.059
1,2-Dichloroethane	0.726	2.25	0.068	0.211
1,1-Dichloroethylene	0.170	0.267	0.016	0.025
1,2-trans-Dichloroethylene	0.224	0.576	0.021	0.054
2,4-Dichlorophenol	0.416	1.196	0.039	0.112
1,2-Dichloropropane	1.63	2.46	0.153	0.230
1,3-Dichloropropylene	0.309	0.470	0.029	0.044
Diethyl phthalate	0.865	2.17	0.081	0.203
2,4-Dimethylphenol	0.192	0.384	0.018	0.036
Dimethyl phthalate	0.202	0.502	0.019	0.047
4,6-Dinitro-o-cresol	0.833	2.96	0.078	0.277
2,4-Dinitrophenol	0.758	1.31	0.071	0.123
2,4-Dinitrotoluene	1.21	3.04	0.113	0.285
2,6-Dinitrotoluene	2.72	6.85	0.255	0.641
Ethylbenzene	0.341	1.15	0.032	0.108
Fluoranthene	0.267	0.726	0.025	0.068
Fluorene	0.235	0.630	0.022	0.059
Hexachlorobenzene	0.160	0.299	0.015	0.028
Hexachlorobutadiene	0.213	0.523	0.020	0.049
Hexachloroethane	0.224	0.576	0.021	0.054
Methyl Chloride	0.918	2.03	0.086	0.190
Methylene Chloride	0.427	0.950	0.040	0.089
Naphthalene	0.235	0.630	0.022	0.059
Nitrobenzene	0.288	0.726	0.027	0.068
2-Nitrophenol	0.437	0.737	0.041	0.069
4-Nitrophenol	0.769	1.32	0.072	0.124
Phenanthrene	0.235	0.630	0.022	0.059
Phenol	0.160	0.277	0.015	0.026
Pyrene	0.267	0.715	0.025	0.067
Tetrachloroethylene	0.235	0.598	0.022	0.056
Toluene	0.277	0.854	0.026	0.080
1,2,4-Trichlorobenzene	11.9	29.6	0.068	0.140
1,1,1-Trichloroethane	15.5	36.1	0.021	0.054
1,1,2-Trichloroethane	4.49	12.8	0.021	0.054
Trichloroethylene	3.42	7.37	0.021	0.054
Vinyl Chloride	18.1	42.5	0.104	0.268

Section 414.91 also provides limits for chromium, copper, lead, nickel, zinc and total cyanide, but DEP is not imposing limits for those pollutants pursuant to § 414.91(b), which states:

> In the case of chromium, copper, lead, nickel, zinc, and total cyanide, the discharge quantity (mass) shall be determined by multiplying the concentrations listed in the following table for these pollutants times the flow from metal-bearing waste streams for the metals and times the flow from cyanide bearing waste streams for total cyanide. The metal-bearing waste streams and cyanide-bearing waste streams are defined as those waste streams listed in Appendix A of this part, plus any additional OCPSF process wastewater streams identified by the permitting authority on a case-by-case basis as metal or cyanide bearing based upon a determination that such streams contain significant amounts of the pollutants identified above. Any such streams designated as metal or cyanide bearing must be treated independently of other metal or cyanide bearing waste streams unless the permitting authority determines that the combination of such streams, prior to treatment, with the Appendix A waste streams will result in substantial reduction of these pollutants. This determination must be based upon a review of relevant engineering, production, and sampling and analysis information.

Shell does not plan to generate any metals or cyanide-bearing waste streams (i.e., waste streams identified in Appendix A of Part 414, not waste streams that merely contain metals or cyanide) at the petrochemicals complex. Metals may be present in the process wastewater, but only in small concentrations as a result of pipe corrosion.

To the extent that DEP may discretionarily impose metals and cyanide limits from § 414.91 if DEP determines that those pollutants are present in significant amounts, Shell's estimated effluent quality at IMP 101 indicates that chromium, copper, lead, nickel, zinc and total cyanide are anticipated to be present in concentrations an order of magnitude less than the concentrations given in § 414.91. For this reason, the chromium, copper, lead, nickel, zinc, and total cyanide limits from § 414.91 will not be imposed at this time.

TBELs for Conventional Pollutants

Limits for the conventional pollutants BOD5 and TSS are subpart specific. For process wastewater discharges that are subject to more than one subpart like Shell's petrochemical plant effluent, 40 CFR § 414.11(i) specifies the following procedure to calculate production-proportioned BOD5 and TSS effluent limits:

> BOD5 and TSS limitations for plants with production in two or more subcategories. Any existing or new source direct discharge point source subject to two or more of subparts B through H must achieve BOD5 and TSS discharges not exceeding the quantity (mass) determined by multiplying the total OCPSF process wastewater flow subject to subparts B through H times the following "OCPSF production-proportioned concentration": For a specific plant, let w_j be the proportion of the plant's total OCPSF production in subcategory j. Then the plant-specific production-proportioned concentration limitations are given by:

$$\text{Plant BOD}_5\text{ Limit} = \sum_{j=B}^{H}\left(w_j\right)\left(BOD_5 Limit_j\right)$$

and

$$\text{Plant TSS Limit} = \sum_{j=B}^{H}\left(w_j\right)\left(TSS\ Limit_j\right).$$

> The "BOD5 Limit_j" and "TSS Limit_j" are the respective subcategorical BOD5 and TSS Maximum for Any One Day or Maximum for Monthly Average limitations.

The petrochemical plant's BOD5 and TSS concentrations are calculated using the proportion of total production attributable to each subcategory (summarized in Table 3) and the BOD5 and TSS concentrations given in Subparts D and F (summarized in Table 4).

Table 3. Production for Subparts D and F

Subcategory	Subcategory Production (million tons/year)	Percentage of Total Production (w_j)
Subpart D	1.763 (PEU 1-3)	1.763/3.413 = 51.66%
Subpart F	1.65 (ECU)	1.65/3.413 = 48.34%

Table 4. NSPS for Conventional Pollutants BOD5 and TSS

Parameter	Subpart D (§ 414.44)		Subpart F (§ 414.64)	
	Monthly Average (mg/L)	Daily Maximum (mg/L)	Monthly Average (mg/L)	Daily Maximum (mg/L)
BOD5	24	64	30	80
TSS	40	130	46	149

Production-Proportioned BOD_5 Conc. = $(w_D)(BOD_5\ Limit_D) + (w_F)(BOD_5\ Limit_F)$

Production-Proportioned TSS Conc. = $(w_D)(TSS\ Limit_D) + (w_F)(TSS\ Limit_F)$

Technology-based mass limits for BOD5 and TSS are then calculated using the production-proportioned concentrations derived from the formulas above and the facility's process wastewater flow rate (1.28 MGD).

Table 5. TBELs for Conventional Pollutants

Parameter	Production-Proportioned Concentration (mg/L)		Production-Proportioned Mass (lb/day)	
	Monthly Avg.	Daily Max	Monthly Avg.	Daily Max
BOD5	27	72	287	766
TSS	43	139	458	1,487
pH*	within the range of 6.0 to 9.0 at all times			

*NSPS under §§ 414.44 and 414.64 require that pH be within the range of 6.0 to 9.0 at all times.

Regulatory Effluent Standards and Monitoring Requirements

Based on applicable state regulations, the following effluent standards and monitoring requirements are imposed:

- Flow monitoring will be required in accordance with 25 Pa. Code § 92a.61(d)(1).
- Limits for pH (6.0 minimum and 9.0 maximum) will be imposed at Outfall 001 based on 25 Pa. Code § 95.2(1). These limits are the same as the NSPS for pH from 40 CFR Part 414 (see Table 5).
- Process wastewaters at IMP 101 may contain oil and grease; however, effluent standards for oil-bearing wastewaters given by 25 Pa. Code § 95.2(2) will be imposed at Outfall 001 rather than IMP 101 because the cooling tower blowdown that mixes with treated process wastewaters prior to discharge may also contain oil and grease. Even though no effluent standards are imposed at IMP 101, reporting will be required for oil and grease.
- An instantaneous maximum limit of 7.0 mg/L is imposed for dissolved iron in accordance with 25 Pa. Code §95.2(4).

Concentration-Based Limits for IMP 101

To supplement the mass limits calculated from the ELGs, DEP will also impose concentration limits under the authority of 40 CFR § 122.45(f)(2)[2] and a guidance document titled, "Production Basis for NPDES Permits" developed with input from both DEP and EPA that recommends the imposition of concentration limits in addition to mass limits when a maximum production rate rather than a long-term average production rate is used to establish mass limits (for production-based ELGs). In accordance with the draft guidance document:

> "…the option of including concentration based effluent limits should be evaluated by the permit writer for use in addition to the mass limits pursuant to the Best Professional Judgment (BPJ) authority in Section 402(a)(1) of the Clean Water Act. This option is also discussed in the U.S. EPA NPDES Permit Writers Manual. This option includes the addition of both monthly average and daily maximum concentration limits from the appropriate subcategory tables in the development document for the specific subcategory and pollutants involved into the permits as effluent limits (not mass × flow at the facility.) The main reason for this approach is to assure proper operation and maintenance of the treatment facility during periods of low production. The major advantage of this approach is simplicity, and it in no way restricts production levels at the facility, since effluent concentrations from

[2] 40 CFR §122.45(f)(2) states: "Pollutants limited in terms of mass additionally may be limited in terms of other units of measurement, and the permit shall require the permittee to comply with both limitations."

the treatment plant remain fairly constant over wide ranges of production levels. This approach is particularly useful at facilities where production is either moderately or highly variable and/or multiple production lines with a centralized treatment facility are involved. It is also useful at new facilities where production records do not exist and mass limits are based solely on production.

"The use of concentration limits also assures compliance with the unit production figures in the ELG, especially during low production periods when mass limits alone can be achieved without treatment in some cases. This approach provides concentration limits that will not change over time and also represent what BAT for the particular production line involved can achieve in a well-operated treatment facility. This approach is preferable to calculating a concentration limit using the current flow at the facility and the mass limits from the ELG, which often yields concentration limits far less stringent than what BAT can achieve. The use of existing waste flow at a facility also leads to a moving target since waste flows are constantly changing due to treatment times, breakdowns, and facility modifications. If there are multiple subcategories involved, whichever subcategory has the majority of the flow to the treatment plant is used as the basis for deriving the concentration limits."

Although 40 CFR Part 414 is not substantially production-based, the passages cited above and 40 CFR § 122.45(f)(2) provide the bases for imposing concentration limits in addition to the mass limits required by the ELGs. Shell will operate multiple production lines (one ECU and three PEUs) with a centralized treatment facility employed to treat process wastewaters from those production lines in addition to other sources such as contaminated storm water. The plant also will be a new facility with certain limits based solely on production estimates since no production records exist.

The concentration limits for toxic parameters come directly from § 414.91, which applies to both Subpart D and F wastes. The concentration limits for conventional pollutants will be the production-proportioned concentrations listed in Table 5. Since the mass limits required by the ELG are based on the facility's process wastewater flow rate and the concentrations given in the ELG, Shell should be able to comply with both sets of limits.

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

WQBELs will not be evaluated at this internal monitoring point. WQBELs are designed to protect water quality by ensuring that water quality standards are met in the receiving water and IMP 101 is not a final stream discharge location. Therefore, water quality limits will be evaluated at Outfall 001 where the combination of IMP 101's wastewaters and cooling tower blowdown from IMP 201 discharge to waters of the Commonwealth.

101.C. Effluent Limitations and Monitoring Requirements for IMP 101

Effluent limits applicable at IMP 101 are the more stringent of TBELs, WQBELs, regulatory effluent standards and monitoring requirements. Since WQBELs are not applicable at IMP 101, effluent limits are based solely on TBELs, regulatory effluent standards and monitoring requirements. In addition to the average monthly and maximum daily concentration limits, instantaneous maximum concentration limits are also included in the permit. Instantaneous maximum limits are for compliance monitoring use by DEP personnel and do not need to be reported on monthly DMRs unless grab samples are taken in place of 24-hour composite samples. The magnitudes of the instantaneous maximum limits will be calculated by multiplying the maximum daily limits by 1.25 in accordance with the maximum daily-to-instantaneous maximum ratio given in Chapter 2, Section C of DEP's *Technical Guidance for the Development and Specification of Effluent Limitations*. IMP 101 limits and monitoring requirements are summarized in Table 6.

Table 6. Effluent Limits and Monitoring Requirements for IMP 101

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)
BOD-5	287	766	27	72	90	40 CFR §§ 414.44 and 414.64
Total Suspended Solids	458	1,487	43	139	174	40 CFR §§ 414.44 and 414.64
Oil and Grease	—	—	Report	Report	—	25 Pa. Code § 92a.61(b)
Acenaphthene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Acenaphthylene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Acrylonitrile	1.03	2.59	0.096	0.242	0.302	40 CFR § 414.91
Anthracene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91

Table 6 (continued). Effluent Limits and Monitoring Requirements for IMP 101

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant Maximum	
Benzene	0.395	1.45	0.037	0.136	0.170	40 CFR § 414.91
Benzo(a)anthracene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
3,4-Benzofluoranthene	0.245	0.651	0.023	0.061	0.076	40 CFR § 414.91
Benzo(k)fluoranthene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Benzo(a)pyrene	0.245	0.651	0.023	0.061	0.076	40 CFR § 414.91
Bis(2-ethylhexyl) phthalate	1.10	2.98	0.103	0.279	0.348	40 CFR § 414.91
Carbon Tetrachloride	0.192	0.405	0.018	0.038	0.047	40 CFR § 414.91
Chlorobenzene	0.160	0.299	0.015	0.028	0.035	40 CFR § 414.91
Chloroethane	1.11	2.86	0.104	0.268	0.335	40 CFR § 414.91
Chloroform	0.224	0.491	0.021	0.046	0.057	40 CFR § 414.91
2-Chlorophenol	0.331	1.05	0.031	0.098	0.122	40 CFR § 414.91
Chrysene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Di-n-butyl phthalate	0.288	0.608	0.027	0.057	0.071	40 CFR § 414.91
1,2-Dichlorobenzene	0.822	1.74	0.077	0.163	0.203	40 CFR § 414.91
1,3-Dichlorobenzene	0.331	0.470	0.031	0.044	0.055	40 CFR § 414.91
1,4-Dichlorobenzene	0.160	0.299	0.015	0.028	0.035	40 CFR § 414.91
1,1-Dichloroethane	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
1,2-Dichloroethane	0.726	2.25	0.068	0.211	0.263	40 CFR § 414.91
1,1-Dichloroethylene	0.170	0.267	0.016	0.025	0.031	40 CFR § 414.91
1,2-trans-Dichloroethylene	0.224	0.576	0.021	0.054	0.067	40 CFR § 414.91
2,4-Dichlorophenol	0.416	1.20	0.039	0.112	0.140	40 CFR § 414.91
1,2-Dichloropropane	1.63	2.46	0.153	0.230	0.287	40 CFR § 414.91
1,3-Dichloropropylene	0.309	0.470	0.029	0.044	0.055	40 CFR § 414.91
Diethyl phthalate	0.865	2.17	0.081	0.203	0.253	40 CFR § 414.91
2,4-Dimethylphenol	0.192	0.384	0.018	0.036	0.045	40 CFR § 414.91
Dimethyl phthalate	0.202	0.502	0.019	0.047	0.058	40 CFR § 414.91
4,6-Dinitro-o-cresol	0.833	2.96	0.078	0.277	0.346	40 CFR § 414.91
2,4-Dinitrophenol	0.758	1.31	0.071	0.123	0.153	40 CFR § 414.91
2,4-Dinitrotoluene	1.21	3.04	0.113	0.285	0.356	40 CFR § 414.91
2,6-Dinitrotoluene	2.72	6.85	0.255	0.641	0.801	40 CFR § 414.91
Ethylbenzene	0.341	1.15	0.032	0.108	0.135	40 CFR § 414.91
Fluoranthene	0.267	0.726	0.025	0.068	0.085	40 CFR § 414.91
Fluorene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Hexachlorobenzene	0.106	0.213	0.010	0.020	0.025	40 CFR § 414.91
Hexachlorobutadiene	0.213	0.523	0.020	0.049	0.061	40 CFR § 414.91
Hexachloroethane	0.224	0.576	0.021	0.054	0.067	40 CFR § 414.91
Methyl Chloride	0.918	2.03	0.086	0.190	0.237	40 CFR § 414.91
Methylene Chloride	0.427	0.950	0.040	0.089	0.111	40 CFR § 414.91
Naphthalene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Nitrobenzene	0.288	0.726	0.027	0.068	0.085	40 CFR § 414.91
2-Nitrophenol	0.437	0.737	0.041	0.069	0.086	40 CFR § 414.91
4-Nitrophenol	0.769	1.32	0.072	0.124	0.155	40 CFR § 414.91
Phenanthrene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Phenol	0.160	0.277	0.015	0.026	0.032	40 CFR § 414.91
Pyrene	0.267	0.715	0.025	0.067	0.083	40 CFR § 414.91
Tetrachloroethylene	0.235	0.598	0.022	0.056	0.070	40 CFR § 414.91

Table 6 (continued). Effluent Limits and Monitoring Requirements for IMP 101

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant Maximum	
Toluene	0.277	0.854	0.026	0.080	0.100	40 CFR § 414.91
1,2,4-Trichlorobenzene	11.9	29.6	0.068	0.140	0.175	40 CFR § 414.91
1,1,1-Trichloroethane	15.5	36.1	0.021	0.054	0.067	40 CFR § 414.91
1,1,2-Trichloroethane	4.49	12.8	0.021	0.054	0.067	40 CFR § 414.91
Trichloroethylene	3.42	7.37	0.021	0.054	0.067	40 CFR § 414.91
Vinyl Chloride	18.1	42.5	0.104	0.268	0.335	40 CFR § 414.91
pH	within the range of 6.0 to 9.0					40 CFR §§ 414.44 and 414.64 & 25 Pa. Code § 95.2(1)

Monitoring frequencies and sample types are imposed in accordance with the recommendations for process wastewater discharges from Chapter 6, Table 6-4 of DEP's *Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits*. Based on that guidance, flow must be measured continuously (metered); pH will require daily grab samples; oil and grease will require 1/week grab samples; volatile pollutants will require 1/week, 4-grabs/24-hours composite sampling and all of the remaining parameters will require 1/week 24-hour composite sampling.

EPA recognized that permittees could incur significant analytical costs as a result of frequent monitoring for the full list of parameters in 40 CFR § 414.91.[3] However, EPA left decisions on monitoring frequencies to individual permitting authorities to be determined on a case-by-case basis pursuant to 40 CFR § 122.44(i)(2).[4] Since actual effluent data are not available for Shell's treated process wastewater, which would allow DEP to determine whether specific organic parameters are or are not present in the process wastewater effluent, the 1/week monitoring frequency assumed by EPA for the purposes of estimating the costs of complying with the OCPSF regulation will be required as described in the preceding paragraph. Data obtained during the first permit cycle may be used to support monitoring frequency reductions pursuant to EPA's *Interim Guidance for Performance-Based Reduction of NPDES Permit Monitoring Frequencies*.

[3] Development Document for Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics and Synthetic Fibers Point Source Category, Volume II, pp. X-32 to X-36.

[4] 40 CFR § 122.44(i)(2): "Except as provided in paragraphs (i)(4) and (5) of this section, requirements to report monitoring results shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the discharge, but in no case less than once a year."

Development of Effluent Limitations

IMP No.	201	**Design Flow (MGD)**	2.47
Latitude	N/A	**Longitude**	N/A

Wastewater Description: Cooling tower blowdown

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 through the use of "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 technology-based performance standards may be determined without the interference of other wastewaters. This rationale is consistent with 40 CFR § 122.45(h), which allows for the imposition of effluent limitations on internal waste streams in these circumstances.

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

Effluent Limitations Guidelines

Cooling tower blowdown is not regulated under 40 CFR Part 414. However, cooling tower blowdown is regulated under 40 CFR Part 423 – Steam Electric Power Generating Point Source Category. Although Shell's petrochemical plant will not be a strict steam electric power generating facility (Shell will operate a cogeneration unit in addition to the ethylene and polyethylene production units), the cooling tower blowdown limits under Part 423 would reasonably inform DEP's permitting of Shell's cooling tower blowdown pursuant to Sections 304(b)(2)(B), 304(b)(4)(B), and 402(a)(1) of the Clean Water Act and implementing regulations under 40 CFR § 125.3, which allow for the establishment of effluent limits on a case-by-case basis using Best Professional Judgment (BPJ).

Section 423.11(j) defines blowdown as "the minimum discharge of recirculating water for the purpose of discharging materials contained in the water, the further buildup of which would cause concentration in amounts exceeding limits established by best engineering practices." This definition does not include language specific to the steam electric power generating industry, so the performance standards applicable to "blowdown" under the Steam Electric Power Generating Point Source Category and the rationale given by EPA for those limits in documentation supporting the Steam Electric Power Generating ELGs would be appropriate for blowdown discharged elsewhere.

Based on DEP's BPJ, cooling tower blowdown monitored at IMP 201 will be subject to the most stringent TBELs and narrative limitations from § 423.12(b) paragraphs (1) and (7) for Best Practicable Control Technology Currently Available (BPT) and § 423.13 paragraphs (d)(1) - (d)(3) 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 in the facility's blowdown. DEP will not impose the chromium and zinc limits from 40 CFR § 423.13(d)(1). Based on the Development Document for the Steam Electric ELGs, chromium and zinc were included as pollutants of concern for discharges of cooling tower blowdown due to the widespread use of chromium and zinc-based corrosion inhibitors when the Steam Electric ELGs were developed and promulgated. Based on the list of chemical additives provided in Shell's NPDES permit amendment application, no chromium or zinc-based additives will be used at the facility, so DEP will forgo the chromium and zinc limits at this time. The applicable TBELs are summarized in Tables 7 and 8.

Table 7. 40 CFR Part 423 – Steam Electric BPT Effluent Limitations for IMP 201

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)

Table 8. 40 CFR Part 423 – Steam Electric BAT Effluent Limitations for IMP 201

Pollutant	Average Concentration (mg/L)	Maximum Concentration (mg/L)	Basis
Free Available Chlorine	0.2	0.5	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)

Table 8 (continued). 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
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)
At the permitting authority's discretion, instead of the monitoring specified in 40 CFR 122.11(b) compliance with the limitations for the 126 priority pollutants in paragraph (d)(1) of this section may be determined by engineering calculations which demonstrate that the regulated pollutants are not detectable in the final discharge by the analytical methods in 40 CFR part 136.			40 CFR § 423.13(d)(3)

The most stringent TBELs from the BPT and BAT levels of control include the pH limits from Table 7 and all of the limits from Table 8.

Regulatory Effluent Standards and Monitoring Requirements

Flow monitoring will be required in accordance with 25 Pa. Code § 92a.61(b). Effluent standards for pH are imposed on industrial wastes by 25 Pa. Code § 95.2(1); however, the § 95.2(1) pH limits are the same as those imposed based on BPJ (see Table 7).

Thermal TBELs for Heated Discharges

No TBELs are developed to control thermal pollution. However, DEP's "Implementation Guidance for Temperature Criteria" and ORSANCO's Pollution Control Standards recommend the imposition of a maximum temperature limit of 110°F for public safety purposes. The 110°F instantaneous maximum temperature limit is treated as an effluent standard for heated discharges. The 110°F limit will be imposed at Outfall 001 (the final discharge location) assuming that thermal water quality-based effluent limitations are not applicable (see Section 001.B).

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

WQBELs will be evaluated at Outfall 001 where the combination of IMP 101's wastewaters and cooling tower blowdown from IMP 201 discharge to waters of the Commonwealth.

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

Effluent limits applicable at IMP 201 are the more stringent of TBELs, WQBELs, regulatory effluent standards and monitoring requirements. Since WQBELs are not applicable at IMP 201, effluent limits are based solely on TBELs, regulatory effluent standards and monitoring requirements. IMP 201 limits and monitoring requirements are summarized in Table 9.

Table 9. 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(b)
Free Available Chlorine	—	—	0.2	0.5	—	BPJ TBELs
pH	within the range of 6.0 to 9.0					BPJ TBELs
Narrative limits in Table 8 will be imposed as conditions in Part C of the amended permit.						

Based on DEP's Permit Writers' Manual, flow must be measured daily (metered); pH will require daily grab samples and free available chlorine will require 1/week grab samples.

Development of Effluent Limitations

Outfall No.	001	**Design Flow (MGD)**	3.75
Latitude	40° 40' 22.996"	**Longitude**	80° 20' 18.489"

Wastewater Description: Treated process water and storm water from the wastewater treatment plant (monitored at IMP 101) and cooling tower blowdown (monitored at IMP 201)

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

Federal ELGs and BPJ TBELs that are applicable to the individual sources contributing to discharges at Outfall 001 are imposed at IMPs 101 and 201 pursuant to 40 CFR § 122.45(h). Therefore, no TBELs will be imposed at Outfall 001. However, regulatory effluent standards and monitoring requirements will be imposed.

Regulatory Effluent Standards and Monitoring Requirements

- Flow monitoring will be required in accordance with 25 Pa. Code § 92a.61(d)(1).
- Effluent standards for pH (6.0 minimum and 9.0 maximum) will be imposed at Outfall 001 based on 25 Pa. Code § 95.2(1).
- As oil-bearing wastewater, discharges from Outfall 001 are subject to effluent standards for oil and grease from 25 Pa. Code § 95.2(2).
- A maximum temperature limit of 110°F will be imposed if thermal WQBELs are not applicable at Outfall 001 due to residual heat from cooling tower blowdown (refer to Section 001.B, below). The 110°F temperature limit is imposed pursuant to DEP guidance and ORSANCO's Pollution Control Standards to protect human health caused by exposure resulting from water contact.
- Based on the proposed use of chlorine-containing additives, residual chlorine may be present in Outfall 001's effluent. Therefore, TRC limits will be imposed at Outfall 001 pursuant to 25 Pa. Code § 92a.48(b)(2).

25 Pa. Code § 95.10 - Treatment requirements for new and expanding mass loadings of Total Dissolved Solids

Section 95.10 of 25 Pa. Code Chapter 95 was promulgated on August 21, 2010 and was intended to address the limited assimilative capacity of Pennsylvania's rivers and streams for Total Dissolved Solids (TDS). The regulation exempts existing mass loadings of TDS from treatment requirements, while new or expanding mass loadings of TDS are subject to the treatment requirements specified in the regulation. DEP's guidance document titled "Policy and Procedure for NPDES Permitting of Discharges of Total Dissolved Solids (TDS) -- 25 Pa. Code §95.10" provides additional explanation of the implementation procedures for the regulation as follows:

> "Integral to the implementation of §95.10 is the principle that existing, authorized mass loadings of TDS are exempt from any treatment requirements under §95.10. Section 95.10(a)(1) effectively exempts any existing mass loading of TDS up to and including the maximum daily discharge loading for any existing discharge, provided that the loading was authorized prior to August 21, 2010. In addition, §95.10 (a)(7) sets a de minimus threshold value of 5,000 lb/d on an average annual basis, below which DEP will not consider the expanding mass loading as sufficient to trigger the treatment requirements. If there is a net increase in TDS loading of more than 5,000 lb/d above the previously authorized loading, treatment requirements may be required for certain discharges, but the treatment requirements are only applicable for the expanding mass loading (the wastewater associated with the portion of the loading in excess of the existing mass loading, as per §95.10 (a)(1)(ii))."
>
> "…Generally, existing mass loadings need be evaluated only at the point that an existing discharge proposes a hydraulic expansion or a change of wastestream. Existing mass loadings should be expressed on both an average daily and a maximum daily basis in order to conform with the requirements of §95.10 (a)(1) and (7)."

Shell requested to maintain the NPDES permit previously issued to Horsehead Corporation (NPDES PA0002208), in part, to maintain the existing TDS loading that was implicitly authorized under that NPDES permit for discharges from Horsehead Corporation's Monaca Zinc Smelter. Shell's request is not necessarily consistent with the intent of § 95.10 given that the change of wastestream and/or hydraulic expansion envisioned by the regulation is supposed to be to an existing wastestream at an existing facility and not a new discharge from a completely new facility conducting different

industrial activities. However, the net effect on the receiving water is essentially the same between Horsehead's TDS discharge loading and Shell's proposed TDS discharge loading. That is, the Ohio River previously received a certain load of TDS from a discharger located at the Monaca site and will continue to receive a load of TDS from another discharger at the same site. The concentrations of the dissolved constituents making up total dissolved solids may be different, but as long as the new discharger's TDS loading is equal to or less than the TDS loading previously authorized for Horsehead, there will be no net reduction in the river's capacity to assimilate TDS.

Based on DEP's analysis of Horsehead's TDS discharges (included in Attachment A of this Fact Sheet), the existing TDS discharge loading authorized prior to August 21, 2010 is 65,556 lb/day average and 73,184 lb/day maximum. Shell's estimated TDS discharge loading for process wastewaters is 50,078 lb/day.[5] Since the proposed TDS discharge loading is less than the existing authorized TDS loading, Shell's process wastewater discharge will be exempt from § 95.10's treatment requirements pursuant to the exemptions in §§ 95.10(a)(1) and (7).

Although § 95.10's treatment requirements will not be imposed, the existing average and maximum TDS discharge loads will be included in a Part C condition in the amended permit. Specifying existing authorized loads will allow for future evaluations regarding the need to impose § 95.10's treatment requirements if there are changes to wastestreams and/or hydraulic expansions at the petrochemical plant.

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

Toxics Screening Analysis – Procedures for Evaluating Reasonable Potential and Developing WQBELs

The procedures for evaluating reasonable potential are as follows:

1. For IW discharges, the design flow to use in modeling is the maximum daily flow the facility is capable of discharging at its maximum rate of production or water usage, and may be taken from the permit application.

2. Perform a Toxics Screening Analysis to identify toxic pollutants of concern. All toxic pollutants whose maximum concentrations, as reported in the permit application or on DMRs, are greater than the most stringent applicable water quality criterion are pollutants of concern. [This includes pollutants reported as "Not Detectable" or as "<MDL" where the method detection limit for the analytical method used by the applicant is greater than the most stringent water quality criterion]. List all toxic pollutants of concern in a Toxics Screening Analysis section of the fact sheet (see Attachment B).

3. For any outfall with an applicable design flow, perform PENTOXSD modeling for all pollutants of concern. Use the maximum reported value from the application form or from DMRs as the input concentration for the PENTOXSD model run.

4. Compare the actual WQBEL from PENTOXSD with the maximum concentration reported on DMRs or the permit application. Use WQN data or another source to establish the existing or background concentration for naturally occurring pollutants, but generally assume zero background concentration for non-naturally occurring pollutants.

    - Establish limits in the draft permit where the maximum reported concentration equals or exceeds 50% of the WQBEL. Use the average monthly and maximum daily limits for the permit as recommended by PENTOXSD. Establish an IMAX limit at 2.5 times the average monthly limit.

    - For non-conservative pollutants, establish monitoring requirements where the maximum reported concentration is between 25% - 50% of the WQBEL.

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

The information described above including the maximum reported discharge concentrations, the most stringent water quality criteria, the pollutant-of-concern (reasonable potential) determinations, the calculated WQBELs, and the WQBEL/monitoring recommendations is collected on a spreadsheet titled "Toxics Screening Analysis." (Attachment B).

[5] TDS present in cooling tower blowdown and non-contact cooling waters that are sourced from the same stream that receives discharges of those wastewaters does not count as part of a facility's TDS discharge loading because a closed-cycle cooling system merely concentrates the natural concentrations of TDS from the stream and does not represent a net increase in TDS loading.

PENTOXSD Water Quality Modeling Program

PENTOXSD Version 2.0 for Windows is a single discharge, mass-balance water quality modeling program that includes consideration for mixing, first-order decay and other factors to determine recommended WQBELs for toxic substances and several non-toxic substances. Required input data including stream code, river mile index, elevation, drainage area, discharge name, NPDES permit number and discharge flow rate are entered into PENTOXSD to establish site-specific discharge conditions. Other data such as low flow yield, reach dimensions and partial mix factors may also be entered to further characterize the conditions of the discharge and receiving water. Pollutants are then selected for analysis based on those present or likely to be present in a discharge at levels that may cause, have the reasonable potential to cause, or contribute to excursions above state water quality standards (i.e., a reasonable potential analysis). Discharge concentrations for the selected pollutants are chosen to represent the "worst case" quality of the discharge (i.e., maximum reported discharge concentrations). PENTOXSD then evaluates each pollutant by computing a Waste Load Allocation for each applicable criterion, determining a recommended maximum WQBEL and comparing that recommended WQBEL with the input discharge concentration to determine which is more stringent. Based on this evaluation, PENTOXSD recommends average monthly and maximum daily WQBELs.

Reasonable Potential Analysis and WQBEL Development for Outfall 001

Discharges from Outfall 001 are evaluated based on concentrations reported on the application, which are engineering estimates of expected effluent quality because the petrochemical plant does not exist yet. The PENTOXSD model is run for Outfall 001 with the modeled discharge and receiving stream characteristics shown in Table 10. The pollutants selected for analysis are those identified as candidates for modeling by the Toxics Screening Analysis. Pollutants for which water quality standards have not been promulgated (e.g., TSS, oil and grease, etc.) are excluded from the PENTOXSD modeling. Shell provided both wet and dry weather estimates for discharge flows and effluent concentrations; the dry weather data will be used because water quality analyses are supposed to be modeled at Q_{7-10} low stream flow conditions pursuant to 25 Pa. Code § 96.4(g).

Table 10. 001 PENTOXSD Inputs

Parameter	**Value**
River Mile Index	952.70
Discharge Flow (MGD)	3.28 (dry)
Basin/Stream Characteristics	
Parameter	**Value**
Area in Square Miles	22,771.80
Q_{7-10} (cfs)	4,730
Low-flow yield (cfs/mi^2)	0.21
Elevation (ft)	681.80
Partial Mix Factor	0.2

A partial mix factor of 0.2 is used for the chronic fish criteria (CRC), threshold human health (THH) and cancer risk level (CRL) analyses in PENTOXSD. DEP uses partial mix factors (PMFs) in PENTOXSD modeling to represent the fractional portion of the receiving stream that mixes with a discharge. A PMF of 0.2 provides the permittee with 20% of the receiving stream's Q_{7-10} flow for mixing and dilution. The PMF was manually input because PENTOXSD, as a single discharge model, allocates high percentages of stream flow to individual discharges, which often results in those discharges being modeled with most or all of a stream's assimilative capacity. This would represent a significant dilution allowance on a large waterway like the Ohio River, which has a high Q_{7-10} (actually a minimum flow regulated by the US Army Corps of Engineers using a series of dams) and would leave little or no assimilative capacity for other dischargers to the same receiving stream.

Output from the PENTOXSD model run is included in Attachment C. The WQBELs calculated using PENTOXSD are compared to the maximum reported effluent concentrations as described in the Toxics Screening Analysis section above to evaluate the need to impose WQBELs or monitoring requirements in the permit. Based on the recommendations of the Toxics Screening Analysis, the monitoring requirements shown in Table 11 are applicable at Outfall 001.

Table 11. Outfall 001 WQBELs and monitoring requirements

Parameter	**Concentration (mg/L)**		
	Average Monthly	**Daily Maximum**	**Instant Maximum**
Total Dissolved Solids	Report	Report	—
Chloride	Report	Report	—
Bromide	Report	Report	—
Sulfate	Report	Report	—
Aluminum, Total	Report	Report	—
Chromium, Hexavalent	Report	Report	—
Benzene	Report	Report	—

The Toxics Screening Analysis' reporting recommendations for TDS, chloride, bromide and sulfate are the result of a new monitoring initiative. TDS and its major constituents including chloride, bromide and sulfate have emerged as pollutants of concern in several major watersheds in the Commonwealth. The conservative nature of these solids allows them to accumulate in surface waters and they may remain a concern even if the immediate downstream public water supply is not directly impacted. Bromide has been linked to the formation of disinfection byproducts at increased levels in public water systems. In addition, the Environmental Quality Board has directed DEP to collect additional data related to sulfate and chloride. Furthermore, EPA has expressed concern related to bromide and the importance of monitoring all point sources for bromide when it may be present.

Based on the concerns identified above and under the authority of 25 Pa. Code § 92a.61, DEP has determined that it should implement monitoring in NPDES permits for TDS, chloride, bromide and sulfate. The monitoring is prompted for discharges that exceed the following thresholds:

- Where the concentration of TDS in the discharge exceeds 1,000 mg/L, or the net TDS load from a discharge exceeds 20,000 lb/day, and the discharge flow exceeds 0.1 MGD, Part A of the permit should include monitor and report for TDS, chloride, bromide and sulfate.

- Where the concentration of bromide in a discharge exceeds 1 mg/L and the discharge flow exceeds 0.1 MGD, Part A of the permit should include monitor and report for bromide.

Thermal Limits

Thermal WQBELs are evaluated using a DEP program called "Thermal Discharge Limit Calculation Spreadsheet" created with Microsoft Excel for Windows. This 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_{7-10} or other as appropriate), 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 will be discharged to the Ohio River at the riverbank and not out into the main flow channel, the dispersion of the discharge plume is likely to be limited and instantaneous complete mixing will not occur. Therefore, a PMF of 0.2 will be applied to the receiving stream's low flow for the thermal limit analysis (0.2 * 4,730 cfs = 946 cfs). As stated previously, a PMF of 0.2 provides the permittee with 20% of the Ohio River's flow for mixing and dilution.

Shell will source its water from the Ohio River using an existing intake structure located on the property. Although Outfall 001 and Shell's intake are both located on the Ohio River, the intake is located approximately 0.6 miles downstream of the discharge; this does not trigger a Case 1 thermal analysis because a downstream intake would not affect the assimilative capacity at the upstream outfall. For this reason, the discharge is analyzed as Case 2.

The results of the thermal discharge analysis using the Thermal Discharge Limit Calculation Spreadsheet (included in Attachment D) show that WQBELs for temperature are not required. Therefore, a maximum temperature limit of 110ºF will be imposed pursuant to ORSANCO's Pollution Control Standards and DEP's temperature guidance.

Total Residual Chlorine

To determine if WQBELs are required for discharges containing 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 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 TRC_CALC program include flow rates and chlorine demands for the receiving stream and the discharge (default chlorine demands of 0.3 and 0.0, respectively), 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 waste load allocations 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 limits is imposed in the permit.

The stream flow and discharge flow entered into the TRC_CALC spreadsheet are 4,730 cfs and 3.75 MGD, respectively. A PMF of 0.2 is input for the CFC criteria and a PMF of 0.066 (calculated from the PENTOXSD analysis) is input for the AFC criteria. The results of the analysis, included in Attachment E, indicate that no WQBELs are required for TRC.

Ohio River TMDL for PCBs and Chlordane

DEP has a final approved TMDL for the Ohio River dated April 9, 2001. The TMDL addresses fish consumption use impairments caused by PCBs and chlordane. PCBs and chlordane are not expected to be present in Shell's effluent, so Shell is unaffected by the TMDL.

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

Effluent limits applicable at Outfall 001 are the more stringent of TBELs, WQBELs, regulatory effluent standards and monitoring requirements as summarized in Table 12.

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)
Oil and Grease	—	—	15.0	—	30.0	25 Pa. Code § 95.2(2)
Temperature	—	—	—	—	110	ORSANCO Pollution Ctrl Stds.
Total Residual Chlorine	—	—	0.5	1.0	1.25	25 Pa. Code § 92a.48(b)(2)
Total Dissolved Solids	—	—	Report	Report	—	25 Pa. Code § 92a.61(b)
Bromide, Total	—	—	Report	Report	—	25 Pa. Code § 92a.61(b)
Chloride, Total	—	—	Report	Report	—	25 Pa. Code § 92a.61(b)
Sulfate, Total	—	—	Report	Report	—	25 Pa. Code § 92a.61(b)
Aluminum, Total	—	—	Report	Report	—	§ 92a.61(b) Reasonable Potential
Chromium, Hexavalent	—	—	Report	Report	—	§ 92a.61(b) Reasonable Potential
Benzene	—	—	Report	Report	—	§ 92a.61(b) Reasonable Potential
pH	within the range of 6.0 to 9.0					25 Pa. Code § 95.2(1)

Based on DEP's Permit Writers' Manual, flow must be measured daily (metered). Oil and grease and pH will require daily grab samples. Temperature must be monitored daily using immersion stabilization sampling. Benzene and TRC will require 1/week grab sampling and all remaining parameters will require 1/week 24-hour composite sampling.

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

As part of the permit amendment application, Shell submitted the information required by 40 CFR § 122.21(r) regarding application requirements for cooling water intake structures. The petrochemical plant will use an existing intake structure (formerly operated by Horsehead Corporation) and will not increase the design intake flow (DIF). Therefore, this facility is being evaluated for CWA § 316(b) compliance under the final regulations for cooling water intake structures at existing facilities (40 CFR Part 125, Subpart J). The permit application was transmitted to the U.S. Fish and Wildlife Services and no comments were received.

The existing intake structure is a closed cycle system that includes two traveling screens with fish handling and return systems. Shell has modified the existing cooling water intake structure to reduce the design intake flow (DIF) from 80 MGD to 21.4 MGD with an expected actual intake flow (AIF) of 18 MGD. Cooling water is pumped to a water treatment plant before being pumped to two open recirculating counter-flow mechanical draft towers. In addition, the anticipated max thru-screen velocity will be 0.5 fps.

Shell listed its chosen method of compliance with impingement mortality standard as a closed-cycle recirculating system (40 CFR 125.94(c)(1)). DEP has determined that the closed-cycle recirculating system will meet BTA standards for impingement mortality. In addition, the facility will operate with a 0.5 fps max through screen velocity and two traveling screens with fish returns. DEP has also determined that the closed-cycle cooling system along with the 0.5 fps intake velocity will meet BTA requirements for entrainment. Since the primary method of compliance with impingement BTA standards is the use of a closed-cycle system, the facility is not required to submit an impingement technology performance optimization study. The permittee must conduct daily monitoring of intake flows as required by 40 CFR 125.94(c)(1). Requirements regarding compliance with § 316(b) will be included in a condition in Part C of the permit.

Development of Effluent Limitations

Outfall Nos. 002, 003, 006-010, 012-014 **Design Flow (MGD)** Variable

Wastewater Description: Storm water (see discharge information at the beginning of this Fact Sheet for outfall-specific wastewater descriptions)

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

The storm water that will be discharged from the future plant is not subject to any federal ELGs. Therefore, effluent limits and/or monitoring requirements will be developed based on applicable state regulations and guidance.

Regulatory Monitoring Requirements

A reporting requirement for flow will be imposed in accordance with 25 Pa. Code § 92a.61(h).

Storm Water Monitoring Requirements

Section III of DEP's "Standard Operating Procedure (SOP) for Clean Water Program – Establishing Effluent Limitations for Individual Industrial Permits" (IW Effluent Limit SOP) recommends that permit writers consider the following when evaluating the need for effluent limits and monitoring requirements for industrial storm water discharges:

A. Effluent limits and monitoring requirements for industrial stormwater discharges may be important for ensuring that Best Management Practices (BMPs) are adequately implemented.

B. Application managers will consider, where appropriate, applying treatment standards contained in Chapter 95.

C. The applicable appendix of the PAG-03 General Permit should be considered the minimum standards for limits and monitoring requirements for individual industrial stormwater permits. The application manager may include other limits and monitoring requirements as justified in the fact sheet.

D. In general, if actual stormwater concentrations exceed 100 times the most stringent Chapter 93 criterion (or a lesser amount for large industrial areas that drain to small streams), or exceed 100 mg/L for pollutants without criteria, the application manager should consider applying effluent limits for the applicable parameters and/or the implementation of BMPs with compliance schedules as necessary to achieve the limits or otherwise reduce stormwater concentrations.

In accordance with Section III.C of the IW Effluent Limit SOP cited above, minimum standards described in the PAG-03 should be applied to Shell's storm water discharges. Based on Shell's SIC Codes of 2821 and 2869, the facility would be classified under Appendix F – Chemicals and Allied Products of the PAG-03 General Permit.[6] In order to ensure that there is consistency across the state for all chemical and allied products facilities that discharge storm water associated with their industrial activities, the monitoring requirements of Appendix F of the PAG-03 will be imposed at Shell's storm water outfalls. The Appendix F monitoring requirements are shown in Table 13.

Table 13. PAG-03 Appendix F – Minimum Monitoring Requirements

Parameter	Measurement Frequency	Sample Type	Benchmark Values
pH (S.U.)	1 / 6 months	Grab	XXX
Chemical Oxygen Demand (COD)	1 / 6 months	Grab	120
Total Suspended Solids (TSS)	1 / 6 months	Grab	100
Nitrate + Nitrite-Nitrogen	1 / 6 months	Grab	XXX
Total Phosphorus	1 / 6 months	Grab	XXX
Total Lead	1 / 6 months	Grab	XXX
Total Zinc	1 / 6 months	Grab	XXX
Total Iron	1 / 6 months	Grab	XXX
Total Aluminum	1 / 6 months	Grab	XXX

[6] The determination of which of the PAG-03 General Permit's appendices applies to a facility is based on a facility's SIC Code.

The benchmark values listed in Table 13 are not effluent limitations and exceedances do not constitute permit violations. However, if the permittee's sampling demonstrates exceedances of benchmark values for two consecutive monitoring periods, the permittee shall submit a corrective action plan within 90 days of the end of the monitoring period triggering the plan; this requirement and the benchmark values will be specified in a condition in Part C of the permit.

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

The water quality analysis for storm water outfalls differs from the water quality analysis for other point source discharges because storm water discharges have a variable flow rate and—unless they are flow-controlled using valves or detention ponds—generally do not discharge at Q_{7-10} design conditions (stream flow is augmented above Q_{7-10} flow by the same rainfall that caused the storm water discharge). However, based on DEP guidance in the IW Effluent Limit SOP, effluent limits may be warranted when pollutant concentrations in storm water are significant, which may be quantified as "100 times the most stringent Chapter 93 criterion" or greater than "100 mg/L." At this time, Shell has no discharge quality estimates for runoff from the proposed petrochemical plant, so the analysis described above cannot be performed.

SWO.C. Effluent Limitations and Monitoring Requirements for Storm Water Outfalls

Effluent limits applicable at Outfalls 002, 003, 006 – 010, 012 – 014 are the more stringent of TBELs, WQBELs, regulatory effluent standards and monitoring requirements. Since there are no data on which to base an evaluation of storm water quality, monitoring requirements are based solely on the PAG-03 General Permit.

Table 14. Effluent limits and monitoring requirements for Outfalls 002, 003, 006 – 010, 012 – 014

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant Maximum	
Flow (MGD)	—	Report	—	—	—	25 Pa. Code § 92a.61(h)
Chemical Oxygen Demand	—	—	—	Report	—	PAG-03, Appendix F
Total Suspended Solids	—	—	—	Report	—	PAG-03, Appendix F
Nitrate + Nitrite-Nitrogen	—	—	—	Report	—	PAG-03, Appendix F
Total Phosphorus	—	—	—	Report	—	PAG-03, Appendix F
Total Lead	—	—	—	Report	—	PAG-03, Appendix F
Total Zinc	—	—	—	Report	—	PAG-03, Appendix F
Total Iron	—	—	—	Report	—	PAG-03, Appendix F
Total Aluminum	—	—	—	Report	—	PAG-03, Appendix F
pH	—	—	—	Report	—	PAG-03, Appendix F

Based on the measurement frequency and sample types given in Appendix F of the PAG-03 General Permit, all parameters should be monitored 1 / 6 months using grab sampling. Overflow outfalls will require 1/discharge grab sampling. Flow should be estimated at the time of sampling.

Storm Water Associated with Construction Activities

As shown in the table on page 3 of this Fact Sheet, Outfalls 004, 007-010, and 013 may be used for an interim period—after DEP determines that storm water does not require treatment, but before the future plant's discharges exist—to discharge storm water associated with construction activities. Storm water discharges associated with construction activities generally are not subject to effluent limits because the primary pollutant for such discharges is sediment and sediment is typically controlled using best management practices. However, rather than designating another effluent limit monitoring period for construction storm water, the monitoring requirements listed in Table 14 will be effective for both the petrochemical plant's construction and operating periods. This is reasonable because the monitoring will help to confirm that storm water discharges during construction are not contaminated, which would be consistent with DEP's determination that storm water runoff during construction would not require treatment.

Development of Effluent Limitations

Outfall No. 004 **Design Flow (MGD)** Variable
Latitude 40° 39' 57.4943" **Longitude** 80° 20' 40.5531"
Wastewater Description: Overflows of storm water from the Accidentally Contaminated (AC) Pond

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

Under normal operating conditions, storm water runoff from process areas of the petrochemical plant will be collected in the AC Pond, treated with process wastewaters by the industrial wastewater treatment plant, and discharged through Outfall 001. During significant rainfall events, the AC Pond may overflow and discharge through Outfall 004.

Since wastewater collected in the AC Pond normally will be treated, it is appropriate that any bypass of the treatment system—such as an emergency overflow discharge from the AC Pond—be subject to the same effluent limits that are imposed on the treated wastewater pursuant to allowable bypass conditions under 40 CFR § 122.41(m)(2), which states:

> *Bypass not exceeding limitations.* The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation.

Therefore, the TBELs imposed at IMP 101 will be imposed on overflows from the AC Pond at Outfall 004 (see Table 6). This will help to ensure proper operation and maintenance of the treatment system and prevent unnecessary discharges from the AC Pond. Note that the oil and grease limits from Outfall 001 are imposed at Outfall 004 because Outfall 004 is a final discharge location and unlike IMP 101, there aren't any other potentially oil-bearing wastewaters that combine with Outfall 004's effluent prior to discharge.

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

As a pond used primarily to collect storm water, the AC Pond should not discharge at the Q_{7-10} low flow design conditions required for WQBEL development. Any rainfall event that is sufficiently large to cause an overflow from the AC Pond would also result in increased flow in Poorhouse Run. On this basis, the discharge flow at Outfall 004 during design conditions should be zero. Shell may also direct blowdown from the cooling tower to the AC Pond for later treatment by the industrial wastewater treatment system if there are hydrocarbons present in the blowdown; however, the routing of blowdown to the AC Pond is not expected to be a normal occurrence.

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

Effluent limits applicable at Outfall 004 are the more stringent of TBELs, WQBELs, regulatory effluent standards and monitoring requirements as summarized in Table 15.

Table 15. Effluent Limits and Monitoring Requirements for Outfall 004

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)
BOD-5	287	766	27	72	90	40 CFR §§ 414.44 and 414.64
Total Suspended Solids	458	1,487	43	139	174	40 CFR §§ 414.44 and 414.64
Oil and Grease	—	—	15.0	—	30.0	25 Pa. Code § 92a.61(b)
Acenaphthene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Acenaphthylene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Acrylonitrile	1.03	2.59	0.096	0.242	0.302	40 CFR § 414.91
Anthracene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Benzene	0.395	1.45	0.037	0.136	0.170	40 CFR § 414.91
Benzo(a)anthracene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
3,4-Benzofluoranthene	0.245	0.651	0.023	0.061	0.076	40 CFR § 414.91
Benzo(k)fluoranthene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Benzo(a)pyrene	0.245	0.651	0.023	0.061	0.076	40 CFR § 414.91
Bis(2-ethylhexyl) phthalate	1.10	2.98	0.103	0.279	0.348	40 CFR § 414.91

Table 15 (continued). Effluent Limits and Monitoring Requirements for Outfall 004

Parameter	Mass (pounds/day)		Concentration (mg/L)			Basis
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant Maximum	
Carbon Tetrachloride	0.192	0.405	0.018	0.038	0.047	40 CFR § 414.91
Chlorobenzene	0.160	0.299	0.015	0.028	0.035	40 CFR § 414.91
Chloroethane	1.11	2.86	0.104	0.268	0.335	40 CFR § 414.91
Chloroform	0.224	0.491	0.021	0.046	0.057	40 CFR § 414.91
2-Chlorophenol	0.331	1.05	0.031	0.098	0.122	40 CFR § 414.91
Chrysene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Di-n-butyl phthalate	0.288	0.608	0.027	0.057	0.071	40 CFR § 414.91
1,2-Dichlorobenzene	0.822	1.74	0.077	0.163	0.203	40 CFR § 414.91
1,3-Dichlorobenzene	0.331	0.470	0.031	0.044	0.055	40 CFR § 414.91
1,4-Dichlorobenzene	0.160	0.299	0.015	0.028	0.035	40 CFR § 414.91
1,1-Dichloroethane	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
1,2-Dichloroethane	0.726	2.25	0.068	0.211	0.263	40 CFR § 414.91
1,1-Dichloroethylene	0.170	0.267	0.016	0.025	0.031	40 CFR § 414.91
1,2-trans-Dichloroethylene	0.224	0.576	0.021	0.054	0.067	40 CFR § 414.91
2,4-Dichlorophenol	0.416	1.20	0.039	0.112	0.140	40 CFR § 414.91
1,2-Dichloropropane	1.63	2.46	0.153	0.230	0.287	40 CFR § 414.91
1,3-Dichloropropylene	0.309	0.470	0.029	0.044	0.055	40 CFR § 414.91
Diethyl phthalate	0.865	2.17	0.081	0.203	0.253	40 CFR § 414.91
2,4-Dimethylphenol	0.192	0.384	0.018	0.036	0.045	40 CFR § 414.91
Dimethyl phthalate	0.202	0.502	0.019	0.047	0.058	40 CFR § 414.91
4,6-Dinitro-o-cresol	0.833	2.96	0.078	0.277	0.346	40 CFR § 414.91
2,4-Dinitrophenol	0.758	1.31	0.071	0.123	0.153	40 CFR § 414.91
2,4-Dinitrotoluene	1.21	3.04	0.113	0.285	0.356	40 CFR § 414.91
2,6-Dinitrotoluene	2.72	6.85	0.255	0.641	0.801	40 CFR § 414.91
Ethylbenzene	0.341	1.15	0.032	0.108	0.135	40 CFR § 414.91
Fluoranthene	0.267	0.726	0.025	0.068	0.085	40 CFR § 414.91
Fluorene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Hexachlorobenzene	0.106	0.213	0.010	0.020	0.025	40 CFR § 414.91
Hexachlorobutadiene	0.213	0.523	0.020	0.049	0.061	40 CFR § 414.91
Hexachloroethane	0.224	0.576	0.021	0.054	0.067	40 CFR § 414.91
Methyl Chloride	0.918	2.03	0.086	0.190	0.237	40 CFR § 414.91
Methylene Chloride	0.427	0.950	0.040	0.089	0.111	40 CFR § 414.91
Naphthalene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Nitrobenzene	0.288	0.726	0.027	0.068	0.085	40 CFR § 414.91
2-Nitrophenol	0.437	0.737	0.041	0.069	0.086	40 CFR § 414.91
4-Nitrophenol	0.769	1.32	0.072	0.124	0.155	40 CFR § 414.91
Phenanthrene	0.235	0.630	0.022	0.059	0.073	40 CFR § 414.91
Phenol	0.160	0.277	0.015	0.026	0.032	40 CFR § 414.91
Pyrene	0.267	0.715	0.025	0.067	0.083	40 CFR § 414.91
Tetrachloroethylene	0.235	0.598	0.022	0.056	0.070	40 CFR § 414.91
Toluene	0.277	0.854	0.026	0.080	0.100	40 CFR § 414.91
1,2,4-Trichlorobenzene	11.9	29.6	0.068	0.140	0.175	40 CFR § 414.91
1,1,1-Trichloroethane	15.5	36.1	0.021	0.054	0.067	40 CFR § 414.91
1,1,2-Trichloroethane	4.49	12.8	0.021	0.054	0.067	40 CFR § 414.91
Trichloroethylene	3.42	7.37	0.021	0.054	0.067	40 CFR § 414.91
Vinyl Chloride	18.1	42.5	0.104	0.268	0.335	40 CFR § 414.91
pH	within the range of 6.0 to 9.0					40 CFR §§ 414.44 and 414.64 & 25 Pa. Code § 95.2(1)

Since discharges from Outfall 004 are rainfall-dependent and should not occur regularly, all pollutants will require 2/discharge grab sampling. Flow should be estimated concurrently.

Development of Effluent Limitations

IMP No. 108 **Design Flow (MGD)** Variable
Latitude N/A **Longitude** N/A
Wastewater Description: Hydrostatic test water

Internal Monitoring Point 108 is a monitoring point for water that may be discharged from hydrostatic testing of tanks and/or pipes.

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

Hydrostatic test water will be subject to the discharge requirements specified in Appendix L of the PAG-03 General Permit for hydrostatic test water discharges and the existing tanks and pipelines discharge requirements from the PAG-10 General Permit for Discharges Resulting from Hydrostatic Testing of Tanks and Pipelines (excluding the requirements for PCBs). Although tanks and pipelines at the petrochemical plant will be new, hydrostatic testing will not necessarily be restricted to plant startup when pipelines and tanks will be free of product.

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

WQBELs are designed to protect water quality by ensuring that water quality standards are met in the receiving water and IMP 108 does not discharge directly to waters of the Commonwealth. Therefore, WQBELs are not developed for this monitoring location.

108.C. Effluent Limitations and Monitoring Requirements for IMP 108

Effluent limits applicable at IMP 108 are the more stringent of TBELs, WQBELs, regulatory effluent standards, and monitoring requirements as summarized in Table 16. There are no WQBELs, so limits are based solely on TBELs and related monitoring requirements.

Table 16. Effluent Limits and Monitoring Requirements for IMP 108

Pollutant	Mass (pounds/day)		Concentration (mg/L)			Basis
	Total Monthly	Total Annual	Average Monthly	Daily Maximum	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(b)
Benzene	—	—	—	—	0.0025	PAG-03, App. L & PAG-10
Total BTEX	—	—	—	—	0.25	PAG-10
Oil and Grease	—	—	15	—	30	PAG-03, App. L & PAG-10
Total Suspended Solids	—	—	30	—	60	PAG-03, App. L & PAG-10
Dissolved Iron	—	—	—	—	7.0	PAG-03, App. L & PAG-10
Total Residual Chlorine	—	—	—	—	0.05	PAG-03, Appendix L
pH	—	—	6.0 (Min)	—	9.0 (Max)	PAG-03, Appendix L

The monitoring frequencies for oil and grease, TSS and pH will be set at 2/discharge with grab sampling. All other parameters will require 1/ discharge grab sampling. Flow should be estimated at the time of sampling.

Development of Effluent Limitations

Outfall No.	005	**Design Flow (MGD)**	Variable
Latitude	40° 40' 50.29"	**Longitude**	80° 19' 11.14"

Wastewater Description: Groundwater discharges from Mall Lot 2

Outfall 005 is currently permitted to discharge storm water runoff and leachate from an old fly ash (and slag) landfill. As described in the "Discharge, Receiving Waters and Water Supply Information" section of this Fact Sheet, the concentrations of limited parameters at Outfall 005 are not elevated. Most reported effluent concentrations (those reported for metals) are one to two orders of magnitude below current effluent limits. Earthmoving in the area of Outfall 005 has modified the characteristics of the area draining to the outfall for both groundwater and storm water; however, there is no appreciable difference in the effluent concentrations reported at Outfall 005 before and after Shell's acquisition of the site. It is not clear from the effluent data that leachate was or is discharging at Outfall 005 because there is no obvious change in the effluent characteristics. The observed concentrations may indicate the negligible extent to which contaminants leach into groundwater or alternatively that there is little or no leachate.

At this time, the effluent limits currently in effect at Outfall 005 will be maintained—at least until earthmoving in the area of Mall Lot 2 and Outfall 005 is complete and the final grades, drainage area characteristics and post-earthmoving effluent characteristics are established. However, in recognition of the history of compliance with the current limits at Outfall 005, the monitoring frequencies for the metals limited at Outfall 005 will be reduced to 2/quarter. The monitoring frequencies for flow, TSS and pH will be maintained at 2/month.

DEP notes that when Outfall 005's effluent limits are reviewed next (as part of either a permit amendment or renewal), the TSS and pH limits will likely be maintained at Outfall 005 regardless of any modification to the metals limits. The rationale for maintaining TSS and pH limits is described in Section 015.A of this Fact Sheet, which is relevant given the similarity between Outfalls 005 and 015 (both are discharges from the old fly ash landfill with possible contributions of combustion residual leachate).

Development of Effluent Limitations

Outfall No. 013 **Design Flow (MGD)** Variable
Latitude 40° 40' 36.75" **Longitude** 80° 20' 1.37"
Wastewater Description: INTERIM: Treated storm water runoff from process areas of the plant and overflows from the Stormwater Replacement Pond

Before the Stormwater Replacement Pond is converted into the final North Pond, the existing pond and Interim Treatment System will be maintained in their current states. Presuming that contaminated storm water runoff is still present at the site and that treatment for that storm water is still required, the existing effluent limits and monitoring requirements imposed at Outfall 013 will be maintained during the interim period before conversion of the Stormwater Replacement Pond to the North Pond. After DEP has determined that treatment is no longer required, the effluent limits specified in Section SWO.C of this permit will take effect at Outfall 013.

Table 17. Interim Effluent Limits and Monitoring Requirements for Outfall 013

Parameter	Mass (pounds/day)		Concentration (mg/L)		
	Average Monthly	Daily Maximum	Average Monthly	Daily Maximum	Instant Maximum
Flow (MGD)	Report	Report	***	***	***
Total Suspended Solids	***	***	10	15	19
Nitrate+Nitrite Nitrogen	***	***	Report	Report	***
Aluminum, Total	***	***	Report	Report	***
Arsenic, Total	***	***	0.57	1.39	1.7
Cadmium, Total	***	***	0.08	0.2	0.3
Chromium, Total	***	***	Report	Report	***
Copper, Total	***	***	0.61	1.28	1.6
Iron, Total	***	***	Report	Report	***
Lead, Total	***	***	0.09	0.10	0.13
Thallium, Total	***	***	Report	Report	***
Zinc, Total	***	***	0.42	1.02	1.3
Fluoride, Total	***	***	Report	Report	***
pH	***	***	not less than 6.0 and not greater than 9.0 s.u.		

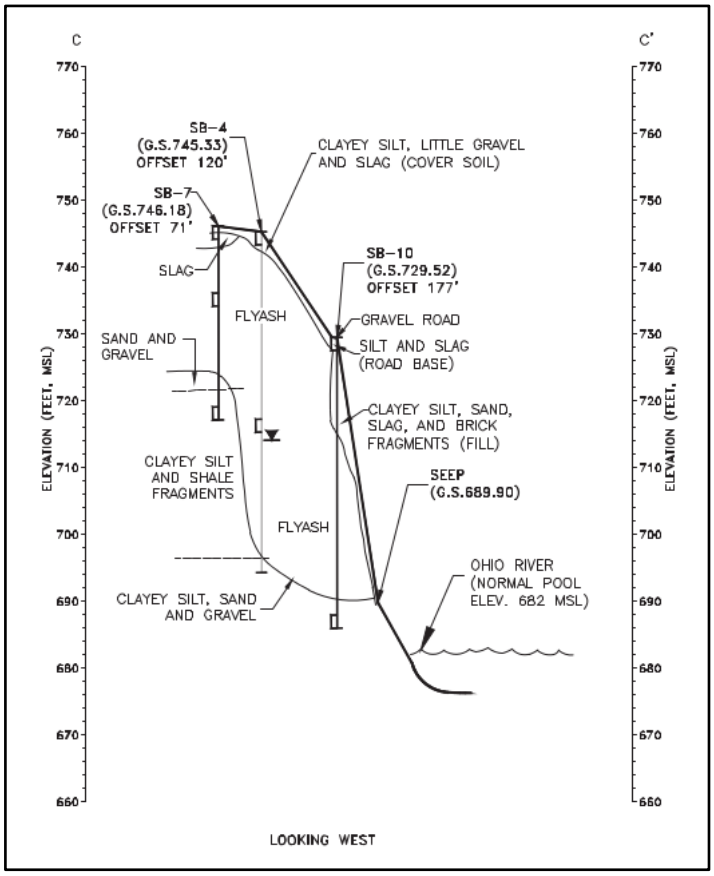
Development of Effluent Limitations

Outfall No. 015 **Design Flow (MGD)** Variable
Latitude 40° 40' 47.53" **Longitude** 80° 19' 19.32"
Wastewater Description: Groundwater seep

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

The seepage from the old fly ash and slag landfill is not regulated under 40 CFR Part 414. However, combustion residual leachate is regulated under 40 CFR Part 423 – Steam Electric Power Generating Point Source Category.

Figure 1. Fly Ash Landfill Cross-Section [7]



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

Similar to the explanation given in Section 201.A for cooling tower blowdown, although Shell's petrochemical plant will not be a strict steam electric power generating facility, the combustion residual leachate limits under 40 CFR Part 423 would reasonably be considered for Outfall 015 pursuant to DEP's Best Professional Judgment. Figure 1 shows that the seep is expressed at the base of the disposed fly ash layer of the landfill, so it fits the definition given in § 423.11(r)—"seepage from a combustion residual landfill."

40 CFR § 423.12(b)(11) and § 423.13(l) impose the BPT and BAT effluent limits shown in Table 18.

Table 18. 40 CFR Part 423 – Steam Electric BPT and BAT Effluent Limits for Combustion Residual Leachate

Pollutant	Average Monthly (mg/L)	Daily Maximum (mg/L)	Basis
Total Suspended Solids	30.0	100.0	40 CFR § 423.12(b)(11) & 423.13(l)
Oil and Grease	15.0	20.0	40 CFR § 423.12(b)(11)

Of the limits shown in Table 18, only the total suspended solids limits will be imposed. Oil and grease was not detected in seep samples, so oil and grease should not require effluent controls.

Figure 1 shows that slag makes up a small amount of the waste in the landfill versus fly ash. Presuming that any metals present in the leachate would most likely come from the slag and given that the concentrations of metals in the seep are low or otherwise not detectable, no additional TBELs will be imposed at Outfall 015.

[7] Figure 3-3 from the Final Site Investigation Report Fly Ash Landfill Mall Lot #2 by Michael Baker Jr., Inc. for Pennsylvania Department of Environmental Protection, September 2013.

Regulatory Effluent Standards and Monitoring Requirements

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

Effluent standards for pH (6.0 minimum and 9.0 maximum) will be imposed at Outfall 015 based on 25 Pa. Code § 95.2(1).

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

No water quality-based effluent limits are imposed at Outfall 015. Reported effluent concentrations for most pollutants in the seep do not exceed water quality criteria; those that do exceed water quality criteria (boron, cadmium, manganese, phenols, thallium and zinc)[8] are nonetheless present at levels much less than the WQBELs that would be considered for Outfall 015. DEP conducted a cursory PENTOXSD analysis assuming a discharge flow rate of 0.1 MGD. The most stringent calculated WQBEL was 2,722 µg/L for cadmium, which is four orders of magnitude greater than the reported cadmium concentration of <0.45 µg/L. Boron had the highest reported concentration on the application at 2,800 µg/L, but the calculated WQBEL is 10,550,000 µg/L. These results are expected given the low effluent concentrations of pollutants in the seep, the (presumed) low discharge flow rate of the seep, and the significant dilution afforded by the Ohio River.

015.C. Effluent Limitations and Monitoring Requirements for Outfall 015

Effluent limits applicable at Outfall 015 are the more stringent of TBELs, WQBELs, regulatory effluent standards, and monitoring requirements as summarized in Table 19. There are no WQBELs, so limits are based solely on TBELs and regulatory monitoring requirements and effluent standards.

Table 19. Effluent Limits and Monitoring Requirements for Outfall 015

Pollutant	Mass (pounds/day)		Concentration (mg/L)			Basis
	Total Monthly	Total Annual	Average Monthly	Daily Maximum	Instant Maximum	
Flow (MGD)	Report	Report	—	—	—	25 Pa. Code § 92a.61(b)
Total Suspended Solids	—	—	30	100	—	40 CFR § 423.12(b)(11) & 423.13(l)
pH	—	—	6.0 (Min)	—	9.0 (Max)	25 Pa. Code § 95.2(1)

The monitoring frequency for TSS and pH will be set at 2/quarter using grab sampling. Given the reported characteristics of the seep and the negligible effect on water quality in the Ohio River, quarterly monitoring should be sufficient to monitor the quality of the seep and compliance with effluent standards and BPJ TBELs. Flow should be estimated at the time of sampling.

[8] Only boron and manganese were detected; the others were reported as 'less than the reporting limit', but the reporting limits used by Shell are higher than DEP's target quantitation limits.

Tools and References Used to Develop Permit	
☐	WQM for Windows Model (see Attachment)
☒	PENTOXSD for Windows Model (see Attachment C)
☒	TRC Model Spreadsheet (see Attachment E)
☒	Temperature Model Spreadsheet (see Attachment D)
☒	Toxics Screening Analysis Spreadsheet (see Attachment B)
☐	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 (SOP) for Clean Water Program – Establishing Effluent Limitations for Individual Industrial Permits*
☐	Other:

ATTACHMENTS

ATTACHMENT A: Previously Authorized TDS Discharge Loading Evaluation

ATTACHMENT B: Toxics Screening Analysis for Outfall 001

ATTACHMENT C: PENTOXSD Modeling Results for Outfall 001

ATTACHMENT D: Temperature Modeling Results for Outfall 001

ATTACHMENT E: TRC Modeling Results for Outfall 001

ATTACHMENT A

Previously Authorized
TDS Discharge Loading Evaluation

TDS Evaluation – Horsehead Corporation, Monaca Smelter / Shell, Proposed Petrochemical Plan

DEP's guidance for TDS load evaluations pursuant to 25 Pa. Code Chapter 95.10 (i.e., *Policy and Procedure for NPDES Permitting of Discharges of Total Dissolved Solids (TDS) -- 25 Pa. Code §95.10*, November 12, 2011, Document No. 385-2100-002) suggests that an initial determination be made on whether a discharge's TDS concentration has a reasonable potential to exceed 2,000 mg/L. "Reasonable potential" is defined in the guidance as exceeding 1,000 mg/L of TDS on a routine basis. If Shell expected TDS concentrations in the proposed petrochemical plant's process wastewater discharges to be below 1,000 mg/L, then determining the existing authorized TDS loading would not be necessary because no reasonable potential would exist and the discharges would be exempt from Chapter 95.10 regulations.

Shell's estimated TDS discharge concentrations for the petrochemical plant's process wastewaters are 4,690 mg/L for wet weather and 7,375 mg/L for dry weather (potentially contaminated storm water will be treated as process wastewater, which is why there is an estimate for wet weather). Both of those concentrations exceed 2,000 mg/L, so it is necessary to determine existing authorized TDS loading.

The TDS guidance directs the timing of determinations on existing mass loadings to be made when there are proposed hydraulic expansions or changes in waste streams. While this generally refers to activities conducted as part of the same industrial operations under the same permit number (e.g., if Horsehead, the former owner of the site, were expanding or changing one of its waste streams), a complete change in the type of industrial activity (zinc smelting to ethane cracking), while not envisioned by the guidance, would reasonably warrant a determination of existing authorized mass loadings of TDS. DEP has transferred Horsehead's NPDES permit to Shell and is now amending that permit to authorize discharges from Shell's future petrochemical plant. The NPDES permit was transferred, in part, to maintain Horsehead's existing mass loadings of TDS for Shell's proposed petrochemical plant as opposed to assigning a new permit number to Shell that would theoretically void the authorized mass loadings of TDS associated with Horsehead's former operations.

Per the TDS guidance, existing mass loadings of TDS should be expressed as both average daily and maximum daily values to conform with the requirements of §95.10 (a)(1) and (7). The guidance establishes a preferred process for determining existing mass loadings of TDS based on what information is available. The primary reference for load determinations would be existing TDS effluent limits in an existing permit. Horsehead was not subject to TDS effluent limits, so the secondary reference is application data. Note that TDS loads based on application data are considered to be authorized even though no TDS limits were imposed; the fact that DEP did not impose TDS effluent limits does not mean that the TDS concentrations/loads reported on an application were not implicitly approved by issuing a permit based on that application.

The guidance states that, "In general, the highest representative data may be selected from the average data values and the maximum data values that are available, provided that the representative data are consistent with DEP authorizations issued prior to August 21, 2010." Those values would exclude data on cooling water and any storm water that does not come into contact with industrial materials and activities. For the purposes of establishing Horsehead's existing authorized mass loadings of TDS that would be carried over to Shell, Horsehead's cooling water is excluded from the calculation. Horsehead's storm water, however, will be included because Horsehead's storm water runoff from the site has historically been collected and treated with the facility's process wastewaters as a bearer of industrial contaminants. DEP does not have TDS data for Horsehead's storm water associated with an industrial activity independent of the combined process/storm water discharge.

The most recent application data on Horsehead's discharges is from 2006, which predates the August 21, 2010 date given in Chapter 95.10. Although DEP has not issued a permit based on the 2006 application that would have implicitly approved the TDS mass loads contained in the 2006 application, the 2006 data are the most current available and are considered to be representative of Horsehead's operations prior to August 21, 2010. Additionally, Horsehead's operations have ceased, so sampling Horsehead's discharges to collect data that would be representative of pre-August 21, 2010 operations is no longer an option.

TDS data and flow data from Horsehead's 2006 application are summarized below.

Outfall No.	Type of Discharge	Module 3		Module 4			
		Discharge Rate		Max Daily Value		Avg. of Analysis	
		Max Flow *MGD*	Avg. Flow *MGD*	TDS *mg/L*	TDS *lb/day*	TDS *mg/L*	TDS *lb/day*
002	Sewage Treatment Plant	0.397	0.104	347	624.6	NA	NA
003	Once through cooling	90	66	136	74,859.8	NA	NA
004	Flyash settling and deioinzer backwash	**1.0**	0.5	**450**	810.65	**416**	749.39
010	Stormwater and sampling condensate	0.0072	0.0072	120	1,859.8	NA	NA
001	Process, stormwater and NCCW	8.39	4.99	NA	NA	NA	NA
101	Process and stormwater (60 ac.)	**1.11**	0.50	**7,500**	39,281.4	**6,706.7**	37,139.9
201	NCCW	5.14	4.42	451	18,981.8	NA	NA
007	Stormwater (11 ac.)	NA	No Flow	NA	NA	NA	NA
008	Stormwater (14 ac.)	NA	0.022	NA	NA	NA	NA
009	Stormwater (34 ac.)	NA	No Flow	NA	NA	NA	NA

Outfalls 002, 003, 007, 008, 009 and 010 and Internal Monitoring Point 201 are excluded from the existing mass loading calculation. Outfall 003 and IMP 201 discharged cooling water, which is excluded from Chapter 95.10 regulations. Outfalls 007, 008 and 009 were overflows from storm water collection basins. Storm water from those basins was normally pumped to Horsehead's industrial wastewater treatment plant. Overflows from the basins occurred infrequently and did not represent a consistent contribution to Horsehead's TDS discharge loading as shown by the lack of data in the table. Outfall 010 contained a mix of potable water, boiler water/steam and storm water runoff. Although some part of Outfall 010's discharges would potentially be considered as part of the existing mass loading of TDS, there is no flow differentiation between the sources; also, although maximum TDS concentrations were reported for Outfall 010, there are no corresponding average values. Similarly, average TDS loads from Outfall 002 were not provided. Therefore, the available dataset for Outfalls 002 and 010 are considered to be insufficient to include those contributions (recall that DEP must develop both maximum daily and average daily values).

Existing mass loadings of TDS will be based on Outfall 004 and IMP 101 (values in red on the table). The maximum flows reported on Module 3 will be used with the maximum and average TDS concentrations reported on Module 4 (i.e., the "highest representative data" selected from the average data values and the maximum data values). These calculations are summarized below:

Loading (lb/day) = Flow (MGD) × Concentration (mg/L) × 8.34 (8.34 is a conversion factor)

Average Daily Loading

$8.34 \times (Qmax_{004}Cavg_{004} + Qmax_{101}Cavg_{101})$
8.34 × [(1.0 MGD)(416 mg/L) + (1.11 MGD)(6,706.7 mg/L)] = **65,556 lb/day**

Maximum Daily Loading

$8.34 \times (Qmax_{004}Cmax_{004} + Qmax_{101}Cmax_{101})$
8.34 × [(1.0 MGD)(450 mg/L) + (1.11 MGD)(7,500 mg/L)] = **73,184 lb/day**

Conclusions and Recommendations

Shell's estimated maximum TDS loading reported on the amendment application is 50,078 lb/day based on a discharge of 1.28 MGD at a TDS concentration of 4,690 mg/L (for wet weather assuming treatment of contaminated storm water). The dry weather TDS loading is less than 50,078 lb/day. Since the estimated, facility-wide TDS loading for discharges from Shell's petrochemical plant is less than the previously authorized TDS discharge loading, the facility is not subject to the TDS effluent standards of § 95.10(c) pursuant to §§ 95.10(a)(1) and (7). The previously authorized monthly average and daily maximum TDS discharge loads will be included in the amended permit to assist with any potential future evaluations of TDS loading from the facility.

ATTACHMENT B

Toxics Screening Analysis for Outfall 001

TOXICS SCREENING ANALYSIS
WATER QUALITY POLLUTANTS OF CONCERN
VERSION 2.3

Facility: **Shell Chemical Appalachia** NPDES Permit No.: **PA0002208** Outfall: **001**

Analysis Hardness (mg/L): **100** Discharge Flow (MGD): **3.28** Analysis pH (SU): **7**

Parameter		Maximum Concentration in Application or DMRs (µg/L)	Most Stringent Criterion (µg/L)	Candidate for PENTOXSD Modeling?	Most Stringent WQBEL (µg/L)	Screening Recommendation
Pollutant Group 1						
Total Dissolved Solids		3317000	500000	Yes	466580000	Monitor
Chloride		313000	250000	Yes	233290000	Monitor
Bromide			N/A			Monitor
Sulfate		812000	250000	Yes	233290000	Monitor
Fluoride		1100	2000	No		
Pollutant Group 2 – Metals						
Total Aluminum		4873	750	Yes	30288.08	Monitor
Total Antimony	<		5.6			
Total Arsenic	<		10			
Total Barium	<		2400			
Total Beryllium	<		N/A			
Total Boron	<		1600			
Total Cadmium	<		0.271			
Total Chromium (III)		139	N/A	No		
Hexavalent Chromium		139	10.4	Yes	657.99	Monitor
Total Cobalt	<		19			
Total Copper		55.6	9.3	Yes	605.74	No Limits/Monitoring
Total Cyanide		55.6	N/A	No		
Total Iron		7577	1500	Yes	1390000	No Limits/Monitoring
Dissolved Iron	<		300			
Total Lead	<		3.2			
Total Manganese		139	1000	No	187434.8	
Total Mercury	<		0.05			
Total Molybdenum	<		N/A			
Total Nickel		13.9	52.2	No		

Total Phenols (Phenolics)		24.5	5	Yes	4665.87	No Limits/Monitoring
Total Selenium	<		5.0			
Total Silver	<		3.8			
Total Thallium	<		0.24			
Total Zinc	<		119.8			
Pollutant Group 3 – Volatiles						
Acrolein	<		3			
Acrylamide	<		0.07			
Acrylonitrile	<		0.051			
Benzene		123	1.2	Yes	573.554	Monitor
Bromoform	<		4.3			
Carbon Tetrachloride	<		0.23			
Chlorobenzene	<		130			
Chlorodibromomethane	<		0.4			
Chloroethane	<		N/A			
2-Chloroethyl Vinyl Ether	<		3500			
Chloroform	<		5.7			
Dichlorobromomethane	<		0.55			
1,1-Dichloroethane	<		N/A			
1,2-Dichloroethane	<		0.38			
1,1-Dichloroethylene	<		33			
1,2-Dichloropropane	<		2200			
1,3-Dichloropropylene	<		0.34			
Ethylbenzene		49	530	No	99340.45	
Methyl Bromide	<		47			
Methyl Chloride	<		5500			
Methylene Chloride	<		4.6			
1,1,2,2-Tetrachloroethane	<		0.17			
Tetrachloroethylene	<		0.69			
Toluene		61	330	No	61853.49	
1,2-trans-Dichloroethylene	<		140			
1,1,1-Trichloroethane	<		610			
1,1,2-Trichloroethane	<		0.59			
Trichloroethylene	<		2.5			
Vinyl Chloride	<		0.025			

Pollutant Group 4 – Acid Compounds						
2-Chlorophenol	<		81			
2,4-Dichlorophenol	<		77			
2,4-Dimethylphenol	<		130			
4,6-Dinitro-o-Cresol	<		13			
2,4-Dinitrophenol	<		69			
2-Nitrophenol	<		1600			
4-Nitrophenol	<		470			
p-Chloro-m-Cresol	<		30			
Pentachlorophenol	<		0.27			
Phenol	<		10400			
2,4,6-Trichlorophenol	<		1.4			
Pollutant Group 5 – Base Compounds						
Acenaphthene		49	17	Yes	3186.392	No Limits/Monitoring
Acenaphthylene		49	N/A	No		
Anthracene		49	8300	No	1550000	
Benzidine	<		0.000086			
Benzo(a)Anthracene	<	2.5	0.0038	No (Value < QL)		
Benzo(a)Pyrene	<	2.5	0.0038	No (Value < QL)		
3,4-Benzofluoranthene	<	2.5	0.0038	No (Value < QL)		
Benzo(ghi)Perylene	<		N/A			
Benzo(k)Fluoranthene	<		0.0038			
Bis(2-Chloroethoxy)Methane	<		N/A			
Bis(2-Chloroethyl)Ether	<		0.03			
Bis(2-Chloroisopropyl)Ether	<		1400			
Bis(2-Ethylhexyl)Phthalate	<		1.2			
4-Bromophenyl Phenyl Ether	<		54			
Butyl Benzyl Phthalate	<		35			
2-Chloronaphthalene	<		1000			
4-Chlorophenyl Phenyl Ether	<		N/A			
Chrysene	<		0.0038			
Dibenzo(a,h)Anthrancene	<		0.0038			
1,2-Dichlorobenzene	<		160			
1,3-Dichlorobenzene	<		69			
1,4-Dichlorobenzene	<		150			
3,3-Dichlorobenzidine	<		0.021			
Diethyl Phthalate	<		800			

Dimethyl Phthalate	<		500			
Di-n-Butyl Phthalate	<		21			
2,4-Dinitrotoluene	<		0.05			
2,6-Dinitrotoluene	<		0.05			
1,4-Dioxane	<		N/A			
Di-n-Octyl Phthalate	<		N/A			
1,2-Diphenylhydrazine	<		0.036			
Fluoranthene	<		40			
Fluorene		49	1100	No	206178.3	
Hexachlorobenzene	<		0.00028			
Hexachlorobutadiene	<		0.44			
Hexachlorocyclopentadiene	<		1			
Hexachloroethane	<		1.4			
Indeno(1,2,3-cd)Pyrene	<		0.0038			
Isophorone	<		35			
Naphthalene	<		43			
Nitrobenzene	<		17			
n-Nitrosodimethylamine	<		0.00069			
n-Nitrosodi-n-Propylamine	<		0.005			
n-Nitrosodiphenylamine	<		3.3			
Phenanthrene	<		1			
Pyrene	<		830			
1,2,4-Trichlorobenzene	<		26			

ATTACHMENT C

PENTOXSD Modeling Results for Outfall 001

PENTOXSD

Modeling Input Data

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
32317	952.70	681.85	22771.80	0.00010	0.00	☑

Stream Data

	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Rch Velocity (fps)	Rch Trav Time (days)	Tributary Hard (mg/L)	Tributary pH	Stream Hard (mg/L)	Stream pH	Analysis Hard (mg/L)	Analysis pH
Q7-10	0.21	0	4730	0	1200	15	0	0	98	7.33	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard (mg/L)	Disc pH
Outfall 001	PA0002208-1	3.28	0	0	0	0	0.2	0.2	0.2	702.9	6

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
ACENAPHTHENE	1E+07	0	0.5	0.5	0	0	0	0	1	0
ALUMINUM	1E+07	0	0.5	0.5	0	0	0	0	1	0
ANTHRACENE	1E+07	0	0.5	0.5	0	0	0	0	1	0
BENZENE	1E+07	0	0.5	0.5	0	0	0	0	1	0
CHLORIDE (PWS)	5E+08	0	0.5	0.5	0	0	0	0	1	0
CHROMIUM, III	1E+07	0	0.5	0.5	0	0	0	0	1	0
CHROMIUM, VI	1E+07	0	0.5	0.5	0	0	0	0	1	0
COPPER	1E+07	0	0.5	0.5	0	0	0	0	1	0
CYANIDE, FREE	1E+07	0	0.5	0.5	0	0	0	0	1	0
ETHYLBENZENE	1E+07	0	0.5	0.5	0	0	0	0	1	0
FLUORENE	1E+07	0	0.5	0.5	0	0	0	0	1	0
FLUORIDE (PWS)	1E+07	0	0.5	0.5	0	0	0	0	1	0
MANGANESE	1E+07	0	0.5	0.5	0	0	0	0	1	0
PHENOLICS (PWS)	1E+07	0	0.5	0.5	0	0	0	0	1	0
SULFATE (PWS)	5E+08	0	0.5	0.5	0	0	0	0	1	0
TOLUENE	1E+07	0	0.5	0.5	0	0	0	0	1	0
TOTAL DISSOLVED SOLIDS (PWS)	5E+08	0	0.5	0.5	0	0	0	0	1	0
TOTAL IRON	1E+07	0	0.5	0.5	0	0	0	0	1	0

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
32317	951.71	681.67	22772.85	0.00010	216.00	☑

Stream Data

	LFY	Trib Flow	Stream Flow	WD Ratio	Rch Width	Rch Depth	Rch Velocity	Rch Trav Time	Tributary Hard	Tributary pH	Stream Hard	Stream pH	Analysis Hard	Analysis pH
	(cfsm)	(cfs)	(cfs)		(ft)	(ft)	(fps)	(days)	(mg/L)		(mg/L)		(mg/L)	
Q7-10	0.21	0	4730	0	1200	15	0	0	98	7.33	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

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

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
ACENAPHTHENE	0	0	0.5	0.5	0	0	0	0	1	0
ALUMINUM	0	0	0.5	0.5	0	0	0	0	1	0
ANTHRACENE	0	0	0.5	0.5	0	0	0	0	1	0
BENZENE	0	0	0.5	0.5	0	0	0	0	1	0
CHLORIDE (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
CHROMIUM, III	0	0	0.5	0.5	0	0	0	0	1	0
CHROMIUM, VI	0	0	0.5	0.5	0	0	0	0	1	0
COPPER	0	0	0.5	0.5	0	0	0	0	1	0
CYANIDE, FREE	0	0	0.5	0.5	0	0	0	0	1	0
ETHYLBENZENE	0	0	0.5	0.5	0	0	0	0	1	0
FLUORENE	0	0	0.5	0.5	0	0	0	0	1	0
FLUORIDE (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
MANGANESE	0	0	0.5	0.5	0	0	0	0	1	0
PHENOLICS (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
SULFATE (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
TOLUENE	0	0	0.5	0.5	0	0	0	0	1	0
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0.5	0.5	0	0	0	0	1	0
TOTAL IRON	0	0	0.5	0.5	0	0	0	0	1	0

PENTOXSD Analysis Results

Hydrodynamics

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	Depth (ft)	Width (ft)	WD Ratio	Velocity (fps)	Reach Trav Time (days)	CMT (min)
Q7-10 Hydrodynamics											
952.700	4730	0	4730	5.07416	0.0001	15	1200	80	0.2631	0.23	1000+
951.710	4730	334.15	4395.8	NA	0	0	0	0	0	0	NA
Qh Hydrodynamics											
952.700	12101	0	12101	5.07416	0.0001	22.671	1200	52.931	0.445	0.136	1000+
951.710	12101	334.15	11767	NA	0	0	0	0	0	0	NA

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number
952.70	**Outfall 001**	**PA0002208-1a**

AFC

Q7-10: **CCT (min)** 15 **PMF** 0.066 **Analysis pH** 7.208 **Analysis Hardness** 107.6

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CHROMIUM, III	0	0	0	0	604.994	1914.539	120626.9
Dissolved WQC. Chemical translator of 0.316 applied.							
CHROMIUM, VI	0	0	0	0	16	16.293	1026.569
Dissolved WQC. Chemical translator of 0.982 applied.							
COPPER	0	0	0	0	14.399	14.999	945.051
Dissolved WQC. Chemical translator of 0.96 applied.							
CYANIDE, FREE	0	0	0	0	22	22	1386.125
PHENOLICS (PWS)	0	0	0	0	NA	NA	NA
BENZENE	0	0	0	0	640	640	40323.65
ETHYLBENZENE	0	0	0	0	2900	2900	182716.5
TOLUENE	0	0	0	0	1700	1700	107109.7
ACENAPHTHENE	0	0	0	0	83	83	5229.473
ANTHRACENE	0	0	0	0	NA	NA	NA
FLUORENE	0	0	0	0	NA	NA	NA
ALUMINUM	0	0	0	0	750	750	47254.28
CHLORIDE (PWS)	0	0	0	0	NA	NA	NA
FLUORIDE (PWS)	0	0	0	0	NA	NA	NA
TOTAL IRON	0	0	0	0	NA	NA	NA
MANGANESE	0	0	0	0	NA	NA	NA
SULFATE (PWS)	0	0	0	0	NA	NA	NA
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

CFC

Q7-10: **CCT (min)** 720 **PMF** 0.2 **Analysis pH** 7.285 **Analysis Hardness** 101.227

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number
952.70	**Outfall 001**	**PA0002208-1a**

Parameter	Stream Conc. (µg/L)	Stream CV	Trib Conc. (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CHROMIUM, III	0	0	0	0	74.859	87.045	16315.25
	Dissolved WQC. Chemical translator of 0.86 applied.						
CHROMIUM, VI	0	0	0	0	10	10.395	1948.387
	Dissolved WQC. Chemical translator of 0.962 applied.						
COPPER	0	0	0	0	9.05	9.427	1766.883
	Dissolved WQC. Chemical translator of 0.96 applied.						
CYANIDE, FREE	0	0	0	0	5.2	5.2	974.661
PHENOLICS (PWS)	0	0	0	0	NA	NA	NA
BENZENE	0	0	0	0	130	130	24366.52
ETHYLBENZENE	0	0	0	0	580	580	108712.2
TOLUENE	0	0	0	0	330	330	61853.48
ACENAPHTHENE	0	0	0	0	17	17	3186.392
ANTHRACENE	0	0	0	0	NA	NA	NA
FLUORENE	0	0	0	0	NA	NA	NA
ALUMINUM	0	0	0	0	NA	NA	NA
CHLORIDE (PWS)	0	0	0	0	NA	NA	NA
FLUORIDE (PWS)	0	0	0	0	NA	NA	NA
TOTAL IRON	0	0	0	0	1500	1500	1390000
	WQC = 30 day average. PMF = 1.						
MANGANESE	0	0	0	0	NA	NA	NA
SULFATE (PWS)	0	0	0	0	NA	NA	NA
TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

THH

Q7-10: **CCT (min)** 720 **PMF** 0.2 **Analysis pH** NA **Analysis Hardness** NA

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CHROMIUM, III	0	0	0	0	NA	NA	NA

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number							
952.70	**Outfall 001**	**PA0002208-1a**							
	CHROMIUM, VI		0	0	0	0	NA	NA	NA
	COPPER		0	0	0	0	NA	NA	NA
	CYANIDE, FREE		0	0	0	0	140	140	26240.87
			CCT based on PWS at RMI 951.71.						
	PHENOLICS (PWS)		0	0	0	0	5	5	4665.87
			CCT based on PWS at RMI 951.71.WQC applied at RMI 951.71 with a design stream flow of 4730.						
	BENZENE		0	0	0	0	NA	NA	NA
	ETHYLBENZENE		0	0	0	0	530	530	99340.45
			CCT based on PWS at RMI 951.71.						
	TOLUENE		0	0	0	0	1300	1300	243665.2
			CCT based on PWS at RMI 951.71.						
	ACENAPHTHENE		0	0	0	0	670	670	125581.3
			CCT based on PWS at RMI 951.71.						
	ANTHRACENE		0	0	0	0	8300	8300	1550000
			CCT based on PWS at RMI 951.71.						
	FLUORENE		0	0	0	0	1100	1100	206178.3
			CCT based on PWS at RMI 951.71.						
	ALUMINUM		0	0	0	0	NA	NA	NA
	CHLORIDE (PWS)		0	0	0	0	250000	250000	2.3329E+08
			CCT based on PWS at RMI 951.71.WQC applied at RMI 951.71 with a design stream flow of 4730.						
	FLUORIDE (PWS)		0	0	0	0	2000	2000	1860000
			CCT based on PWS at RMI 951.71.WQC applied at RMI 951.71 with a design stream flow of 4730.						
	TOTAL IRON		0	0	0	0	NA	NA	NA
	MANGANESE		0	0	0	0	1000	1000	187434.8
			CCT based on PWS at RMI 951.71.						
	SULFATE (PWS)		0	0	0	0	250000	250000	2.3329E+08
			CCT based on PWS at RMI 951.71.WQC applied at RMI 951.71 with a design stream flow of 4730.						
	TOTAL DISSOLVED SOLIDS (PWS)		0	0	0	0	500000	500000	4.6658E+08
			CCT based on PWS at RMI 951.71.WQC applied at RMI 951.71 with a design stream flow of 4730.						

CRL

Qh: **CCT (min)** 720 **PMF** 0.2

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
CHROMIUM, III	0	0	0	0	NA	NA	NA

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number						
952.70	**Outfall 001**	**PA0002208-1a**						
	CHROMIUM, VI	0	0	0	0	NA	NA	NA
	COPPER	0	0	0	0	NA	NA	NA
	CYANIDE, FREE	0	0	0	0	NA	NA	NA
	PHENOLICS (PWS)	0	0	0	0	NA	NA	NA
	BENZENE	0	0	0	0	1.2	1.2	573.554
	ETHYLBENZENE	0	0	0	0	NA	NA	NA
	TOLUENE	0	0	0	0	NA	NA	NA
	ACENAPHTHENE	0	0	0	0	NA	NA	NA
	ANTHRACENE	0	0	0	0	NA	NA	NA
	FLUORENE	0	0	0	0	NA	NA	NA
	ALUMINUM	0	0	0	0	NA	NA	NA
	CHLORIDE (PWS)	0	0	0	0	NA	NA	NA
	FLUORIDE (PWS)	0	0	0	0	NA	NA	NA
	TOTAL IRON	0	0	0	0	NA	NA	NA
	MANGANESE	0	0	0	0	NA	NA	NA
	SULFATE (PWS)	0	0	0	0	NA	NA	NA
	TOTAL DISSOLVED SOLIDS (PWS)	0	0	0	0	NA	NA	NA

PENTOXSD Analysis Results

Recommended Effluent Limitations

SWP Basin	Stream Code:	Stream Name:
20E	32317	OHIO RIVER

RMI	Name	Permit Number	Disc Flow (mgd)
952.70	Outfall 001	PA0002208-1a	3.2800

Parameter	Effluent Limit (µg/L)	Governing Criterion	Max. Daily Limit (µg/L)	Most Stringent WQBEL (µg/L)	Most Stringent WQBEL Criterion
ACENAPHTHENE	3186.392	CFC	4971.283	3186.392	CFC
ALUMINUM	30288.08	AFC	47254.28	30288.08	AFC
ANTHRACENE	1550000	THH	2420000	1550000	THH
BENZENE	573.554	CRL	894.836	573.554	CRL
CHLORIDE (PWS)	2.3329E+08	THH	3.6397E+08	2.3329E+08	THH
CHROMIUM, III	16315.25	CFC	25454.41	16315.25	CFC
CHROMIUM, VI	657.99	AFC	1026.569	657.99	AFC
COPPER	605.74	AFC	945.051	605.74	AFC
CYANIDE, FREE	888.451	AFC	1386.126	888.451	AFC
ETHYLBENZENE	99340.45	THH	154987.1	99340.45	THH
FLUORENE	206178.3	THH	321671.3	206178.3	THH
FLUORIDE (PWS)	1860000	THH	2910000	1860000	THH
MANGANESE	187434.8	THH	292428.4	187434.8	THH
PHENOLICS (PWS)	4665.87	THH	7279.507	4665.87	THH
SULFATE (PWS)	2.3329E+08	THH	3.6397E+08	2.3329E+08	THH
TOLUENE	61853.49	CFC	96501.38	61853.49	CFC
TOTAL DISSOLVED SOLIDS (PWS)	4.6658E+08	THH	7.2795E+08	4.6658E+08	THH
TOTAL IRON	1390000	CFC	2180000	1390000	CFC

ATTACHMENT D

Temperature Modeling Results for Outfall 001

Facility: **Shell Chemical Appalachia Petrochemical Complex**
Permit Number: PA0002208 **PMF**
Stream Name: Ohio River 0.200
Analyst/Engineer: Ryan Decker
Stream Q7-10 (cfs): 4730

	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	18	0	14.25	3.75	15136.00	3021.63	3027.43
Feb 1-29	18	0	14.25	3.75	16555.00	3305.43	3311.23
Mar 1-31	18	0	14.25	3.75	33110.00	6616.43	6622.23
Apr 1-15	18	0	14.25	3.75	43989.00	8792.23	8798.03
Apr 16-30	18	0	14.25	3.75	43989.00	8792.23	8798.03
May 1-15	18	0	14.25	3.75	24123.00	4819.03	4824.83
May 16-30	18	0	14.25	3.75	24123.00	4819.03	4824.83
Jun 1-15	18	0	14.25	3.75	14190.00	2832.43	2838.23
Jun 16-30	18	0	14.25	3.75	14190.00	2832.43	2838.23
Jul 1-31	18	0	14.25	3.75	8041.00	1602.63	1608.43
Aug 1-15	18	0	14.25	3.75	6622.00	1318.83	1324.63
Aug 16-31	18	0	14.25	3.75	6622.00	1318.83	1324.63
Sep 1-15	18	0	14.25	3.75	5203.00	1035.03	1040.83
Sep 16-30	18	0	14.25	3.75	5203.00	1035.03	1040.83
Oct 1-15	18	0	14.25	3.75	5676.00	1129.63	1135.43
Oct 16-31	18	0	14.25	3.75	5676.00	1129.63	1135.43
Nov 1-15	18	0	14.25	3.75	7568.00	1508.03	1513.83
Nov 16-30	18	0	14.25	3.75	7568.00	1508.03	1513.83
Dec 1-31	18	0	14.25	3.75	11352.00	2264.83	2270.63

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: **Shell Chemical Appalachia Petrochemical Complex**
Permit Number: PA0002208 **PMF**
Stream: Ohio River 0.20

	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	81,589	110.0	3.75
Feb 1-29	35	0	40	89,238	110.0	3.75
Mar 1-31	40	0	46	214,163	110.0	3.75
Apr 1-15	47	0	52	237,107	110.0	3.75
Apr 16-30	53	0	58	237,107	110.0	3.75
May 1-15	58	0	64	156,035	110.0	3.75
May 16-30	62	0	71.2	239,254	110.0	3.75
Jun 1-15	67	0	78.8	180,517	110.0	3.75
Jun 16-30	71	0	84	198,875	110.0	3.75
Jul 1-31	75	0	87	104,033	110.0	3.75
Aug 1-15	74	0	87	92,817	110.0	3.75
Aug 16-31	74	0	87	92,817	110.0	3.75
Sep 1-15	71	0	84	72,931	110.0	3.75
Sep 16-30	65	0	78	72,931	110.0	3.75
Oct 1-15	60	0	72	73,440	110.0	3.75
Oct 16-31	54	0	66	73,440	110.0	3.75
Nov 1-15	48	0	58	81,596	110.0	3.75
Nov 16-30	42	0	50	65,276	110.0	3.75
Dec 1-31	37	0	42	61,194	110.0	3.75

[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 E

TRC Modeling Results for Outfall 001

TRC EVALUATION

4730	**= Q stream (cfs)**	**0.5**	**= CV Daily**
3.75	**= Q discharge (MGD)**	**0.5**	**= CV Hourly**
4	**= no. samples**	**0.066**	**= AFC_Partial Mix Factor**
0.3	**= Chlorine Demand of Stream**	**0.2**	**= 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 = 17.185	**1.3.2.iii**	WLA cfc = 50.725
PENTOXSD TRG	**5.1a**	LTAMULT afc = 0.373	**5.1c**	LTAMULT cfc = 0.581
PENTOXSD TRG	**5.1b**	LTA_afc= 6.404	**5.1d**	LTA_cfc = 29.489

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)**