ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

June 18, 2024

SUBJECT: **Neville Chemical Company**
2800 Neville Road
Pittsburgh, PA 15225-1496
Allegheny County

Renewal Title V Operating Permit No. 0060-OP24

TO: JoAnn Truchan, P.E.
Section Chief, Engineering

FROM: Helen O. Gurvich
Air Quality Engineer

FACILITY DESCRIPTION:

Neville Chemical Company, located at 2800 Neville Road, Pittsburgh (Neville Township), manufactures synthetic hydrocarbon resins, plasticizers, and plasticizing oils. The facility also operates a groundwater remediation system and wastewater treatment system. Also located at the facility are three resin flaking and packaging centers, a 49.4 MMBtu/hr, and a 29.5 MMBtu/hr natural gas-fired boiler.

The facility is a major source of volatile organic compounds (VOCs); and a minor source of particulate matter (PM), particulate matter <10 µm in diameter (PM_{10}), particulate matter <2.5 µm in diameter ($PM_{2.5}$), nitrogen oxides (NO_X), sulfur oxides (SO_X), and hazardous air pollutants (HAPs), as defined in §2102.20 of Article XXI. The facility is also a minor source of greenhouse gas emissions (CO_2e) as defined in the U.S. EPA Greenhouse Gas Tailoring Rule. The plant is subject to VOC Reasonable Available Control Technology (VOC RACT).

OPERATING PERMIT DESCRIPTION:

This is a Title V renewal for Neville Chemical Company located in Neville Township, Allegheny County. The original operating permit was issued on September 28, 2015 and was amended on September 12, 2016 to correct sections I, II, IV, and V; on December 22, 2017 to modify limits for area "O" tanks; on April 23, 2020 to incorporate RACT II requirements; and on November 10, 2020 to correct RACT II requirements. This renewal permit incorporates RACT III requirements.

Changes that have occurred at the facility are described below:

1. #4 Still (P009) has been permanently shut down.
2. #4 Still Heater (B007) has been permanently shut down.
3. Resin Rework Tanks (P015) have been permanently shut down.
4. Facility no longer uses propane.
5. Unit #20 (P006) and Unit #21 (P007) were combined into one process unit now designated as Unit #20/21 (P006).
6. Resin Former materials can now be stored in Tank #5003 (formerly used to store piperylene).
7. The baghouse for #2 Packaging Center (P011) has been replaced.
8. The baghouse for #3 Packaging Center (P012) has been replaced.
9. Changes to Storage Tanks:
    a. Category D002, Distillates, has been split into two categories. Category D002 includes all tanks storing low vapor pressure Distillates, and Category D003 includes all tanks storing medium vapor pressure Distillates.
    b. Category D004, formerly for LX-1144 Charge Stock tanks, now represents the Heat Poly Charge Stock tanks. The LX-1144 Charge Stock category has been eliminated.
    c. Category D009, Resin Former, now includes Tank Nos. 8502, 8504, 8505 and 8506 since these tanks are no longer controlled and do not need to be listed separately.
    d. Tank Nos. 8501 and 8503 are now used to store Low Vapor Pressure Distillates, so they are included in Category D002, Distillates Low VP.
    e. Due to the above-mentioned combination of Unit Nos. 20 and 21, any tanks previously listed under Category D012, Unit #21 Feed Blend, are now included in Category D011, now designated as Unit #20/21 Feed Blend.
    f. New Tank #341 has been added to Category D011, Unit #20/21 Feed Blend. New Tank #342 has been added to Category D002, Distillates Low VP.
    g. New Distillate Storage Tank #2108 is included in Category D003, Distillates Medium VP.

h. Tanks removed from the permit (removed tanks and tanks out of service with no plans to reactivate) – Tank Nos. 1005, 1016, 2101, 2102, 11, 172, 179, 211, 212, 310, 311, 1018, 1019, 2107, 147, 175, 201, 301, 1013, 93, 94, TA-14, TA-15.

RENEWAL PERMIT APPLICATION COMPONENTS:

1. Title V Operating Permit #0060, issued September 28, 2015
2. Amended Title V Operating Permit #0060a, issued September 12, 2016 (corrected sections I, II, IV, and V)
3. Amended Title V Operating Permit #0060b, issued December 22, 2017 (Area "O" tanks)
4. Amended Title V Operating Permit #0060c, issued April 23, 2020 (RACT II)
5. Renewal Title V Operating Permit application #0060, dated April 29, 2020
6. Amended Title V Operating Permit #0060d, issued November 10, 2020 (corrected RACT II)
7. Installation Permit #0060-I010a, issued August 3, 2016, amended concurrent with this operating permit (Unit #20/21; case-by-case RACT III)
8. Installation Permit #0060-I011, issued November 7, 2017 (Process P011 – new baghouse))
9. Installation Permit #0060-I012, issued August 12, 2020 (P001 – new hydrogenation unit) – *not installed yet*
10. Installation Permit #0060-I013, issued October 19, 2021 (P012 – new baghouse) - *not installed yet*
11. Installation Permit #0060-I001, issued April 30, 1999 (Unit #43)
12. Installation Permit #0060-I002, issued March 24, 1999 (Air Stripper – no longer in operation)
13. Installation Permit #0060-I003a, issued October 4, 2000, amended April 5, 2011 (Boiler #8)
14. Installation Permit #0060-I004a, issued August 2, 2000, amended October 21, 2003 (Tank Area "O")
15. Installation Permit #0060-I005, withdrawn/not issued (Tank Area "Y")
16. Installation Permit #0060-I006, issued March 7, 2005 (Connection of Unit Nos. 15, 16, 18 & 19 to the Thermal Oxidizer)
17. Installation Permit #0060-I007a, issued October 6, 2006, amended November 3, 2006 (#2 Packaging Center)
18. Installation Permit #0060-I008, issued December 16, 2010 (#5 Packaging Center)
19. Installation Permit #0060-I009, issued March 18, 2014 (#6 Boiler fuel use)
20. RACT Plan Approval and Agreement #230, dated December 13, 1996
21. Stack test report, dated October 16, 2007 (new #2 Packaging Center)
22. Stack test report, dated August 30, 2005 (old #2-2 Packaging Center)
23. Stack test report, dated July 16, 2003 (Unit #43)
24. Stack test report, dated May 17, 1999 (Air Stripper)
25. Stack test report, dated September 10-12, 1997 (Still #18)
26. Permits issued prior to 1995 (See Table 1 below)
27. U.S. EPA Implementation Tool for the Organic Liquids Distribution NESHAP, September 2007

Determinations

1. September 20, 2016: Tank #5003
   - Request for determination received on June 16, 2016
   - The storage of resin former in tank without use of the condenser – does not require an IP
2. October 5, 2016: Tank Nos. 2108, 341 & 342
   - Request for determination received on August 25, 2016
   - Tank Nos. 341 and 342– does not require an IP; Tank #2108 – required an IP
3. November 18, 2016: Tank #2108
   - Request for determination/correspondence received on October 28, 2016
   - Tank #2108– does not require an IP
4. May 4, 2017: #2 Packaging Center Baghouse
   - Request for determination received on April 5, 2017
   - Baghouse replacement need an IP required an IP
5. May 30, 2017: Area "O" Tanks – Vapor balancing system
   - Request for determination received on April 18, 2017

- Amendment to the Title V Operating Permit

6. June 28, 2018: Rework Tanks
   - Request for determination received on June 5, June 21, and June 26, 2018
   - Temporary operation – does not require an IP
7. December 21, 2020: Tank Nos. 86 and 87
   - Request for determination received on December 14, 2020
   - Tank Nos. 86 and 87 – does not require an IP

Older Permits

Table 1 contains a list of permits issued prior to 1995, and if applicable, any reasons the permit was not referenced in the Title V Operating Permit.

Table 1: Permits Issued Prior to 1995

Permit Number	Issue Date	Description	Reason for Exclusion from TVOP
4051008-000-28700	08/17/1973	Nevillac Reactor - Resin Production	Process no longer in operation.
73-O-0877-P	08/17/1973	#16 Still - Resin Production	Superseded by permit #4051008-000-42505.
4051008-000-24100	05/06/1973	#18 Still Furnace - Oil Heater	Incorporated into the TVOP under section V.K.
73-O-2672-C	03/12/1973	#18 Still Furnace - Oil Heater	
73-O-0875-P	08/17/1973	#3 Still - Resin Production	Incorporated into the TVOP under section V.D.
4051008-000-23900	03/12/1973	#4 Boiler	Unit no longer in operation.
73-O-2671-C	05/06/1973	#4 Boiler	
4051008-000-42504	08/17/1973	#4 Still - Resin Production	Process is no longer in operation, but equipment is still onsite. A maintenance plan is in place. #4 Continuous Still is included in the TVOP under section V.D.
73-O-0876-P	08/17/1973	#4 Still - Resin Production	
4051008-000-42506	08/17/1973	Unit #30 - Resin Production	Process no longer in operation.
73-O-0878-P	08/17/1973	Unit #30 - Resin Production	
4051008-000-76201	12/19/1974	#18 Still - Resin Production	Connected to thermal oxidizer under IP #0060-I006.
74-O-2674-P	12/19/1974	#18 Still - Resin Production	
4051008-000-71101	01/09/1974	#2 Packaging Center	Replaced by IP #0060-I007.
74-O-3889-P	01/09/1974	#2 Packaging Center	
4051008-000-76202	12/31/1975	#19 Still - Resin Production	Connected to thermal oxidizer under IP #0060-I006.
75-O-0006-P	09/09/1975	#19 Still - Resin Production	
4051008-000-23902	09/09/1975	#19 Still Furnace - Oil Heater	Incorporated into the TVOP under section V.K.
75-O-0007-C	09/09/1975	#19 Still Furnace - Oil Heater	
74-I-0030-P	05/01/1975	C-5 Unit	Process no longer in operation.
4051008-000-05901	03/24/1976	Nevtac Furnace - C-5 Unit	Process no longer in operation.
75-O-0031-C	03/24/1976	Nevtac Furnace - C-5 Unit	
4051008-000-05900	03/16/1976	Nevtac Unit - C-5 Unit	Process no longer in operation.
75-O-0030-P	02/16/1976	Nevtac Unit - C-5 Unit	
74-O-3582-P	03/22/1976	Unit #20	Process has been modified since issuance. Included in the TVOP under section V.B.

Permit Number	Issue Date	Description	Reason for Exclusion from TVOP
74-O-3583-P	03/22/1976	Unit #21	Process has been modified since issuance. Included in the TVOP under section V.C.
4051008-000-28701	12/31/1977	Nevillac	Process no longer in operation.
76-I-0109-P	12/27/1976	Nevillac	
77-I-0030-P	08/30/1977	Chemical Treatment of Crudes & Solvents	Process no longer in operation; equipment currently part of Unit #21 Aqueous Neutralization.
4051008-000-82401	08/03/1977	Chlorinated Paraffin Production	Process no longer in operation.
76-I-0092-P	08/31/1977	Chlorinated Paraffin Production	
4051008-000-66500	05/31/1978	#5 Packaging Center Flaker	Incorporated into the TVOP under section V.G.
77-I-0025-P	05/23/1977	#5 Packaging Center Flaker	
4051008-000-00901	05/31/1978	#5 Packaging Center Oil Furnace	Incorporated into the TVOP under section V.M.
77-I-0026-C	05/11/1977	#5 Packaging Center Oil Furnace	
79-I-0003-P	05/24/1979	Wastewater Treatment Plant	Process has been modified since issuance. Included in the TVOP under section V.H.
79-I-0024-C	07/05/1979	#6 Boiler	Incorporated into the TVOP under section V.N.
4051008-000-00902	05/06/1980	#6 Boiler	
82-I-0012-C	03/26/1982	#7 Boiler	Unit no longer in operation.
4051008-000-00903	01/18/1983	#7 Boiler	
4051008-000-42507	06/22/1984	#15 Still - Resin Production	Connected to thermal oxidizer under IP #0060-I006.
82-I-0042-P	01/26/1983	#15 Still - Resin Production	
4051008-000-23903	06/25/1984	#15 Still Furnace - Oil Heater	Incorporated into the TVOP under section V.K.
82-I-0043-C	01/18/1983	#15 Still Furnace - Oil Heater	
4051008-000-00900	12/12/1985	#16 Still Furnace - Oil Heater	Incorporated into the TVOP under section V.K.
4051008-000-00904	12/12/1985	#16 Still Furnace - Oil Heater	
85-I-0046-C	03/29/1985	#16 Still Furnace - Oil Heater	
86-I-0018-C	05/30/1986	Nos. 6 & 7 Boilers	Boiler #7 is no longer in operation; Boiler #6 is included in the TVOP under section V.N.
4051008-000-00905	07/21/1988	#3 Packaging Center Furnace	Incorporated into the TVOP under section V.M.
88-I-0022-C	06/28/1988	#3 Packaging Center Furnace	
89-I-0034-P	11/02/1989	Piperylene Tank	Included in the tank list as Tank #5003. In the TVOP under Section V.P.
90-I-0058-P	05/02/1991	Bio Wastewater Treatment	Incorporated into the TVOP under section V.H.
90-I-0064-P	05/10/1991	Groundwater Air Stripping Facility	Process no longer in operation; replaced by Groundwater Remediation.
91-I-0053-P	08/07/1991	Soil Vapor Extraction	Process no longer in operation.
4051008-000-42503	05/19/1992	#3 Still - Furnace	Unit is still in operation but with a new furnace; permitted in the TVOP under section V.L.
91-I-0051-P	07/29/1991	#3 Still - Furnace	
4051008-000-01000	01/13/1992	Soil Vapor Extraction	Process no longer in operation.
92-I-0064-P	12/08/1992	Groundwater Air Stripping Facility	Process no longer in operation; replaced by Groundwater Remediation System.
4051008-000-42505	08/19/1993	#16 Still - Resin Production (replacement reactor)	Connected to thermal oxidizer under IP #0060-I007.

Permit Number	Issue Date	Description	Reason for Exclusion from TVOP
4051008-000-00900	08/13/1993	Nos. 4, 6 & 7 Boilers - Use of LX-830 (incorrect #)	Boiler Nos. 4 & 7 no longer in operation; Boiler #6 is included in the TVOP under section V.N.
93-I-0032-P	11/17/1993	Resin & Rosin Emulsion	Process no longer in operation.

EMISSION SOURCES:

Table 2: Emissions Sources

I.D.	Source Description	Control Device(s)	Maximum Capacity	Fuel/Raw Material	Stack I.D.
Heat Polymerization Stills					
P001	**Heat Polymerization Still - #15**				
	Reactor	18.9 MMBtu/hr thermal oxidizer	18,000,000 lb/yr	resin-forming feedstock, additives	S101
	2 – Distillate Receivers	thermal oxidizer			
	2 – Ejector Vents	thermal oxidizer			
	Decanter	thermal oxidizer			
P001	**Heat Polymerization Still - #16**				
	Reactor	18.9 MMBtu/hr thermal oxidizer	21,000,000 lb/yr	resin-forming feedstock, additives	S101
	2 – Distillate Receivers	thermal oxidizer			
	Vacuum Pump	thermal oxidizer			
	Decanter (shared with #18 & #19)	thermal oxidizer			
P001	**Heat Polymerization Still - #18**				
	Reactor	18.9 MMBtu/hr thermal oxidizer	26,280,000 lb/yr	resin-forming feedstock, additives	S101
	2 – Distillate Receivers	thermal oxidizer			
	Vacuum Pump	thermal oxidizer			
	Decanter (shared with #16 & #19)	thermal oxidizer			
P001	**Heat Polymerization Still - #19**				
	Reactor	18.9 MMBtu/hr thermal oxidizer	25,000,000 lb/yr	resin-forming feedstock, additives	S101
	2 – Distillate Receivers	thermal oxidizer			
	Vacuum Pump	thermal oxidizer			
	Decanter (shared with #16 & #18)	thermal oxidizer			
P001	**Heat Polymerization Still - #43**				
	Reactor	18.9 MMBtu/hr thermal oxidizer	25,000,000 lb/yr	resin-forming feedstock, additives	S101
	2 – Distillate Receivers	thermal oxidizer			

I.D.	Source Description	Control Device(s)	Maximum Capacity	Fuel/Raw Material	Stack I.D.
	2 – Ejector Vents	thermal oxidizer			
	Decanter	thermal oxidizer			
Catalytic Resin and Polyoil Neutralization					
P006	**Unit #20/21 – Scenario #1**				
	U20 Reactor	packed bed scrubber	66,600,000 lb/yr	ethylene-cracking products, resin-forming feedstock, additives	S020, S021
	U20 Holding Tank	packed bed scrubber			
	Neutralization Mix Tank	none			
	Neutralization Decanter	none			
	Rinse Mix Tank	none			
	Rinse Decanter	none			
	#4 Aqueous Treater	none			S025a
P006	**Unit #20/21 – Scenario #2**				
	U20 Reactor	packed bed scrubber	66,600,000 lb/yr	ethylene-cracking products, resin-forming feedstock, additives	S020, S021
	U20 Holding Tank	packed bed scrubber			
	#10 & #11 Aqueous Treaters	none			S025b, c
P006	**Unit #20/21 – Scenario #3**				
	U20 Reactor	packed bed scrubber	66,600,000 lb/yr	ethylene-cracking products, resin-forming feedstock, additives	S020, S021
	Holding Tank Nos. 1 & 2	none			
	Final Holding Tank #171	none			
	Neutralization Mix Tank	none			
	Neutralization Decanter	none			
	Rinse Mix Tank	none			
	Rinse Decanter	none			
	#4 Aqueous Treater	none			S025a
P006	**Unit #20/21 – Scenario #4**				
	U20 Reactor	packed bed scrubber	66,600,000 lb/yr	ethylene-cracking products, resin-forming feedstock, additives	S020, S021
	Holding Tank Nos. 1 & 2	none			
	Final Holding Tank #171	none			
	#10 & #11 Aqueous Treaters	none			S025b, c

I.D.	Source Description	Control Device(s)	Maximum Capacity	Fuel/Raw Material	Stack I.D.
Continuous Stills					
P008	**#3 Continuous Still**				
	Tray Tower	none	67,200,000 lb/yr	polyoil, resin-forming feedstock, additives	--
	Distillate Condenser	none			--
	Decanter	none			S026
	Batch/Flush Tank	none			--
	Sidestream Oil Tank (T-85)	none			--
Flaking and Packaging					
P011	**#2 Packaging Center**				
	7 – Drain Kettles	none	12,500 lb/hr 87,600,000 lb/yr	liquid hydrocarbon resins	S042-S048
	Flaking Belt	none		liquid hydrocarbon resins	S050a
	Packaging Station	baghouse		solid flaked hydrocarbon resins	S051
P012	**#3 Packaging Center**				
	7 – Drain Kettles	none	122,600,000 lb/yr	liquid hydrocarbon resins	S054-S060
	Flaking Belt	none	48,000,000 lb/yr	liquid hydrocarbon resins	S061a, b, c
	Packaging Station	fabric filter	122,600,000 lb/yr	solid flaked hydrocarbon resins	S062
	Pouring Station	none	122,600,000 lb/yr	liquid hydrocarbon resins	S063
P013	**#5 Packaging Center**				
	3 – Drain Kettles	none	78,800,000 lb/yr	liquid hydrocarbon resins	S065-S067
	Flaking Belt	none		liquid hydrocarbon resins	S068a, b, c
	Packaging Station	fabric filter		solid flaked hydrocarbon resins	S069
Other Processes					
P014	**Wastewater Collection, Conveyance, and Treatment**				
	3 – Surge Tanks (Nos. 5001, 5251, 1004)	none	105,000,000 gal/yr (total for system)	wastewater	--
	3 – Batch Tanks (Nos. 2011, 2012, 2013)	none		wastewater	S071-S073
	Equalization Tank (#5002)	none		wastewater	
	2 – Biological Treatment / Aeration Tanks (TA-2, TA-3)	none		wastewater	S074-S075
	2 – Clarifier Tanks (TA-4, TA-5)	none		wastewater	
	Effluent Tank (TA-7)	none		wastewater	S076
	Sludge Tank (#2010)	none		wastewater	S077

I.D.	Source Description	Control Device(s)	Maximum Capacity	Fuel/Raw Material	Stack I.D.
	Rotary Vacuum Filter	vented to Boiler #6		wastewater	
	Oil/Water Separator	none		wastewater	S078
	Aerobic Digester Tank (TA-6)	none		wastewater	S078a
P016	**Final Product Loading**				
	LX-830 Fuel Oil Barge Loading	none	6,000,000 gal/yr	petroleum hydrocarbon resins, distillate fuel oils, distillate oils	--
	Final Product Tankcar & Tankwagon Loading	none	24,300,000 gal/yr	petroleum hydrocarbon resins, distillate fuel oils, distillate oils	--
P017	**Groundwater Remediation System**				
	7 – Groundwater Wells	none	165,000 gal/yr (recovered oil)	groundwater, recovered oils	--
	7 – Oil Recovery Wells	none	165,000 gal/yr (recovered oil)	groundwater, recovered oils	--
	#2 Drywell pump and Treat System	none	165,000 gal/yr (recovered oil)	groundwater, recovered oils	--
	Old # 8 Water Well Pump and Treat System	none	165,000 gal/yr (recovered oil)	groundwater, recovered oils	--
Still Process Heaters					
B001	#15 Still Process Heater	none	7.5 MMBtu/hr	natural gas	S001
B002	#16 Still Process Heater	none	6.1 MMBtu/hr	natural gas	S006
B003	#18 Still Process Heater	none	7.21 MMBtu/hr	natural gas	S009
B004	#19 Still Process Heater	none	7.5 MMBtu/hr	natural gas	S012
B015	Unit #43 Process Heater	none	7.5 MMBtu/hr	natural gas	S104
B006	#3 Continuous Still Process Heater	none	5.25 MMBtu/hr	natural gas	S027
Packaging Center Heaters					
B009	#2 Packaging Center Heater	none	5.0 MMBtu/hr	natural gas	S053
B010	#3 Packaging Center Heater	none	3.91 MMBtu/hr	natural gas	S064
B011	#5 Packaging Center Heater	none	3.0 MMBtu/hr	natural gas	S070
Boilers and Generators					
B013	#6 Boiler	none	49.4 MMBtu/hr	natural gas	S099
B012	#8 Boiler	low-NO_X burners, induced flue gas recirc	29.5 MMBtu/hr	natural gas	S098
--	8 - Emergency Generators	none		natural gas	--
Storage Tanks					
D001	1001-1002, 1017	none	100,980 gal. ea.	Catalytic & Misc. Polymer Oil	--
	174	none	20,350 gal.	Catalytic & Misc. Polymer Oil	--

I.D.	Source Description	Control Device(s)	Maximum Capacity	Fuel/Raw Material	Stack I.D.
D002	9	none	2,256 gal.	Distillates, Low VP	--
	69	none	9,568 gal.	Distillates, Low VP	--
	80	none	15,100 gal.	Distillates, Low VP	--
	3 Still Wash	none	3,900 gal.	Distillates, Low VP	--
	85	none	3,900 gal.	Distillates, Low VP	--
	178	none	16,120 gal.	Distillates, Low VP	--
	273-278	none	26,004 gal. ea.	Distillates, Low VP	--
	307-309, 314-315	none	30,050 gal. ea.	Distillates, Low VP	--
	342	none	34,000 gal.	Distillates, Low VP	
	8501, 8503	none	845,968 gal. ea.	Distillates, Low VP	
D003	601	none	60,914 gal.	Distillates, Medium VP	
	2108	none	217,336 gal.	Distillates, Medium VP	
D004	176-177	none	16,120 gal. ea.	Heat Poly Charge Stock	--
	205-206	none	20,305 gal. ea.	Heat Poly Charge Stock	--
	1014	none	100,651 gal.	Heat Poly Charge Stock	--
	2104, 2109	none	217,336 gal. ea.	Heat Poly Charge Stock	--
D005	76	none	7,614 gal.	Miscellaneous	--
	60SC	none	6,016 gal.	Miscellaneous	--
	252	none	24,052 gal.	Miscellaneous	--
	9 Agitator	none	1,980 gal.	Miscellaneous	--
D006	1, 2	none	19,320 gal. ea.	Naphthenic/Ink/ Vegetable Oil	--
	4	none	17,626 gal.	Naphthenic/Ink/ Vegetable Oil	--
	10	none	20,850 gal.	Naphthenic/Ink/ Vegetable Oil	--
	68	none	9,568 gal.	Naphthenic/Ink/ Vegetable Oil	--
	81	none	10,000 gal.	Naphthenic/Ink/ Vegetable Oil	--
	100	none	10,450 gal.	Naphthenic/Ink/ Vegetable Oil	--
	102	none	10,000 gal.	Naphthenic/Ink/ Vegetable Oil	--
	108	none	10,450 gal.	Naphthenic/Ink/ Vegetable Oil	--
	112	none	9,107 gal.	Naphthenic/Ink/ Vegetable Oil	--
	145	none	1,763 gal.	Naphthenic/Ink/ Vegetable Oil	--

I.D.	Source Description	Control Device(s)	Maximum Capacity	Fuel/Raw Material	Stack I.D.
	202-204	none	20,082 gal. ea.	Naphthenic/Ink/ Vegetable Oil	--
	302-303	none	30,050 gal. ea.	Naphthenic/Ink/ Vegetable Oil	--
D007	82-83	none	10,000 gal. ea.	NEVCHEM LR	--
D008	1008	none	100,980 gal.	Recovered Oil	
D009	1012	none	100,651 gal.	Resin Former	--
	1015	none	100,980 gal.	Resin Former	
	5003	none	497,277 gal.	Resin Former	--
	8502, 8504-8506	none	845,968 gal. ea.	Resin Former	--
	6301-6302	none	630,000 gal. ea.	Resin Former	--
D010	135	none	2,010 gal.	Resin Solutions	--
	304-305, 312-313, 316-317	none	30,050 gal. ea.	Resin Solutions	--
	320	none	22,438 gal.	Resin Solutions	--
	330-334	none	30,913 gal. ea.	Resin Solutions	--
D011	271-272	none	26,004 gal. ea.	Unit #20/21 Feed Blend	--
	341	none	34,750 gal.	Unit #20/21 Feed Blend	
	2105-2106	none	217,336 gal. ea.	Unit #20/21 Feed Blend	--
Miscellaneous Sources					
F001	Roads and Vehicles	none	n/a	n/a	--
G001	Hydrolaser Water Blasting	none		pressurized water	--
G002	Parts Washing	none	2,500 gal/yr	degreasing materials	--
G003	R&D Laboratory Hoods	none			
G004	Tank Cleaning and Painting	none	2,000 gal/yr	sandblasting agents, primer, coatings	--

STACKS

Table 3: Stacks

Stack ID	Stack Name	Stack Height (ft)	Stack Diameter (ft)	Exhaust Rate (acfm)	Exhaust Temp. (°F)	Lining/Outer Material
S001	#15 Still Process Heater	70	2.8	4,000	782	carbon steel / LHV castable
S006	#16 Still Process Heater	57	2.25	2,876	698	carbon steel / LHV castable
S009	#18 Still Process Heater	44.25	2.0	3,830	646	carbon steel / LHV castable
S012	#19 Still Process Heater	26.5	2.5	3,810	641	carbon steel / LHV castable

Stack ID	Stack Name	Stack Height (ft)	Stack Diameter (ft)	Exhaust Rate (acfm)	Exhaust Temp. (°F)	Lining/Outer Material
S020	Unit #20/21 Scrubber Vent	12	0.33	50	70	none / pyrex glass
S021	Unit #20/21 Scrubber Vent	12	0.33	50	70	none / pyrex glass
S025a	Unit #21 Aqueous Treater 1	20	0.25	1.0	68	carbon steel / none
S025b	Unit #21 Aqueous Treater 2	20	0.25	1.0	68	carbon steel / none
S025c	Unit #21 Aqueous Treater 3	20	0.25	1.0	68	carbon steel / none
S026	#3 Cont. Still & Decanter	25	0.25	2.4	80	none / carbon steel
S027	#3 Continuous Still Process Heater	30	1.5	2,200	620	carbon steel / none
S042	#2 Flaker Kettle 1	25	0.5	1.0	390	carbon steel / none
S043	#2 Flaker Kettle 2	25	0.5	1.0	390	carbon steel / none
S044	#2 Flaker Kettle 3	25	0.5	1.0	390	carbon steel / none
S045	#2 Flaker Kettle 4	25	0.5	1.0	390	carbon steel / none
S046	#2 Flaker Kettle 5	25	0.5	1.0	390	carbon steel / none
S047	#2 Flaker Kettle 6	25	0.5	1.0	390	carbon steel / none
S048	#2 Flaker Kettle 7	25	0.5	1.0	390	carbon steel / none
S050a	#2 Flaker Belt Exhaust	15	2.0	4,850	100	steel / none
S051	#2 Pkg Center Dust Collector	12	0.83 × 0.83	3,000	68	carbon steel / none
S053	#2 Pkg Center Heater	37	2.5	2,500	625	carbon steel / none
S054	#3 Flaker Kettle 1	25	0.50	6.2	350	carbon steel / none
S055	#3 Flaker Kettle 2	25	0.50	6.2	350	carbon steel / none
S056	#3 Flaker Kettle 3	25	0.50	6.2	350	carbon steel / none
S057	#3 Flaker Kettle 4	25	0.50	6.2	350	carbon steel / none
S058	#3 Flaker Kettle 5	25	0.50	6.2	350	carbon steel / none
S059	#3 Flaker Kettle 6	25	0.50	6.2	350	carbon steel / none
S060	#3 Flaker Kettle 7	25	0.50	6.2	350	carbon steel / none
S061a	#3 Flaker Belt Exhaust 1	15	2.0	4,850	68	carbon steel / none
S061b	#3 Flaker Belt Exhaust 2	15	2.0	4,850	68	carbon steel / none
S061c	#3 Flaker Belt Exhaust 3	15	2.0	4,850	68	carbon steel / none
S062	#3 Pkg Center Dust Collector	12	0.83 × 0.83	3,000	68	carbon steel / none
S063	#3 Pkg Center Pouring Station	15	2.0	3,300	68	carbon steel / none
S064	#3 Pkg Center Heater	51	2.0	1,500	626	carbon steel / LHV castable
S065	#5 Flaker Kettle 1	25	0.5	1.2	390	carbon steel / none
S066	#5 Flaker Kettle 2	25	0.5	1.2	390	carbon steel / none
S067	#5 Flaker Kettle 3	25	0.5	1.2	390	carbon steel / none
S068a	#5 Flaker Belt Exhaust 1	15	2.0	4,850	68	carbon steel / none
S068b	#5 Flaker Belt Exhaust 2	15	2.0	4,850	68	carbon steel / none
S068c	#5 Flaker Belt Exhaust 3	15	2.0	4,850	68	carbon steel / none
S069	#5 Pkg Center Dust Collector	12	0.83 × 0.83	3,000	68	carbon steel / none

Stack ID	Stack Name	Stack Height (ft)	Stack Diameter (ft)	Exhaust Rate (acfm)	Exhaust Temp. (ºF)	Lining/Outer Material
S070	#5 Pkg Center Heater	24	1.5	1,480	640	carbon steel / none
S071	Batch Treatment Tank T-2011	30	0.33	16	90	carbon steel / none
S072	Batch Treatment Tank T-2012	30	0.33	16	90	carbon steel / none
S073	Batch Treatment Tank T-2013	30	0.33	16	90	carbon steel / none
S074	Biological Treatment/ Aeration Tank TA-2	25	2.0	1,250	90	carbon steel / none
S075	Biological Treatment/ Aeration Tank TA-3	25	2.0	1,250	90	carbon steel / none
S076	Effluent Tank TA-7	15	0.33	1.0	90	carbon steel / none
S077	Sludge Tank T-2010	30	0.33	1.0	90	carbon steel / none
S078	API Separator	6.0	0.33	1.0	90	carbon steel / none
S078a	Aerobic Digester TA-6	25	0.17	1.0	90	carbon steel / none
S098	#8 Boiler	54	4.0	10,400	540	carbon steel / LHV castable
S099	#6 Boiler	35	3.0	11,600	354	carbon steel / LHV castable
S101	Thermal Oxidizer Stack	48	2.2	23,760	1,400	cast refractory / carbon steel
S104	Unit #43 Process Heater	65	3.0	6,700	550	carbon steel / LHV castable

METHOD OF DEMONSTRATING COMPLIANCE:

Methods of demonstrating compliance with the emission standards set in this permit are summarized in Table 4 below. See Operating Permit #0060-OP24 for the specific conditions for determining compliance with the applicable requirements. Compliance with the short-term (lb/hr) limits must be maintained at all times, including startup and shutdown unless explicitly stated otherwise in the permit. Any emissions due to startup and/or shutdown are included in facility's total annual emissions.

The reporting period requirements of §61.357 and §63.7951(a)(5) apply. However, the Department has approved different dates for the reporting schedule in accordance with these sections, which the facility will follow. See Operating Permit #0060-OP24, Section III.15 for the actual reporting dates.

Table 4: Method(s) of Demonstrating Compliance

TVOP Section	Process	Method(s) of Demonstrating Compliance
V.A	Heat Polymerization Still Nos. 15, 16, 18, 19 & 43	• Testing of the thermal oxidizer at least once every five years • Continuous monitoring of thermal oxidizer temperature • Recordkeeping of production and raw materials per batch and batch cycle times *Note: The reporting period is now semiannually instead of quarterly due to all the Heat Poly Stills now being controlled by the thermal oxidizer. Because of the common header from all stills to the thermal oxidizer, it is not possible to determine controlled emissions from the individual stills. However, sample ports are available to determine uncontrolled emissions from each still.*
V.B	Unit #20/21	• Recordkeeping and reporting of the number of product changes and, if the rolling 12-month total number of product changes reaches 90% of the maximum allowable, calculated emissions • Recordkeeping of batch temperature • Recordkeeping of monthly product changes and poly oil addition rate • Recordkeeping of water washes in the aqueous treaters per batch • Recordkeeping of scrubber flowrate and catalyst used • Analyses of materials

TVOP Section	Process	Method(s) of Demonstrating Compliance
V.C	Continuous Still #3	• Recordkeeping and reporting of the number of product changes and, if the rolling 12-month total number of product changes reaches 90% of the maximum allowable, calculated emissions • Recordkeeping of daily production and raw materials
V.D, V.E, V.F	Packaging Center Nos. 2, 3, and 5	• Emissions testing at least once every five years • Continuous monitoring of baghouse pressure drops • Annual inspections of baghouse • Recordkeeping and reporting of calculated emissions from kettles • Daily, monthly, and 12-month recordkeeping of production and raw materials
V.G	Wastewater Collection, Conveyance, and Treatment	• Monthly photo ionization detector (PID) readings • Recordkeeping of flows and influent concentrations
V.I	Final Product Loading	• Monitoring of vapor balancing system during barge off-loading • Recordkeeping of loading operations and, if the amount of material transferred reaches 90% of the maximum allowable, calculated emissions
V.J, V.K	Heat Poly Still Heaters, Continuous Still Heater, Packaging Center Heaters	• Recordkeeping of fuel use
V.L	Boiler #6	• Emissions testing at least once every five years • Recordkeeping of fuel use
V.M	Boiler #8	• Recordkeeping of fuel use
V.N	Storage Tanks	• Recordkeeping of material, material vapor pressure, and throughput
VI.A	Groundwater Remediation	• Testing of each container for vapor-tightness or for no detectable organic emissions Recordkeeping of materials collected
VI.B	Emergency Generators	• Recordkeeping of hours of operation
IV.31 & IV.32	Leak Detection and Repair	• Identification of all components in VOC and HAP service • Periodic monitoring of all components • Recordkeeping of all monitor readings and repairs

EMISSION CALCULATIONS:

All vapor pressures were calculated using Antoine Equation coefficients found in published texts.

P001: Heat Polymerization Stills

Emissions from the Heat Polymerization Stills consists of controlled emissions from Still Nos. 15, 16, 18, 19, and Unit #43 from the thermal oxidizer stack, as well as emissions from combustion of natural gas from the thermal oxidizer itself.

Thermal Oxidizer Combustion

All emissions from thermal oxidizer combustion, except for particulate matter, were based on factors found in U.S. EPA AP-42 *Section 1.4: Natural Gas Combustion (7/98)* and *Section 1.5: Liquified Petroleum Gas Combustion (7/08).* Particulate matter emissions limits are those found in Article XXI, §2104.02.a.1.A. A 15% adjustment was added to all emissions calculated with AP-42 factors to account for operational variability. All PM is assumed to be PM_{10}, and all PM_{10} is assumed to be $PM_{2.5}$.

The following assumptions were also used as a basis:

Natural gas rating:	1,020 Btu/scf
Hours of operation:	8,760 hours/year on natural gas
Max fuel amount:	18.9 MMBtu/hr

Table 5: Thermal Oxidizer Combustion Emissions

Pollutant	AP-42 Factors	Thermal Oxidizer Combustion	
	lb/10^6 scf	lb/hr	tpy
Particulate Matter[1]	0.008[1]	0.151	**0.66**
PM_{10}	0.008[1]	0.151	**0.66**
$PM_{2.5}$	0.008[1]	0.151	**0.66**
Nitrogen Oxides (NO_X)	100	2.131	**9.33**
Sulfur Oxides (SO_X)	0.6	0.013	**0.06**
Carbon Monoxide (CO)	84	1.790	**7.84**
VOC	5.5	0.117	**0.51**
Total HAP	1.9	0.040	**0.18**
Formaldehyde	0.075	0.002	**0.01**

[1]Based on Article XXI, §2104.02.a.1.A (lb/MMBtu)

<u>Emission Factor Derivation</u>
Emission factors for each emission episode of the heat polymerization process were determined based on VOC and HAP rates in the September 1997 stack test conducted on Still #18, except for atmospheric venting and vacuum distillation. Those values were determined from the July 2003 stack test conducted on Unit #43. The uncontrolled emission factors are summarized in Table 6a below. These factors represent the sum of emissions from (where applicable) the ejector stack, receiver vent, and decanter vent.

Table 6a: Heat Poly Still Emission Factors (uncontrolled)

Emission Episode	Typical Duration	VOC		Benzene		Cumene		Ethylbenzene	
	hours	lb/hr	lb/batch	lb/hr	lb/batch	lb/hr	lb/batch	lb/hr	lb/batch
Charging	1.25	0.910	1.138	0.061	0.076	0.003	0.004	0.047	0.058
Initial Heat-up	2.83	2.360	6.679	0.055	0.157	0.002	0.006	0.034	0.095
Heat to Hold Temp.	4.58								
Hold	10.60								
Atmospheric Venting	5.00	10.100	50.500	0.060	0.302	0.003	0.013	0.044	0.222
Vac. Dist./ Steam Strip.	8.50	27.970	237.745	0.124	1.054	0.017	0.144	0.152	1.288
Cool Down	2.73	3.120	8.518	0.003	0.010	0.000	0.000	0.000	0.000
Addition/ Cutback / Agitation	4.58	0.900	4.122	0.063	0.288	0.003	0.013	0.047	0.214
Pump Out	2.58								
Misc. Time	2.25								
Total	42.17		308.701		1.886		0.178		1.877

Emission Episode	Typical Duration	Styrene		Toluene		Xylenes			
	hours	lb/hr	lb/batch	lb/hr	lb/batch	lb/hr	lb/batch		
Charging	1.25	0.027	0.036	0.107	0.134	0.040	0.050		
Initial Heat-up	2.83	0.022	0.063	0.098	0.279	0.029	0.082		
Heat to Hold Temp.	4.58								
Hold	10.60								
Atmospheric Venting	5.00	0.028	0.140	0.115	0.574	0.038	0.190		
Vac. Dist./ Steam Strip.	8.50	0.057	0.486	0.000	0.000	0.163	1.383		
Cool Down	2.73	0.002	0.005	0.030	0.082	0.000	0.000		
Addition/ Cutback / Agitation	4.58	0.030	0.136	0.126	0.578	0.040	0.183		
Pump Out	2.58								
Misc. Time	2.25								
Total	42.17		0.866		1.647		1.887		

Heat Polymerization Emissions Limitations

Controlled emissions from the heat polymerization process are based on the emission factors from Table 6a, the thermal oxidizer destruction efficiency of 98%, and the following information from existing permits:

Table 6b: Heat Poly Unit Permit Summary

Unit	Reference Permit	Operation (hours/year)	Max. Production (batches/year)
#15	#4051008-000-42507 *(06/22/84)*	8,760	189
#16	#4051008-000-42505 *(08/19/93)*		258
#18	#4051008-000-76201 *(12/19/74)*		274
#19	#4051008-000-76202 *(09/09/75)*		260
Unit #43	#0060-I001 *(04/30/99)*		260

Short-term emissions (lb/hr) are based on the emission episode with the highest emissions rate from Table 6a. Long-term emissions (tpy) are based on the lb/batch emission factor and maximum production from Table 6b.

Table 6c: Heat Poly Emissions (controlled)

Pollutant	#15 Still		#16 Still		#18 Still	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Total VOC	0.559	0.583	0.559	0.796	0.559	0.846
Benzene	0.002	0.004	0.002	0.005	0.002	0.005
Ethylbenzene	0.003	0.004	0.003	0.005	0.003	0.005
Styrene	0.001	0.002	0.001	0.002	0.001	0.002
Xylenes	0.003	0.004	0.003	0.005	0.003	0.005
Total HAP	0.013	0.016	0.013	0.022	0.013	0.023

Pollutant	#19 Still		Unit #43		Total from T.O.	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Total VOC	0.559	0.803	0.559	0.803	2.797	**3.831**
Benzene	0.002	0.005	0.002	0.005	0.012	0.023
Ethylbenzene	0.003	0.005	0.003	0.005	0.015	0.023
Styrene	0.001	0.002	0.001	0.002	0.006	0.011
Xylenes	0.003	0.005	0.003	0.005	0.016	0.023
Total HAP	0.013	0.022	0.013	0.022	0.064	**0.104**

Table 7: Thermal Oxidizer Emission Limitations

Pollutant	Short-term Limits (lb/hr)	Long-term Limits (tpy[1])
Particulate Matter[2]	0.15	0.66
Particulate Matter <10 µm (PM_{10}) [2]	0.15	0.66
Particulate Matter <2.5 µm ($PM_{2.5}$) [2]	0.15	0.66
Nitrogen Oxides (NO_X)	2.13	9.33
Sulfur Oxides (SO_X)	0.02	0.06
Carbon Monoxide (CO)	1.79	7.84
Volatile Organic Compounds (VOC)	2.91	4.34
Hazardous Air Pollutants (HAP)	0.10	0.28

[1]A year is defined as any consecutive 12-month period.
[2]All particulate matter emission limits are for filterable particulate.

<u>P006: Unit #20/21</u>

The arrangement for the Unit #20/21 Process consists of the integration of equipment from the previous Unit #20 and Unit #21 into four different scenarios. For each scenario, there are four possible charge stocks: Nevchem, Nevpene, Nevex (FT-11-134), and NI-100. The four scenarios consist of the equipment and steps in Table 8a.

Table 8a – Scenario Nos. 1- 4

Scenario #1	Scenario #2
• Reactor – charging • Reactor – heat-up • Unit #20 Holding Tank – charging • Neutralization Mix Tank – charging • Neutralization Mix Tank – heat-up • Neutralization Decanter – charging • Rinse Mix Tank – charging • Rinse Decanter – charging • Aqueous Treater #4 – charging	• Reactor – charging • Reactor – heat-up • Unit #20 Holding Tank – charging • Aqueous Treater #10 – charging • Aqueous Treater #10 – water wash • Aqueous Treater #10 – heat-up • Aqueous Treater #11 – charging • Aqueous Treater #11 – water wash • Aqueous Treater #11 – heat-up

Scenario #3	Scenario #4
• Reactor – charging • Reactor – heat-up • Holding Tank #1 – charging • Holding Tank #1 – solvent flush • Holding Tank #2 – charging • Holding Tank #2 – solvent flush • Holding Tank #171 – charging (Nevchem only)	• Reactor – charging • Reactor – heat-up • Holding Tank #1 – charging • Holding Tank #1 – solvent flush • Holding Tank #2 – charging • Holding Tank #2 – solvent flush • Holding Tank #171 – charging (Nevchem only)

Scenario #3	**Scenario #4**
• Holding Tank #171 – solvent flush (Nevchem only) • Neutralization Mix Tank – charging • Neutralization Mix Tank – heat-up • Neutralization Decanter – charging • Rinse Mix Tank – charging • Rinse Decanter – charging • Aqueous Treater #4 – charging	• Holding Tank #171 – solvent flush (Nevchem only) • Aqueous Treater #10 – charging • Aqueous Treater #10 – water wash • Aqueous Treater #10 – heat-up • Aqueous Treater #11 – charging • Aqueous Treater #11 – water wash • Aqueous Treater #11 – heat-up

Emissions from all vessels occur during material charging operations. Each time a product change occurs, the empty reactor is filled with charge stock, causing a displacement of reactor vapors. Boron trifluoride (BF_3) gas is also injected as a catalyst. After the initial charge into the reactor, the liquid level remains constant until the next product change. Emissions also occur from the reactor and Neutralization Mix Tank during heat-up operations. It is assumed that:

1. Vapors are saturated with either Nevchem, Nevpene, FT-11-134, or NI-100 charge stock vapors, Poly Oil “A” vapors, or Poly Oil “B” vapors.
2. The reactor contains nitrogen as the remaining gas component.
3. All vapors from the reactor discharge to the Holding Tank, then to the scrubber.

All calculations were based on the following information:

Table 8b – General Information

Product Changes:	78 changes/yr
Density of Poly Oil @ 30°C:	7.689 lb/gal
Max. Poly Oil Throughput:	66,600,000 lbs/yr
	8,661,725 gal/yr
Ideal Gas Law Constant:	10.731 ft^3·psi/lb-mol·°R

Table 8c – Vessel Operating Parameters

Unit	U20 Reactor	U20 Holding Tank	Holding Tank Nos. 1 & 2	Holding Tank #171	Neut. Mix Tank	Neut. Decanter
Volume (gal.)	300	4,700	4,100	19,500	5,000	71
(cu. ft.)	40.1	628.3	548.1	2,606.8	668.4	9.4
Operating Level	100%	90%	90%	90%	90%	90%
Displ. (cf/change)	40.1	565.5	493.3	2,346.1	601.6	8.5
(cf/year)	3,128	44,107	38,476	182,996	46,922	662
Press. (psia)	29.7	14.7	14.7	14.7	59.7	59.7
Temperature (°F)						
Nevchem	68	113	113	113	113	176
Nevpene	68	95	95	--	95	176
Nevex	68	158	158	--	158	158
NI-100	68	158	158	--	158	158

Unit	Rinse Mix Tank	Rinse Decanter	Aqueous Treater #4	Aqueous Treater #10 Charge	Aqueous Treater #11 Charge	Aqueous Treater #10 Water Wash	Aqueous Treater #11 Water Wash
Volume (gal.)	1,200	71	29,200	--	--	--	--
(cu. ft.)	160.4	9.4	3,903.5	--	--	--	--
Operating Level	90%	90%	90%	--	--	--	--
Displ. (cf/change)	144.4	8.5	3,513.1	1,283.3	1,577.4	401.0	561.5
(cf/year)	11,261	662	274,024	519,435	638,472	162,323	227,253
Press. (psia)	59.7	59.7	14.7	14.7	14.7	14.7	14.7
Temperature (°F)							
Nevchem	176	176	104	113	113	113	113
Nevpene	176	176	104	95	95	95	95
Nevex	158	158	104	158	158	158	158
NI-100	158	158	104	158	158	158	158

Table 8d – Vessel Heat-Up Parameters

Unit	Reactor		Neutralization Mix Tank		Aqueous Treater #10		Aqueous Treater #11	
Free Vol. (cf/change)	0.0		66.8		187.2		173.8	
Pressure (psia)	29.7		59.7		14.7		14.7	
Changes/year	78		78		405 × 2/chg.		405 × 2/chg.	
Temp. Change (°F)								
Nevchem	68	113	113	176	113	149	113	149
Nevpene	68	95	95	176	95	131	95	131
Nevex	68	158	158	158	158	158	158	158
NI-100	68	158	158	158	158	158	158	158

Table 8e – Constituent Composition Data

		Nevchem		Nevpene		Nevex		NI-100	
Pollutant	**M.W.**	**Charge Stock**	**Poly Oil "A"**	**Charge Stock**	**Poly Oil "A"**	**Charge Stock**	**Poly Oil "A"**	**Charge Stock**	**Poly Oil "A"**
Benzene	78.11	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Toluene	92.13	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ethylbenzene	106.17	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
p-Xylene	106.20	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
m-Xylene	106.17	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
o-Xylene	106.17	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Cumene	120.20	0.40	0.40	0.40	0.40	0.27	0.27	0.30	0.30
Styrene	104.15	1.80	0.09	1.90	0.10	7.56	0.38	8.40	0.42
Naphthalene	128.17	2.10	2.10	1.90	1.90	1.98	1.98	2.20	2.20
Pentane	72.15	3.90	1.00	16.20	2.00	0.00	0.00	0.00	0.00
Vinylnorborene	120.16	0.70	0.04	0.60	0.03	0.09	0.00	0.10	0.01
n-Propylbenzene	120.19	3.30	3.30	3.00	3.00	1.35	1.35	1.50	1.50
Ethyltoluene	120.19	12.10	12.10	10.30	10.30	6.48	6.48	7.20	7.20
1,3,5-Trimethylbenzene	120.20	2.10	2.10	1.80	1.80	1.26	1.26	1.40	1.40
t-Butylbenzene	134.22	2.60	2.60	2.30	2.30	1.62	1.62	1.80	1.80
1,2,4-Trimethylbenzene	120.19	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
alpha-Methylstyrene	118.00	1.30	0.07	1.40	0.07	11.98	0.60	2.20	0.11
Dicyclo -pentadiene	132.20	23.20	1.16	16.30	0.82	0.81	0.04	0.90	0.05
Vinyltoluenes	118.18	6.30	0.32	6.80	0.34	13.68	0.68	15.20	0.76
1,2,3-Trimethylbenzene	120.20	2.80	2.80	2.40	2.40	2.52	2.52	2.80	2.80
Courmarone	118.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dimethylstyrenes	134.22	3.40	0.17	3.50	0.18	6.12	0.31	6.80	0.34
Indane	118.18	2.50	2.50	2.20	2.20	1.08	1.08	1.20	1.20
Indene	116.16	5.50	0.28	6.00	0.30	12.69	0.63	14.10	0.71
Boiling Point Range 1	130.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Methylindenses	130.19	1.40	0.07	0.60	0.03	6.12	0.31	4.10	0.21
Boiling Point Range 5	130.00	4.50	8.82	2.30	6.75	4.29	10.39	9.70	8.91
Resins		0.00	40.00	0.00	45.00	0.00	50.00	0.00	50.00

Table 8f – Constituent Vapor Pressures

		Vapor Pressure (psia)							
Pollutant	**M.W.**	**68 °F**	**95 °F**	**104 °F**	**113 °F**	**131 °F**	**149 °F**	**158 °F**	**176 °F**
Benzene	78.11	1.444	4.269	3.493	4.269	6.243	8.896	10.525	14.495
Toluene	92.13	0.423	1.426	1.139	1.426	2.183	3.246	3.918	5.605
Ethylbenzene	106.17	0.136	0.534	0.415	0.534	0.858	1.332	1.640	2.435
p-Xylene	106.20	0.095	0.385	0.297	0.385	0.627	0.986	1.222	1.837
m-Xylene	106.17	0.095	0.385	0.297	0.385	0.627	0.986	1.222	1.837
o-Xylene	106.17	0.095	0.385	0.297	0.385	0.627	0.986	1.222	1.837
Cumene	120.20	0.047	0.210	0.160	0.210	0.354	0.573	0.719	1.107
Styrene	104.15	0.087	0.359	0.277	0.359	0.588	0.930	1.156	1.746
Naphthalene	128.17	0.001	0.006	0.004	0.006	0.012	0.023	0.031	0.054
Pentane	72.15	8.191	19.785	16.798	19.785	26.987	36.062	41.393	53.827
Vinylnorborene	120.16	0.047	0.210	0.160	0.210	0.354	0.573	0.719	1.107
n-Propylbenzene	120.19	0.047	0.211	0.160	0.211	0.354	0.573	0.720	1.108
Ethyltoluene	120.19	0.037	0.168	0.127	0.168	0.284	0.463	0.583	0.903
1,3,5-Trimethylbenzene	120.20	0.037	0.168	0.127	0.168	0.284	0.463	0.583	0.903
t-Butylbenzene	134.22	0.014	0.073	0.054	0.073	0.130	0.222	0.285	0.459
1,2,4-Trimethylbenzene	120.19	0.037	0.168	0.127	0.168	0.284	0.463	0.583	0.903
alpha-Methylstyrene	118.00	0.031	0.141	0.106	0.141	0.239	0.391	0.494	0.770
Dicyclo -pentadiene	132.20	0.056	0.251	0.191	0.251	0.423	0.685	0.862	1.331
Vinyltoluenes	118.18	0.031	0.141	0.106	0.141	0.239	0.391	0.494	0.770
1,2,3-Trimethylbenzene	120.20	0.037	0.168	0.127	0.168	0.284	0.463	0.583	0.903
Courmarone	118.10	0.025	0.118	0.089	0.118	0.201	0.331	0.419	0.654
Dimethylstyrenes	134.22	0.008	0.044	0.032	0.044	0.081	0.140	0.183	0.300
Indane	118.18	0.024	0.112	0.085	0.112	0.192	0.315	0.398	0.622
Indene	116.16	0.021	0.094	0.071	0.094	0.160	0.263	0.333	0.521
Boiling Point Range 1	130.00	0.051	0.221	0.169	0.221	0.370	0.595	0.745	1.142
Methylindenses	130.19	0.005	0.030	0.022	0.030	0.055	0.097	0.126	0.207
Boiling Point Range 5	130.00	0.001	0.006	0.004	0.006	0.012	0.023	0.031	0.054

For all charging operations, emissions were calculated using the following equation:

$$E = V/RT \times \Sigma(P_i)(MW_i)$$

Where:
E = Mass of Emissions; P_i = Partial Pressure
V = Volume of Gas Displaced; MW_i = Molecular Weight
R = Ideal Gas Constant = 10.731 cf psi/lb·mol °R

For all heat-up operations, emissions were calculated using the following equation:

$$E = [(P_{iT1}/P_{a1} + P_{iT2}/P_{a2})/2] \times Delta(n) \times MW_i$$

Where:
E = Mass of emissions
P_{iT1} = Partial pressure of constituent at T1
P_{iT2} = Partial pressure of constituent at T2
MW_i = Molecular weight
P_{a1} = Initial gas pressure
P_{a2} = Final gas pressure
Delta(n) = Moles of gas displaced
$Delta(n) = V/R \times [(P_{a1}/T_1) - (P_{a2}/T_2)]$
R = Ideal gas constant = 10.731 cf psi/lb·mol °R
P_S = System pressure
T_1 = Initial temperature
T_2 = Final temperature
V = Volume of free space
$P_{a1} = P_S - \Sigma P_{iT1}$
$P_{a2} = P_S - \Sigma P_{iT2}$

Table 9a – Scenario #1 Potential Emissions

	Nevchem		**Nevpene**		**Nevex**		**NI-100**	
	lb/chg	**tpy**	**lb/chg**	**tpy**	**lb/chg**	**tpy**	**lb/chg**	**tpy**
Total VOC	44.487	1.888	70.053	3.054	24.516	0.956	24.985	0.974
Total HAP	8.550	0.369	8.196	0.370	14.169	0.553	14.202	0.554
Benzene	0.585	0.025	0.569	0.025	0.882	0.034	0.881	0.034
Ethylbenzene	1.839	0.079	1.759	0.080	3.036	0.118	3.031	0.118
Naphthalene	0.018	0.001	0.016	0.001	0.036	0.001	0.040	0.002
Styrene	0.046	0.002	0.046	0.002	0.321	0.013	0.356	0.014
Xylenes	3.987	0.173	3.806	0.173	6.673	0.260	6.663	0.260

Table 9b – Scenario #2 Potential Emissions

	Nevchem		**Nevpene**		**Nevex**		**NI-100**	
	lb/chg	**tpy**	**lb/chg**	**tpy**	**lb/chg**	**tpy**	**lb/chg**	**tpy**
Total VOC	43.431	7.857	52.797	9.457	47.688	8.642	48.629	8.813
Total HAP	8.365	1.520	5.569	1.012	26.704	4.839	26.772	4.852
Benzene	0.574	0.104	0.418	0.076	1.485	0.269	1.483	0.269
Ethylbenzene	1.800	0.327	1.184	0.215	5.783	1.048	5.774	1.047
Naphthalene	0.017	0.003	0.008	0.001	0.085	0.015	0.095	0.017
Styrene	0.045	0.008	0.031	0.005	0.622	0.112	0.690	0.124
Xylenes	3.895	0.708	2.525	0.459	12.928	2.343	12.909	2.340

Table 9c – Scenario #3 Potential Emissions

	Nevchem		Nevpene		Nevex		NI-100	
	lb/chg	tpy	lb/chg	tpy	lb/chg	tpy	lb/chg	tpy
Total VOC	76.318	3.130	76.463	3.304	30.689	1.197	31.248	1.219
Total HAP	15.528	0.641	9.265	0.412	17.285	0.674	17.324	0.676
Benzene	1.048	0.043	0.641	0.028	1.058	0.041	1.056	0.041
Ethylbenzene	3.307	0.137	1.978	0.088	3.700	0.144	3.695	0.144
Naphthalene	0.031	0.001	0.017	0.001	0.045	0.002	0.050	0.002
Styrene	0.120	0.005	0.063	0.003	0.394	0.015	0.436	0.017
Xylenes	7.131	0.296	4.266	0.191	8.141	0.318	8.129	0.317

Table 9d – Scenario #4 Potential Emissions

	Nevchem		Nevpene		Nevex		NI-100	
	lb/chg	tpy	lb/chg	tpy	lb/chg	tpy	lb/chg	tpy
Total VOC	75.261	9.098	59.206	9.707	53.861	8.883	54.892	9.057
Total HAP	15.342	1.792	6.637	1.054	29.820	4.961	29.895	4.973
Benzene	1.037	0.122	0.490	0.079	1.661	0.276	1.658	0.276
Ethylbenzene	3.268	0.384	1.402	0.224	6.447	1.074	6.437	1.072
Naphthalene	0.030	0.004	0.009	0.001	0.094	0.016	0.105	0.018
Styrene	0.119	0.011	0.048	0.006	0.695	0.115	0.769	0.127
Xylenes	7.039	0.831	2.985	0.477	14.396	2.401	14.375	2.397

P008: #3 Continuous Still

The only emission point for the #3 Continuous Still is the respective decanter. The only emission episode would be the initial filling of distillate to the still column, decanter, heater tube, piping, and overheads condenser. The liquid level of the decanter is then maintained at a constant level after the initial fill. The still is operated at or near atmospheric conditions (there are no vacuum pumps or steam ejectors for this still). The following assumptions are used:

1. Vapors are saturated with distillate (the overheads from the still).
2. The decanter contains nitrogen as the remaining gas component.
3. All vapors discharge to the atmosphere.

Table 10a: Specific Assumptions

Still Dimensions & Operating Parameters	#3 Continuous Still	
Column Volume	141.4	cubic feet
Decanter Volume	56.5	cubic feet
Heater Tube Volume	65.0	cubic feet
Side Stripper Volume	n/a	
SS Tank Volume	n/a	
Piping Volume	7.3	cubic feet
Condenser Volume	144.0	cubic feet
Normal Operating Liquid Level (column & decanter)	90	%
Duration for Startup	2	hours

Still Dimensions & Operating Parameters	#3 Continuous Still	
Max. Number of Startups	1	start-up/day
	365	start-ups/year
Volume of Gas Displaced	414.2	cf/start-up
	207.1	cf/hour
	151,194	cf/year
System Pressure	0	psig
System Temperature	131	°F
	590.67	°R

Emissions were calculated using the following equation:

$E = V/RT \times \Sigma(P_i)(MW_i)$

Where:

E = Mass of Emissions — P_i = Partial Pressure
V = Volume of Gas Displaced — MW_i = Molecular Weight
R = Ideal Gas Constant = 10.731 cf psi/lb·mol °R

The total number of moles calculated for #3 Still = 0.888 lb·mol per startup

Sample Calculation for Benzene from the #3 Still:

Molecular weight = 78.11 lb/lb·mol
Vapor pressure = 6.243 psia
Liquid weight percent = 0.04
Mole fraction, X_i = (0.04 ÷ 78.11 lb/lb·mol) ÷ 0.888 lb·mol = 6.00×10^{-4}
Partial pressure = 6.243 psia × 6.00×10^{-4} = 3.60×10^{-3} psia

Benzene emissions:

(414.2 cf/startup × 3.60×10^{-3} psia) ÷ (10.731 cf·psi/lb·mol°R × 590.67 °R) × 78.12 lb/lb·mol = 1.8×10^{-2} lb/product change of benzene

(151,194 cf/yr × 3.60×10^{-3} psia) ÷ (10.731 cf·psi/lb·mol°R × 590.67 °R) × 78.12 lb/lb·mol ÷ 2,000 lb/ton = 3.0×10^{-3} tpy of benzene

Table 10b: Continuous Still #3

Constituent	M.W.	Vapor Pressure	Liquid Wt.	#3 Continuous Still	
	lb/lb·mol	psia	%	lb/product change	tpy
Total VOC	112.55		100.00	14.004	**2.556**
Benzene	78.11	6.243	0.04	0.018	**0.003**
Biphenyl	154.20	0.005	0.00	0.000	**0.000**
Cumene	104.15	0.588	1.00	0.043	**0.008**
Ethylbenzene	106.17	0.858	5.00	0.315	**0.058**
Naphthalene	106.20	0.627	15.00	0.692	**0.126**
Styrene	92.13	2.183	3.50	0.562	**0.103**
Toluene	120.20	0.354	1.00	0.026	**0.005**
Xylene	128.17	0.012	4.00	0.004	**0.001**

Constituent	M.W.	Vapor Pressure	Liquid Wt.	#3 Continuous Still	
	lb/lb·mol	psia	%	lb/product change	tpy
Total HAP				1.660	**0.303**

P011-P013: Packaging Centers

Emissions from the packaging centers consist of those emissions from the kettles, the flaker belts, and the baghouses. The #3 Packaging Center also has emissions from pouring stations. Emissions factors were determined from the October 2007 stack test on the new #2 Packaging Center (for the #2 and #5 pkg. centers) and the August 2005 stack test on the old #2-2 Packaging Center (for the #3 pkg. center). It is assumed that the vapor composition in the flaking belt exhaust is the same as that in the kettle exhaust.

The #2 Packaging Center was originally permitted under Installation Permit #0060-I007 and the #5 Packaging Center Flaker Belt under Installation Permit #0060-I008. A 10% adjustment factor was added to the kettle and flaker belt emissions from the #3 Packaging Center to account for variability in the test results.
Maximum throughputs:

#2 pkg. center:	87,600,000 lb/yr of resin
#3 pkg. center:	122,600,000 lb/yr of resin at Kettles
	48,000,000 lb/yr at Flaking Belt
#5 pkg. center:	78,800,000 lb/yr of resin
Hours of operation:	8,760 hours/year

Kettle Emissions

VOC emissions factors for kettle emissions were determined by organic vapor analyzer (OVA) readings:

Blowing into empty kettles	= 0.05 lb/100,000 lb_{resin}
Pumping into kettles	= 1.35 lb/100,000 lb_{resin}
Line blowing of empty kettles	= 0.21 lb/100,000 lb_{resin}
Nitrogen blanket on resin drain kettles	= 28.0 lb/100,000 lb_{resin}
Nitrogen blanketing on solution kettles	= 2.7 lb/100,000 lb_{resin}
Total VOC	= 32.31 lb/100,000 lb_{resin}

Table 11a: Kettle Emissions

Process	Pollutant	Emission Factor	Emissions	
		lb/lb VOC[1,2]	lb/hr	tpy
#2 Kettles (7 kettles)	Total VOC	3.23×10^{-4}	**3.554**	**15.567**
	Benzene	1.08×10^{-4}	0.000	0.002
	Ethylbenzene	3.05×10^{-3}	0.011	0.047
	Naphthalene	7.89×10^{-3}	0.028	0.123
	Styrene	3.14×10^{-3}	0.011	0.049
	Xylenes	6.99×10^{-3}	0.025	0.109
	Total HAP	2.31×10^{-2}	**0.082**	**0.360**
#3 Kettles (7 kettles)	Total VOC	3.23×10^{-4}	**4.974**	**21.787**
	Benzene	8.13×10^{-5}	0.000	0.002
	Ethylbenzene	1.55×10^{-3}	0.008	0.034
	Naphthalene	2.50×10^{-2}	0.124	0.545
	Styrene	1.23×10^{-3}	0.006	0.027
	Xylenes	2.43×10^{-3}	0.012	0.053

Process	Pollutant	Emission Factor	Emissions	
		lb/lb VOC[1,2]	lb/hr	tpy
	Total HAP	3.24×10^{-2}	**0.161**	**0.705**
#5 Kettles (3 kettles)	Total VOC	3.23×10^{-4}	**3.197**	**14.003**
	Benzene	8.13×10^{-5}	0.000	0.001
	Ethylbenzene	1.55×10^{-3}	0.005	0.022
	Naphthalene	2.50×10^{-2}	0.080	0.350
	Styrene	1.23×10^{-3}	0.004	0.017
	Xylenes	2.43×10^{-3}	0.008	0.034
	Total HAP	3.24×10^{-2}	**0.104**	**0.454**

[1]The VOC emission factor is in lb/lb of resin.
[2]Since the HAP factors are based on VOC, the 10% adjustment factor was added only to the VOC emissions numbers.

Flaking Belt Emissions

Table 11b: Flaking Belt Emissions

Process	Pollutant	Emission Factor	Emissions	
		lb/lb resin	lb/hr	tpy
#2 Belt[1]	Total VOC	0.338	**1.859**	**8.142**
	Benzene	3.64×10^{-5}	0.001	0.001
	Ethylbenzene	1.03×10^{-3}	0.006	0.025
	Naphthalene	2.67×10^{-3}	0.015	0.064
	Styrene	1.06×10^{-3}	0.006	0.026
	Xylenes	2.36×10^{-3}	0.013	0.057
	Total HAP	7.82×10^{-3}	**0.043**	**0.188**
#3 Belt	Total VOC	0.507	**1.528**	**6.693**
	Benzene	4.12×10^{-5}	0.000	0.001
	Ethylbenzene	7.87×10^{-4}	0.002	0.010
	Naphthalene	1.27×10^{-2}	0.038	0.167
	Styrene	6.25×10^{-4}	0.002	0.008
	Xylenes	1.23×10^{-3}	0.004	0.016
	Total HAP	1.64×10^{-2}	**0.049**	**0.216**
#5 Belt	Total VOC	0.338	**1.672**	**7.324**
	Benzene	3.64×10^{-5}	0.000	0.001
	Ethylbenzene	1.03×10^{-3}	0.002	0.007
	Naphthalene	2.67×10^{-3}	0.005	0.022
	Styrene	1.06×10^{-3}	0.013	0.058
	Xylenes	2.36×10^{-3}	0.005	0.023
	Total HAP	7.82×10^{-3}	**0.039**	**0.169**

[1]Limits from IP #0060-I007.

#3 Pouring Stations

VOC emissions from the pouring stations were based on the methodology found in U.S. EPA AP-42 *Section 5.2, Transportation and Marketing of Petroleum Liquids (6/08)*:

$L_L = 12.46 \times (SPM \div T)$

Where:

S	= saturation factor	= 1.45 for splash loading
P	= true vapor pressure of liquid loaded, psia	= 0.097 psia
M	= molecular weight of vapors, lb/lb·mol	= 120 lb/lb·mol
T	= temperature of bulk liquid loaded, °R	= 888 °R
L_L	= loading loss, lb/10^3 gallons of liquid loaded	= 0.236 $lb_{VOC}/10^3$ gal

Maximum Throughputs:

	Portable Station	No. 3 Station
Max. throughput, lb/yr:	1,000,000	122,000,000
Density:	8.5 lb/gal	
Pour rate:	30 gal/min	
Max. throughput, gal/yr:	117,647	14,352,941
Max. throughput, gal/hr:	1,800	1,800

Table 11c: #3 Pouring Station Emissions

Process	Pollutant	Emission Factor	Emissions	
		lb/lb VOC[1,2]	lb/hr	tpy
Portable Pouring Station	Total VOC	0.236 lb/10^3 gal	**0.468**	**0.015**
	Benzene	8.13×10^{-5}	0.000	0.000
	Ethylbenzene	1.55×10^{-3}	0.001	0.000
	Naphthalene	2.50×10^{-2}	0.012	0.000
	Styrene	1.23×10^{-3}	0.001	0.000
	Xylenes	2.43×10^{-3}	0.001	0.000
	Total HAP	3.24×10^{-2}	**0.015**	**0.000**
#3 Pouring Station	Total VOC	0.236 lb/10^3 gal	**0.468**	**1.864**
	Benzene	8.13×10^{-5}	0.000	0.000
	Ethylbenzene	1.55×10^{-3}	0.001	0.003
	Naphthalene	2.50×10^{-2}	0.012	0.047
	Styrene	1.23×10^{-3}	0.001	0.002
	Xylenes	2.43×10^{-3}	0.001	0.005
	Total HAP	3.24×10^{-2}	**0.015**	**0.060**
Total	Total VOC		**0.936**	**1.879**
	Benzene		**0.000**	**0.000**
	Ethylbenzene		**0.002**	**0.003**
	Naphthalene		**0.024**	**0.047**
	Styrene		**0.002**	**0.002**
	Xylenes		**0.002**	**0.005**
	Total HAP		**0.030**	**0.060**

[1]The VOC emission factor is in lb/lb of resin.
[2]Since the HAP factors are based on VOC, the 10% adjustment factor was added only to the VOC emissions numbers.

<u>Baghouses Emissions</u>
Particulate emissions from the packaging center baghouses are based on the following information. All PM is assumed to be PM_{10}, and all PM_{10} is assumed to be $PM_{2.5}$. For #2 Belt baghouse limits taken from Installation Permit #0060-I011, issued 11/07/2017.

Hourly PM emissions for #3 and #5 Belt were obtained from the following equation:

$E = 10 \times 3000 \times 60 \times 0.001 \div 7000 = 0.257$ lb/hr

Where:

Influent Loading = 10 grains/ft^3 (based on manufacturer's data)
Fan Capacity = 3,000 scfm (based on manufacturer's data)
Control Efficiency = 99.9%
Transfer Factor = 7000 gr/lb

Table 11d: Baghouses Emissions

	#2 Packaging Center Baghouse	#3 Packaging Center Baghouse	#5 Packaging Center Baghouse
Emissions:	0.237 lb/hr	0.257 lb/hr	0.257 lb/hr
	1.04 tpy	1.126 tpy	1.126 tpy

<u>Packaging Center Summary</u>

Table 12a: Summary of Packaging Center Emissions (lbs/hr)

	PM[1]	Total VOC	Total HAP	Benzene	Ethyl-benzene	Naphthalene	Styrene	Xylenes
#2 Packaging Center								
Kettles	--	3.554	0.082	0.000	0.011	0.028	0.011	0.025
Flaking/ Baghouse	0.237	1.859	0.043	0.001	0.006	0.015	0.006	0.013
Total	**0.237**	**5.413**	**0.125**	**0.001**	**0.017**	**0.043**	**0.017**	**0.038**
#3 Packaging Center								
Kettles	--	4.974	0.161	0.000	0.008	0.124	0.006	0.012
Flaking/ Baghouse	0.257	1.528	0.049	0.000	0.002	0.038	0.002	0.004
Pouring	--	0.936	0.030	0.000	0.002	0.024	0.002	0.002
Total	**0.257**	**7.438**	**0.240**	**0.000**	**0.012**	**0.186**	**0.010**	**0.018**
#5 Packaging Center								
Kettles	--	3.197	0.104	0.000	0.005	0.080	0.004	0.008
Flaking/ Baghouse	0.257	1.672	0.039	0.000	0.002	0.005	0.013	0.005
Total	**0.257**	**4.869**	**0.143**	**0.000**	**0.007**	**0.085**	**0.017**	**0.013**

[1]All PM is assumed to be PM_{10}, and all PM_{10} is assumed to be $PM_{2.5}$.

Table 12b: Summary of Packaging Center Emissions (tons/yr[2])

	PM[1]	Total VOC	Total HAP	Benzene	Ethyl-benzene	Naphthalene	Styrene	Xylenes
#2 Packaging Center								
Kettles	--	15.567	0.360	0.002	0.047	0.123	0.049	0.109
Flaking/ Baghouse	1.04	8.142	0.188	0.001	0.025	0.064	0.026	0.057

	PM[1]	Total VOC	Total HAP	Benzene	Ethyl-benzene	Naphthalene	Styrene	Xylenes
Total	**1.04**	**23.709**	**0.548**	**0.003**	**0.072**	**0.187**	**0.075**	**0.166**
#3 Packaging Center								
Kettles	--	21.787	0.705	0.002	0.034	0.545	0.027	0.053
Flaking/ Baghouse	1.126	6.693	0.216	0.001	0.010	0.167	0.008	0.016
Pouring	--	1.879	0.060	0.000	0.003	0.047	0.002	0.005
Total	**1.126**	**30.359**	**0.981**	**0.003**	**0.047**	**0.759**	**0.037**	**0.074**
#5 Packaging Center								
Kettles	--	14.003	0.454	0.001	0.022	0.350	0.017	0.034
Flaking/ Baghouse	1.126	7.324	0.169	0.001	0.007	0.022	0.058	0.023
Total	**1.126**	**21.327**	**0.623**	**0.002**	**0.029**	**0.372**	**0.075**	**0.057**

[1]All PM is assumed to be PM_{10}, and all PM_{10} is assumed to be $PM_{2.5}$.

P014: Wastewater Collection, Conveyance, and Treatment

In January 2008, a comprehensive review of the Wastewater Collection, Conveyance, and Treatment System was conducted by Malcolm Pirnie, Inc. The study, titled *Hazardous Air Pollutants (HAPs) and Volatile Organic Compounds (VOCs) Emission Estimate for Wastewater Conveyance and Treatment*, can be found in the Title V Renewal Operating Permit application under Emission Calculations. Emission factors for the wastewater conveyance system and the wastewater treatment system were taken directly from that study.

Wastewater Conveyance

Hours of operation = 8,760 hours/year

VOC, ug/m^3 = (442.16)(PID reading, ppm) + 194,138 Per manhole or catch basin

Average PID concentration, ppmv 233.0 Per manhole or catch basin

Average air flow rate, cfm 2.46 Per manhole or catch basin

Total VOC, lb/hr [(442.16) x (avg ppmv) + 194,138] : (1,000,000 g/ug) : (454 g/lb) : (35.3 cf/m^3) x (cfm) x (60 min/hr) x (number of sources) = **0.77** lbs/hr

Total VOC, tons/yr **3.36** at 8760 hr/yr

Table 13: Wastewater Conveyance System

PID[1] Units	Qty.	Emission Factors – lb/hr/source							Total HAP Emissions	
		Benzene	Toluene	Ethyl-Benzene	Styrene	Cumene	Xylenes	Total HAP	lb/hr	tpy
10	40	8.92×10^{-8}	1.04×10^{-6}	2.48×10^{-6}	4.10×10^{-6}	1.68×10^{-6}	2.00×10^{-5}	2.94×10^{-5}	0.001	0.005
50	44	4.46×10^{-7}	5.20×10^{-6}	1.24×10^{-5}	1.66×10^{-5}	8.39×10^{-6}	9.98×10^{-5}	1.43×10^{-4}	0.006	0.028
100	20	8.92×10^{-7}	1.04×10^{-5}	2.48×10^{-5}	3.04×10^{-5}	1.68×10^{-5}	2.00×10^{-4}	2.83×10^{-4}	0.006	0.025
500	30	4.46×10^{-6}	5.20×10^{-5}	1.24×10^{-4}	1.23×10^{-4}	8.39×10^{-5}	9.98×10^{-4}	1.39×10^{-3}	0.042	0.182
1,000	26	8.92×10^{-6}	1.04×10^{-4}	2.48×10^{-4}	2.25×10^{-4}	1.68×10^{-4}	2.00×10^{-3}	2.75×10^{-3}	0.072	0.313
2,000	15	1.78×10^{-5}	2.08×10^{-4}	4.97×10^{-4}	4.12×10^{-4}	3.36×10^{-4}	3.99×10^{-3}	5.46×10^{-3}	0.082	0.359
3,000	3	2.68×10^{-5}	3.12×10^{-4}	7.45×10^{-4}	5.86×10^{-4}	5.03×10^{-4}	5.99×10^{-3}	8.16×10^{-3}	0.024	0.107
4,000	0	3.57×10^{-5}	4.16×10^{-4}	9.94×10^{-4}	7.53×10^{-4}	6.71×10^{-4}	7.99×10^{-3}	1.09×10^{-2}	0.000	0.000
5,000	1	4.46×10^{-5}	5.20×10^{-4}	1.24×10^{-3}	9.15×10^{-4}	8.39×10^{-4}	9.98×10^{-3}	1.35×10^{-2}	0.014	0.059
Total HAP Emissions:									**0.25**	**1.08**
Total VOC Emissions[2]:									**0.77**	**3.36**

[1]Photo Ionization Detector (PID) readings (ppm).
[2]Calculated in the Malcolm Pirnie Report using the same methodology as for HAP emissions.

Wastewater Treatment
Hours of operation = 8,760 hours/year
Total flow = 105,000,000 gallons/year

Table 14: Wastewater Treatment System

Pollutant	Surge Tank (5001)		Batch Tanks Emissions (2011/2012/2013)		Equalization Tank Emissions (5002)		Biological Treatment (TA-2/TA-3)		Total Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
1,3-Butadiene	0.000	0.000	0.001	0.005	0.000	0.000	0.000	0.000	0.001	0.005
Benzene	0.076	0.334	0.001	0.004	0.000	0.001	0.000	0.001	0.077	0.339
Carbon Disulfide	0.000	0.000	0.0014	0.006	0.0000	0.000	0.0000	0.000	0.001	0.006
Cumene	0.000	0.000	0.0100	0.044	0.0008	0.004	0.0004	0.002	0.011	0.050
Ethylbenzene	0.020	0.089	0.0530	0.232	0.0179	0.078	0.0092	0.040	0.101	0.442
Hexane	0.000	0.000	0.0016	0.007	0.0000	0.000	0.0000	0.000	0.002	0.007
Methylene Chloride	0.000	0.000	0.0011	0.005	0.0000	0.000	0.0000	0.000	0.001	0.005
Naphthalene	0.025	0.108	0.0002	0.001	0.0188	0.082	0.0013	0.005	0.045	0.196
Styrene	0.012	0.052	0.0234	0.102	0.0192	0.084	0.0829	0.363	0.142	0.622
Toluene	0.212	0.926	0.0061	0.027	0.0021	0.009	0.0017	0.007	0.221	0.970
Xylenes	0.086	0.378	0.2469	1.082	0.1075	0.471	0.1017	0.445	0.546	2.390
Total HAP	0.431	**1.89**	0.3457	**1.514**	0.167	**0.731**	0.197	**0.863**	**1.149**	**3.03**
Total VOC	0.431	**1.89**	2.3469	**10.280**	0.409	**1.790**	0.313	**1.370**	**3.511**	**15.38**

P016: Final Product Loading

The Final Product Loading consists of two types of loading: Barge Loading and Tankcar/Tankwagon Loading.

Emissions were estimated using the saturation factor method found in U.S. EPA AP-42 *Section 5.2: Transportation and Marketing of Petroleum Liquids (6/08)*. A saturation factor of 0.5 (submerged fill) was used for barge loading, and the loading loss emission factor was calculated using the following equation:

$L_L = 12.46 \times (SPM \div T)$

Where:

L_L = loading loss, lb/10^3 gallons of liquid loaded
S = saturation factor
P = true vapor pressure of liquid loaded, psia
M = molecular weight of vapors, lb/lb·mol
T = temperature of bulk liquid loaded, °R

Barge Loading – LX-830

Emissions from the barge loading were determined using the following basis:

Transfer rate to barges = 850 gal/min = 51,000 gal/hr
Annual quantity transferred = 6,000,000 gal/year
Loading temperature = 60 °F = 520 °R

VOC and HAP emissions were calculated using the maximum weight percent concentration and the vapor pressure. The following totals were calculated:

Total moles (liquid phase) = 0.811 lb·mol
True vapor pressure = 0.274 psia
Total molecular weight (vapor phase) = 79.32 lb/lb·mol

Loading loss factor $L_L = 12.46 \times (0.5 \times 0.274 \times 79.33 \div 520) = 0.261$ lb/10^3 gal

Sample Calculation for Benzene:

Maximum concentration = 0.070$\%_{wt}$
Molecular weight = 78.12 lb/lb·mol
True Vapor pressure = 1.163 psia

Mole fraction (liquid phase), X_i = (0.070 ÷ 78.12 lb/lb·mol) ÷ 0.811 lb·mol = 1.10×10^{-3}
Partial pressure = 1.163 psia × 1.10×10^{-3} = 1.28×10^{-3} psia
Mole fraction (vapor phase), Yi = 1.28×10^{-3} psia ÷ 0.274 psia = 4.67×10^{-3}
Vapor molecular weight = 4.67×10^{-3} × 78.12 lb/lb·mol = 0.366 lb/lb·mol
Vapor weight fraction = 0.366 lb/lb·mol ÷ 79.366 lb/lb·mol = 4.60×10^{-3}
Benzene emissions = 0.261 lb/10^3 gal × 51,000 gal/hr ÷ 1,000 gal/10^3 gal × 4.60×10^{-3}
= <u>0.061 lb/hr of benzene</u>
= 0.261 lb/10^3gal × 6,000,000 gal/yr ÷ 1,000 gal/10^3 gal × 4.60×10^{-3} ÷ 2,000lb/ton
= <u>0.004 tpy of benzene</u>

Table 15: Barge Loading Emissions

	Concentration	Molecular Weight	Vapor Pressure	Vapor Wt. Fraction	Emissions	
	wt. %	lb/lb·mol	psia		lb/hr	tpy
Total VOC	100.00			1.000	**13.30**	**0.78**
Benzene	0.07	78.1	1.163	0.005	0.06	0.004
Toluene	0.22	92.1	0.332	0.004	0.05	0.003
Ethylbenzene	1.80	106.2	0.104	0.011	0.14	0.008
Xylenes	6.00	106.2	0.072	0.024	0.32	0.019
Cumene	0.60	120.2	0.035	0.001	0.02	0.001

	Concentration	Molecular Weight	Vapor Pressure	Vapor Wt. Fraction	Emissions	
	wt. %	lb/lb·mol	psia		lb/hr	tpy
Styrene	0.80	104.2	0.066	0.003	0.04	0.002
Naphthalene	3.20	106.2	0.001	0.001	0.00	0.001
Total HAP					**0.64**	**0.04**

<u>Tankcar & Tankwagon Loading – NCLR</u>
Emissions from the barge loading were determined using the same method as for barge loading with a saturation factor of 1.0 and the following basis:

Transfer rate to tankcars = 250 gal/min = 15,000 gal/hr
Annual quantity transferred = 24,300,000 gal/year (sum of Tankwagon and tankcar loading)
Loading temperature = 200 °F = 660 °R

VOC and HAP emissions were calculated using the maximum weight percent concentration and the vapor pressure. The following totals were calculated:

Total moles (liquid phase) = 0.769 lb·mol
Partial vapor pressure = 0.613 psia
Total molecular weight (vapor phase) = 129.679 lb/lb·mol

Loading loss factor $L_L = 12.46 \times (1.0 \times 0.613 \times 129.68 \div 660) = 1.501$ lb/10^3 gal

Table 16: Tankcar & Tankwagon Loading Emissions

	Concentration	Molecular Weight	Vapor Pressure	Vapor Wt. Fraction	Emissions	
	wt. %	lb/lb·mol	psia		lb/hr	tpy
Total VOC	100.000			1.0000	**22.52**	**18.24**
Biphenyl	0.005	154.2	2.682	0.0002	0.01	0.01
Naphthalene	0.050	106.2	13.705	0.0112	0.25	0.20
Total HAP					**0.26**	**0.21**

<u>P017: Groundwater Remediation</u>
The Groundwater Remediation System consists of the following emission sources: oil recovery wells - container filling, #2 drywell, old #8 water well, backwash tank, and fugitive emissions (equipment leaks).

<u>Oil Recovery Wells – Container Filling Emissions</u>
Total VOC emissions were calculated using the following:

Vapor MW = 78.72 lb/lb·mol
Vapor pressure = 1.20 psia
Hourly volume = 315 gal/hr (7 wells at 45 gal/hr each)
Annual volume = 164,400 gal/yr

VOC emissions = (gallons) × (1 ft^3/7.48 gal) × (1 mole/379 ft^3) × (MW) × (vap. pres/14.7)

Table 17a: Oil Recovery Container Emissions

Compound	Vapor Concentration	Tote-Filling	Tote-Filling	Drum-Filling	Total
	% by wt.	lbs/hr	tpy	tpy	tpy
Total VOC	**100.00**	**0.80**	**0.209**	**0.209**	**0.417**

Compound	Vapor Concentration	Tote-Filling	Tote-Filling	Drum-Filling	Total
	% by wt.	lbs/hr	tpy	tpy	tpy
Benzene	1.92	0.015	0.004	0.004	0.008
Toluene	1.32	0.011	0.003	0.003	0.006
Styrene	0.08	0.001	0.0002	0.0002	0.000
Ethylbenzene	0.39	0.003	0.0008	0.0008	0.002
Xylenes	1.15	0.009	0.0024	0.0024	0.005
Cumene	0.06	0.001	0.0001	0.0001	0.000
Naphthalene	0.03	0.000	0.0001	0.0001	0.000

#2 Drywell and Old #8 Water Well Emissions

Emissions from these two systems were calculated using the U.S. EPA WATER 9 program and the following flowrates:

#2 Drywell	Old #8 Well
1,200 gal/hr	12,000 gal/hr
1,500,000 gal/year	520,000 gal/year

Table 17b: #2 Drywell & Old #8 Well Emissions

Compound	#2 Drywell				Old #8 Well			
	g/sec	lb/gal	lb/hr	tpy	g/sec	lb/gal	lb/hr	tpy
Total VOC	2.39×10^{-4}	1.58×10^{-6}	**0.0019**	**0.0012**	2.39×10^{-3}	1.58×10^{-6}	**0.0189**	**0.0004**
Benzene	8.02×10^{-5}	5.30×10^{-7}	0.0006	0.0004	8.01×10^{-4}	5.30×10^{-7}	0.0064	0.0001
Toluene	1.95×10^{-5}	1.29×10^{-7}	0.0002	0.0001	1.95×10^{-4}	1.29×10^{-7}	0.0015	0.0000
Styrene	3.18×10^{-6}	2.10×10^{-8}	0.0000	0.0000	3.17×10^{-5}	2.10×10^{-8}	0.0003	0.0000
Ethylbenzene	2.84×10^{-5}	1.88×10^{-7}	0.0002	0.0001	2.84×10^{-4}	1.88×10^{-7}	0.0023	0.0000
Xylenes	3.30×10^{-5}	2.18×10^{-7}	0.0003	0.0002	3.30×10^{-4}	2.18×10^{-7}	0.0026	0.0001
Cumene	1.24×10^{-5}	8.20×10^{-8}	0.0001	0.0001	1.24×10^{-4}	8.20×10^{-8}	0.0010	0.0000
Naphthalene	7.17×10^{-6}	4.74×10^{-8}	0.0001	0.0000	7.16×10^{-5}	4.74×10^{-8}	0.0006	0.0000
Total HAP			**0.0019**	**0.0012**			**0.0189**	**0.0004**

Equalization Tank (backwash), Tank #247

Emissions based on EPA's TANKS 4.0 program and 8,000 hr/yr:
VOC emissions = 2.5 lb/yr or 0.001 tpy

Groundwater Remediation System Equipment Leaks (Fugitive emissions)

SOCMI emission factors used for calculating equipment leak emissions were taken from U.S. EPA's "Protocol for Equipment Leak Emission Estimates", 1995.

Table 17c: Groundwater Remediation Equipment Leak (Fugitive) Emissions

	Valves	Press. Relief	Pumps	Flanges	Screwed Connect.	Hours per year	VOC Emissions	
SOCMI Factor (lb/hr/source)	0.000363	0.0983	0.00411	0.000178	0.000178			
	Equipment Count						lb/hr	tpy
Carbon Adsorption	82	1	3	41	9	8,760	0.149	0.654
Water Wells	55	0	7	2	1		0.049	0.216
Oil Recovery Wells	55	0	7	2	1		0.049	0.216
Totals	192	1	17	45	11		**0.248**	**1.086**

<u>Groundwater Remediation System Summary</u>

Table 18: Summary of Groundwater Remediation System Emissions

Compound	Oil Recovery Wells	Backwash Tank	#2 Drywell	#8 Well	Equipment Leaks	Total Emissions
	tpy	tpy	tpy	tpy	tpy	tpy
Total VOC	0.417	0.001	0.001	0.000	1.086	**1.51**
Benzene	0.008		0.000	0.000		0.009
Toluene	0.006		0.000	0.000		0.006
Styrene	0.000		0.000	0.000		0.000
Ethylbenzene	0.002		0.000	0.000		0.002
Xylene	0.005		0.000	0.000		0.005
Cumene	0.000		0.000	0.000		0.000
Naphthalene	0.000		0.000	0.000		0.000
Total HAP						**0.02**

<u>Fugitive Emissions from Equipment Leaks</u>

Calculations for equipment leak fugitive emissions were based on the US EPA document *Protocol for Equipment Leak Emissions Estimates* (November 1995, EPA-453/R-95-017)) and components identified in a comprehensive LDAR study conducted by Air/Compliance Consultants, Inc. in 2007.

Components Above Leak Threshold:	2%
Components Below Leak Threshold:	98% ("default zero")
Hours of Operation:	8,760 hours/year

Table 19a: VOC Emission Factors

	Gas Valves	Liquid Valves	Pressure Relief Valves	Pumps	Agitator Seals	Connectors[1]
Screening Values, ppm	500	500	500	1000	10,000	500
Calculated Leak Emission Rate, lb/hr/source	9.36E-04	2.00E-03	7.01E-03	1.24E-02	8.28E-02	1.64E-03
Default Zero Factor, lb/hr/source	1.46E-06	1.08E-06	1.65E-05	1.65E-05	1.65E-05	1.43E-06

[1]The Connectors category includes: flanges, screw connectors, manways, gauge hatches, instruments, and open-ended lines. They all have the same emission factor.

Table 19b: Fugitive VOC Emission

Service Type	Equipment Counts[1]						VOC	
	Gas Valves	Liquid Valves	Pressure Relief Valves	Pumps	Agitator Seals	Connectors	lb/hr	tpy
Light Liquid		1,836		57	29	7,071	0.381	1.67
Heavy Liquid		2,154		58	35	8,075	0.439	1.92
Gas	367		37				0.013	0.06
Overall Totals	367	3,990	37	115	64	15,146	**0.83**	**3.65**

[1]Equipment counts provided by Neville Chemical Company.

Total HAP emissions are based on 15.3% of the total VOC emissions from leaks. That percentage was estimated by taking the five largest emitting processes and calculating a mean-weighted average of HAP emissions by ACHD during review of the current Title V permit.

Table 19c: Fugitive HAP Emissions

Pollutant	Predicted[1] Emission Rate lbs/hr	Percentage of Total HAP %	Potential Emissions tons/yr
Total HAP Emissions			**0.558**
Benzene	0.0001	0.25	0.001
Cumene	0.0021	4.08	0.023
Ethylbenzene	0.0061	11.81	0.066
Naphthalene	0.0086	16.72	0.093
Phenol	0.00005	0.10	0.001
Styrene	0.0124	24.27	0.135
Toluene	0.0008	1.46	0.008
Xylene	0.0211	41.29	0.230
Totals	**0.051**	100	

[1]A fugitive emissions monitoring program was conducted in 2007 for equipment in HAP service, where the USEPA Correlation approach was used to estimate VOC and HAP emissions. Only lines containing HAP were monitored.

B001-B004, B015 & B006: Still Process Heaters

All emissions from the Heat Poly Still Process Heaters and the #3 Continuous Still Process Heater, except for particulate matter, were based on factors found in U.S. EPA AP-42 *Section 1.4: Natural Gas Combustion (7/98)*. Particulate matter emissions limits are those found in Article XXI, §2104.02.a.1.A. A 15% adjustment was added to all emissions calculated with AP-42 factors to account for operational variability.

The following assumptions were also used as a basis:

Natural gas rating: 1,020 Btu/scf
Hours of operation: 8,760 hours/year on natural gas

Table 20: Still Process Heaters Emissions Limitations

Pollutant	AP-42 Factors[1] nat. gas lb/10^6 scf	#15 Still B001		#16 Still B002		#18 Still B003		#19 Still B004		#43 Still B015		#3 Cont. Still, B006	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
PM[1]	0.008[1]	0.060	0.26	0.049	0.21	0.058	0.25	0.060	0.26	0.060	0.26	0.042	0.18
NO_X	100	0.846	3.71	0.688	3.01	0.811	3.56	0.846	3.71	0.846	3.71	0.592	2.59
SO_X	0.6	0.005	0.02	0.004	0.02	0.005	0.02	0.005	0.02	0.005	0.02	0.004	0.02
CO	84	0.710	3.11	0.578	2.53	0.682	2.99	0.710	3.11	0.710	3.11	0.497	2.18
VOC	5.5	0.047	0.21	0.038	0.17	0.043	0.20	0.047	0.21	0.047	0.21	0.033	0.14
HAP	1.9	0.016	0.07	0.013	0.06	0.014	0.06	0.016	0.07	0.016	0.07	0.011	0.05

[1]All PM is assumed to be PM_{10}, and all PM_{10} is assumed to be $PM_{2.5}$. Emission factors for PM, PM_{10}, and $PM_{2.5}$ are from Article XXI, §2104.02.a.1.A (lb/MMBtu).

<u>B009-B011: Packaging Center Heaters</u>

All emissions from the Packaging Center Heaters, except for particulate matter, were based on factors found in U.S. EPA AP-42 *Section 1.4: Natural Gas Combustion (7/98)*. Particulate matter emissions limits are those found in Article XXI, §2104.02.a.1.A. A 15% adjustment was added to all emissions calculated with AP-42 factors to account for operational variability. All PM is assumed to be PM_{10}, and all PM_{10} is assumed to be $PM_{2.5}$.

The following assumptions were also used as a basis:

Natural gas rating: 1,020 Btu/scf
Hours of operation: 8,760 hours/year on natural gas

Table 21: Packaging Center Heater Emissions Limitations

Pollutant	AP-42 Factors[1] Natural Gas	#2 Packaging Center Heater (B009)		#3 Packaging Center Heater (B010)		#5 Packaging Center Heater (B011)	
	lb/10^6 scf	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
PM[1]	0.008[1]	0.040	**0.18**	0.031	**0.14**	0.024	**0.11**
NO_X	100	0.564	**2.47**	0.441	**1.93**	0.338	**1.48**
SO_X	0.6	0.003	**0.01**	0.003	**0.01**	0.002	**0.01**
CO	84	0.474	**2.08**	0.370	**1.62**	0.284	**1.24**
VOC	5.5	0.040	**0.18**	0.024	**0.11**	0.024	**0.11**
HAP	1.9	0.011	**0.05**	0.001	**0.01**	0.001	**0.01**

[1]All PM is assumed to be PM_{10}, and all PM_{10} is assumed to be $PM_{2.5}$. Emission factors for PM, PM_{10}, and $PM_{2.5}$ are from Article XXI, §2104.02.a.1.A (lb/MMBtu).

<u>B012 & B013: Boiler Nos.8 & 6</u>

All emissions from Boiler #6, except for particulate matter were based on factors found in U.S. EPA AP-42 *Section 1.4: Natural Gas Combustion (7/98)*. Particulate matter emissions limits are those found in Article XXI, §2104.02.a.1.A. A 15% adjustment was added to all emissions calculated with AP-42 factors to account for operational variability. All PM is assumed to be PM_{10}, and all PM_{10} is assumed to be $PM_{2.5}$.

Emissions from Boiler #8 are based on the amended existing permit (IP #0060-I003a). However, the facility no longer burns LX®-830 fuel oil in Boiler #8, so only the emissions from natural gas combustion are used. All PM is assumed to be PM_{10}, and all PM_{10} is assumed to be $PM_{2.5}$.

The following assumptions were also used as a basis:

Natural gas rating: 1,020 Btu/scf
Hours of operation: 8,760 hours/year

Table 22: Boiler Nos. 6 & 8 Emissions

Pollutant	AP-42 Factors	Boiler #6		Boiler #8	
		49.4 MMBtu/hr		29.5 MMBtu/hr	
	lb/10^6 scf	lb/hr	tpy	lb/hr	tpy
PM[1]	0.008[1]	0.40	**1.75**	0.24	**1.05**
NO_X	100[2]	5.57	**24.39**	1.66	**7.28**
SO_X	0.6	0.03	**0.15**	0.02	**0.09**
CO	84	4.68	**20.49**	2.79	**12.24**
VOC	5.5	0.31	**1.34**	0.18	**0.80**
Total HAP	1.9	0.11	**0.48**	0.06	**0.26**

[1]All PM is assumed to be PM_{10}, and all PM_{10} is assumed to be $PM_{2.5}$. Emission factors for PM, PM_{10}, and $PM_{2.5}$ are from Article XXI, §2104.02.a.1.A (lb/MMBtu).
[2] NO_X factor for Boiler #8 is 50 lb/mmcf, based on a 50% reduction due to low-NO_X burner and flue gas recirculation.

<u>Emergency Generators</u>

All emissions, except for particulate matter, are based on US EPA AP-42 factors, *Section 3.2: Natural Gas-Fired Reciprocating Engines (10/96)*. A 15% adjustment was added to all emissions calculated with AP-42 factors to account for operational variability. Particulate matter emissions limits are those found Article XXI, §2104.02.a.1.A. All PM is assumed to be PM_{10}, and all PM_{10} is assumed to be $PM_{2.5}$.

Basis:
Natural gas rating: 1,020 Btu/scf
Hours of Operation: 500 hours/year

Table 23a: Emergency Generator Emissions

Pollutant	AP-42	WWTP		Unit #43		BH		Building #50	
	Factor[1]	600 hp		691 hp		242 hp		31 hp	
	4SLB	1.53 MMBtu/hr		1.76 MMBtu/hr		0.62 MMBtu/hr		0.08 hp	
	lb/MMBtu	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
PM[2]	0.012	0.018	0.005	0.021	0.005	0.007	0.002	0.001	0.001
NO_X	8.47×10^{-1}	1.488	0.372	1.714	0.429	0.600	0.150	0.077	0.019
SO_X	5.88×10^{-4}	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
CO	5.57×10^{-1}	0.979	0.245	1.127	0.282	0.395	0.099	0.051	0.013
VOC	1.18×10^{-1}	0.207	0.052	0.239	0.060	0.084	0.021	0.011	0.003

Pollutant	AP-42	Building #19A		QTL		Building #50 ICT			
	Factor[1]	10 hp		12 hp		29.5 hp			
	4SLB	0.03 MMBtu/hr		0.03 MMBtu/hr		0.08 MMBtu/hr			
	lb/MMBtu	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy		
PM[2]	0.012	0.001	0.001	0.001	0.001	0.001	0.001		
NO_X	8.47×10^{-1}	0.025	0.006	0.030	0.007	0.073	0.018		
SO_X	5.88×10^{-4}	0.001	0.001	0.001	0.001	0.001	0.001		
CO	5.57×10^{-1}	0.016	0.004	0.020	0.005	0.048	0.012		
VOC	1.18×10^{-1}	0.003	0.001	0.004	0.001	0.010	0.003		

Pollutant	AP-42	Heat Poly						Total	

	Factor[1]	600 hp						(for 8 generators)
	4SRB	1.53 MMBtu/hr						
	lb/MMBtu	lb/hr	tpy					tpy
PM[2]	0.012	0.018	0.005					**0.017**
NO_X	2.27×10^{0}	3.989	0.997					**1.999**
SO_X	5.88×10^{-4}	0.001	0.001					**0.001**
CO	3.72×10^{0}	6.537	1.634					**2.293**
VOC	2.96×10^{-2}	0.052	0.013					**0.153**

[1]Emission factors for PM, PM_{10}, and $PM_{2.5}$ are from Article XXI, §2104.02.a.1.A.
[2]All PM is assumed to be PM_{10}, and all PM_{10} is assumed to be $PM_{2.5}$.

The emergency generators are subject to 40 CFR Part 63, Subpart ZZZZ under the following applicability sections:

Table 23b: Emergency Generator Subpart ZZZZ Applicability

WWTP	Unit #43	BH	Bldg. #50
§63.6640(f)	§63.6640(f)	§63.6602, §63.6625(e),(f), §63.6640(f), §63.6655(f)	§63.6602, §63.6625(e),(f), §63.6640(f), §63.6655(f)
Bldg. #19A	**QTL**	**Bldg. #50 ICT**	**Heat Poly**
§63.6602, §63.6625(e),(f), §63.6640(f), §63.6655(f)	§63.6602, §63.6625(e),(f), §63.6640(f), §63.6655(f)	§63.6602, §63.6625(e),(f), §63.6640(f), §63.6655(f)	§63.6640(f)

Storage Tanks

Emissions from the tanks were estimated using the USEPA Tanks 4.0.9d program for each storage tank. Each tank was then grouped by category. Total throughput emissions represent the maximum based on plant production capacity, not necessarily storage capacity.

The conditions of Installation Permit #0060-I004 for group Tank Nos. 8501- 8506 for emission limits, and throughput of 12,000,000 gallons per year have changed from the installation permit due to these tanks storing different materials.

Table 24a: Tank Material Categories

Category ID	Material Category	Tank ID
D001	Catalytic & Misc. Poly Oil	174, 1001, 1002, 1017
D002	Distillates, Low VP	9, 12-14, 69, 80, 85, 178, 273-278, 307-309, 314, 315, 342, 8501, 8503, #3 Still Wash
D003	Distillates, Mid VP	601, 2108
D004	Heat Poly Charge Stock	176, 177, 205, 206, 1014, 2104, 2109
D005	Miscellaneous	76, 252, 60SC, #9 Agitator
D006	Naphthenic/Ink/Veg Oils	1, 2, 4, 10, 68, 81, 100, 102, 108, 112, 145, 202-204, 302, 303
D007	Nevchem LR	82, 83
D008	Recovered Oil	1008
D009	Resin Former	1012, 1015, 5003, 6301, 6302, 8502, 8504-8506
D010	Resin Solutions	135, 304, 305, 312, 313, 316, 317, 320, 330-334
D011	Unit #20/21 Feed Blend	271, 272, 341, 2105, 2106

Table 24b: Storage Tank Emissions

Category	Max. Thruput MMgal/yr	Potential Emissions – lbs/yr								
		Total VOC	Benzene	Cumene	Ethyl-Benzene	Naphtha	Styrene	Toluene	Xylenes	Total HAP
D001	9.55	6,165	39.1	7.5	20.6	1.7	5.4	64.5	128.2	267.2
D002	20.00	4,493	61.8	14.9	54.2	4.6	71.6	169.9	270.0	646.9
D003	8.80	5,424	21.4	6.9	18.8	1.6	5.0	58.8	116.8	229.2
D004	19.60	3,303	59.8	16.8	366.9	7.7	363.5	575.2	396.1	1,785.9
D005	1.00	82	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D006	9.10	1,687	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D007	1.00	294	12.3	0.0	0.0	7.2	0.0	0.0	0.0	19.5
D008	0.50	41	5.2	1.0	7.5	0.1	0.6	2.0	23.1	39.7
D009	24.86	3,836	76.5	21.5	268.2	9.9	465.1	420.6	506.8	1,768.5
D010	18.19	36,625	0.0	0.0	0.0	24.9	0.0	0.0	0.0	24.9
D011	9.12	6,643	31.9	6.1	69.9	1.4	36.9	87.6	104.4	338.2
Storage Tank Totals	121.71	**68,619**	308.3	74.8	806.4	59.1	948.5	1,379.6	1,546.9	**5,123.6**

Category	Max. Thruput MMgal/yr	Potential Emissions – tpy								
		Total VOC	Benzene	Cumene	Ethyl-Benzene	Naphtha	Styrene	Toluene	Xylenes	Total HAP
D001	9.55	3.08	0.020	0.004	0.010	0.001	0.003	0.032	0.064	0.134
D002	20.00	2.26	0.031	0.007	0.027	0.002	0.036	0.085	0.136	0.325
D003	8.80	2.71	0.011	0.003	0.009	0.001	0.002	0.029	0.058	0.115
D004	19.60	1.65	0.030	0.008	0.183	0.004	0.182	0.288	0.198	0.893
D005	1.00	0.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
D006	9.10	0.84	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
D007	1.00	0.15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
D008	0.50	0.02	0.003	0.001	0.004	0.000	0.000	0.001	0.012	0.020
D009	24.86	1.92	0.038	0.011	0.134	0.005	0.233	0.210	0.253	0.884
D010	18.19	18.31	0.000	0.000	0.000	0.012	0.000	0.000	0.000	0.012
D011	9.12	3.32	0.016	0.003	0.035	0.001	0.018	0.044	0.052	0.169
Storage Tank Totals	121.71	**34.31**	0.15	0.04	0.40	0.03	0.47	0.69	0.77	**2.56**

Other Sources of Minor Significance

Hydrolaser Water Blasting/Cleaning

Emissions from the Hydrolaser Water Blasting/Cleaning operations are worst-case estimates based on engineering judgment and past numbers used by the facility

Table 25: Hydrolaser Water Blasting & Cleaning Emissions Estimate

PM	PM_{10}	$PM_{2.5}$	VOC
tpy	tpy	tpy	tpy
1.0	0.5	0.5	1.0

Parts Washing

Annual usage of cleaning solvent is based on the actual 2009 usage, scaled up (based on engineering judgment) to reflect a worst-case scenario.

Annual usage: 2,500 gallons/year
Solvent density[1]: 6.60 lb/gal

Table 26: Parts Washing Emissions Estimate

Pollutant	MSDS Amount[1]	Annual Usage		Amount Recycled	Total Emissions	
		lb/yr	tpy		lb/yr	tpy
VOC	97%	16,005	8.00	75%	4,001.43	2.00
Benzene	0.04 mg/L	0.0008	0.00	75%	0.000	0.00
p-Dichlorobenzene	5.00 mg/L	0.1043	0.00	75%	0.026	0.00
Toluene	30.00 mg/L	0.6246	-.00	75%	0.156	0.00
Total HAP						0.00

[1]From Safety-Kleen Premium Solvent / Premium Gold Solvent, MSDS #82658.

R&D Laboratory Hoods

Emissions from the R&D Laboratory Hoods are worst-case estimates based on engineering judgment and past numbers used by the facility. Hours of operation are assumed to be 8,760 hours per year.

VOC Emissions = 0.457 lb/hr = **2.000 tpy**

Tank Cleaning & Painting

Annual usage of coatings and solvents are based on the actual 2009 usage, scaled up (based on engineering judgment) to reflect a worst-case scenario.

Total Usage: 2,000 gallons/year
Thinner (20%): 400 gal/yr
Base Coat (40%): 800 gal/yr
Top Coat (40%): 800 gal/yr

Table 27: Tank Cleaning & Painting Emissions Estimate

Material Description	VOC Content		VOC Emissions	
	gr/L	lb/gal	lb/yr	tpy
Low VOC Epoxy Thinner (025T000)	838.2	6.99	2,797.6	1.40
White Base Coat (220B3501)	327.1*	2.73*	2,183.6	1.09
White Enamel Top Coat (379B9500)	372.7*	3.11*	2,488.1	1.24
			Total VOC:	**3.73**

*VOC content as applied

Greenhouse Gas Emissions

Emissions of greenhouse gases (GHG) are from combustion of natural gas from the boilers, process heaters, and the thermal oxidizer, and consist of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Calculations of greenhouse gas and CO_2-equivalent (CO_2e) emissions are based on the methodology found in 40

CFR Part 98, Subpart C, §98.33(a)(1), and factors found in Table A-1, Table C-1, and Table C-2 of that subpart.

Note: Emergency generators, as defined in §98.6, are not considered part of the source category for greenhouse gas reporting (per §98.30(b)(2)), and are therefore not included in the total GHG estimate.

Emission Factors (from Part 98, Subpart C, Tables C-1 & C-2):

CO_2 = 53.06 kg/MMBtu
N_2O = 1.0×10^{-4} kg/MMBtu
CH_4 = 1.0×10^{-3} kg/MMBtu

Global Warming Potential (GWP) Factors (from Part 98, Subpart A, Table A-1):

CO_2 = 1
N_2O = 298
CH_4 = 25

Table 28: Rated Heat Input of Combustion Equipment

Combustion Equipment	Rating MMBtu/hr
Thermal Oxidizer	18.9
#15 Still Process Heater	7.5
#16 Still Process Heater	6.1
#18 Still Process Heater	7.21
#19 Still Process Heater	7.5
#43 Still Process Heater	7.5
#3 Continuous Still Process Heater	5.25
#2 Packaging Center Heater	5.0
#3 Packaging Center Heater	3.91
#5 Packaging Center Heater	3.0
# 6 Boiler	49.4
# 8 Boiler	29.5
Total Rated Heat Input	**150.77**

150.77 MMBtu/hr × 8,760 hrs/yr = 1,320,745 MMBtu/yr

CO_2: 1,320,745 MMBtu/yr × 53.06 kg/MMBtu ÷ 1,000 kg/metric ton = 70,079 metric tons/year
NO_2: 1,320,745 MMBtu/yr × 1×10^{-4} kg/MMBtu ÷ 1,000 kg/metric ton = 0.132 metric tons/year
CH_4: 1,320,745 MMBtu/yr × 1×10^{-3} kg/MMBtu ÷ 1,000 kg/metric ton = 1.321 metric tons/year

CO_2e = (70,079 × 1) + (0.132 × 298) + (1.321 × 25) = **70,151 metric tons/year of CO_2e**
= 77,327 tpy of CO_2e

Emissions Summary by Processes

Table 29: Emissions Summary by Processes

Pollutant	Emissions, tpy							
	P001	P006	P008	P011	P012	P013	P014	P016
PM	0.66	-	-	1.04	0.95	1.13	-	-
PM_{10}	0.66	-	-	1.04	0.95	1.13	-	-
$PM_{2.5}$	0.66	-	-	1.04	0.95	1.13	-	-
NO_X	9.33	-	-	-	-	-	-	-
SO_X	0.06	-	-	-	-	-	-	-
CO	7.84	-	-	-	-	-	-	-
VOC	4.34	9.71	2.56	23.71	30.36	21.33	18.74	19.02
HAP	0.28	4.97	0.31	0.55	0.98	0.62	4.11	0.25
Benzene	0.02	0.28	0.00	0.00	0.00	0.00	0.03	0.00
Ethylbenzene	0.02	1.07	0.06	0.07	0.05	0.03	0.44	0.01
Naphthalene	-	0.02	0.13	0.19	0.76	0.37	0.20	0.20
Styrene	0.01	0.13	0.10	0.08	0.04	0.08	0.62	0.00
Xylenes	0.02	2.40	0.00	1.17	0.07	0.06	2.40	0.02

Pollutant	Emissions, tpy								
	P017	Pack. Heaters	Still Heaters	Boiler #6	Boiler #8	Generators	Fugitive	Storage Tanks	Misc.
PM	-	0.43	1.42	1.75	1.05	0.02	-	-	1.00
PM_{10}	-	0.43	1.42	1.75	1.05	0.02	-	-	0.5
$PM_{2.5}$	-	0.43	1.42	1.75	1.05	0.02	-	-	0.5
NO_X	-	5.88	20.29	24.39	7.28	2.00	-	-	-
SO_X	-	0.03	0.12	0.15	0.09	0.00	-	-	-
CO	-	4.94	17.15	20.49	12.24	2.29	-	-	-
VOC	1.51	0.40	1.14	1.34	0.80	0.15	3.65	34.31	8.73
HAP	0.02	0.07	0.38	0.48	0.26	-	0.56	2.56	0.00
Benzene	0.01	-	-	-	-	-	0.00	0.15	0.00
Ethylbenzene	0.00	-	-	-	-	-	0.07	0.40	0.00
Naphthalene	0.00	-	-	-	-	-	0.09	0.03	0.00
Styrene	0.00	-	-	-	-	-	0.14	0.47	0.00
Xylenes	0.01	-	-	-	-	-	0.23	0.77	0.00

REGULATORY APPLICABILITY:

1. **Article XXI Requirements for Issuance:**
   See Permit Application #0060-OP24, Attachment B. The requirements of Article XXI, Parts B and C for the issuance of operating permits have been met for this facility. Article XXI, Part D, Part E & Part H will have the necessary sections addressed individually.

   The cold start notification provisions of §2108.01.d do not apply to the nine process heaters. Until terminated by written notice from the Department, the requirement to report cold starts 24 hours in advance is waived for Boiler Nos. 6 and 8, and the facility may report all cold starts as part of the semiannual report.

2. **Testing Requirements:**
   Testing is required on the following once every five years: thermal oxidizer and the packaging centers. The Department reserves the right to require additional testing if necessary in the future to assure compliance with the terms and conditions of this Title V Operating Permit.

3. <u>New Source Performance Standards (NSPS):</u>

Boiler #8 is subject to 40 CFR Part 60, Subpart Dc – *Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units.* Because Boiler #6 was constructed prior to June 9, 1989, this NSPS does not apply.

Tank #601 is the only tank that meets the applicability requirements of 40 CFR Part 60, Subpart K – *Standards of Performance for Storage Vessels for Petroleum Liquids (1973-1978)*. However, since the maximum vapor pressure of the material stored is less than 6.9 kPa (1.0 psi), according to §60.113, the conditions of this subpart do not apply.

All storage tanks constructed after 1984 with capacities between 75 m^3 and 151 m^3 (19,813 and 39,890 gallons) contain materials with a maximum true vapor pressure less than 15.0 kPa (2.18 psi), and those with capacities less than 75 m^3 contain materials with a maximum true vapor pressure less than 3.5 kPa (0.51 psi). Tank Nos. 2108, 6301, 6302, and 8501- 8506, have capacities greater than 151 m^3, therefore, per §60.110b(b), 40 CFR Part 60, Subpart Kb – *Standards of Performance for Volatile Organic Liquid Storage Vessels (post-1984)* only applies to Tank Nos. 2108, 6301, 6302, and 8501- 8506. The permit limits these tanks to storing only materials with a vapor pressure less than 3.5 kPa, so there are no other applicable requirements under this subpart.

The emergency generators are not subject to 40 CFR Part 60, Subpart JJJJ – *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*, as they were all installed prior to July 1, 2007.

4. <u>NESHAP and MACT Standards:</u>

The facility is subject to 40 CFR Part 61, Subpart FF – *National Emission Standard for Benzene Waste Operations*.

The Groundwater Remediation System is subject to 40 CFR Part 63, Subpart GGGGG – *National Emission Standards for Hazardous Air Pollutants: Site Remediation*.

The emergency generators are subject to 40 CFR Part 63, Subpart ZZZZ – *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*. The generators meet the operational requirements of "emergency stationary RICE" under §63.6640(f). See Table 24b above for individual generator applicability.

The facility is not subject to 40 CFR Part 63, Subpart EEEE – *National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution* or Subpart FFFF – *National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing* because the facility became a minor source of HAP on May 7, 2008. With the original compliance date for Subpart FFFF (MON), the facility would have had to be in compliance with the MON before needing to be in compliance with Subpart EEEE (OLD), and therefore the OLD would not apply to the facility. However, the compliance date of the MON was pushed back to after that of the OLD. Before that compliance date was reached, the facility became a minor source for HAP.

According to the EPA document, "Implementation Tool for the Organic Liquids Distribution NESHAP" (#305B07002, September 2007, page 55), sources subject to the MON were not subject to the OLD during the interim period between the compliance dates. Based on the EPA guidance memorandum "Potential to Emit for MACT Standards – Guidance on Timing Issues" (May 16, 1995), if a facility becomes an area source at any time before the first compliance date of the standard, it is considered an area source for that standard. Neville Chemical became an area source on May 7, 2008. The first compliance date for the MON was May 10, 2008.

The facility is not subject to 40 CFR Part 63, Subpart VVVVVV – *National Emission Standards for Hazardous Air Pollutants: Chemical Manufacturing Area Sources*. The only applicable HAP at the facility is 1,3-Butadiene, and it is contained in concentrations well below the applicability threshold.

The facility is not subject to 40 CFR Part 63, Subpart PPP – *National Emission Standards for Hazardous Air Pollutant Emissions for Polyether Polyols Production*. Based on the definition of "polyether polyol" in §63.1423(b), the polymerization must be with cyclic ether compounds. None of the feedstocks used in Unit #20/21 apply, and "polyoil" is just a term used by Neville Chemical Company to describe the raw material, intermediates, and final products.

The boilers and process heaters are not subject to 40 CFR Part 63, Subpart DDDDD – *National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters*. The facility became a minor source of HAP prior to the compliance date.

Boiler Nos. 6 and 8 are not subject to 40 CFR Part 63, Subpart JJJJJJ – *National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources*. Both boilers combust natural gas only and are therefore exempted under §63.11195(e). Per §63.11237, the Still Process Heaters and Packaging Center Heaters are not considered boilers and therefore are not subject to this subpart.

5. <u>Emissions Inventory</u>

This facility is required to provide annual Emission Inventory reports per §2108.01.e of Article XXI because this facility is a major source of volatile organic compounds (VOC).

6. <u>Risk Management Plan; CAA Section 112(r):</u>

The facility is subject to §112(r) of the Clean Air Act due to the storage of boron trifluoride (BF3). There is a risk management plan in place at the facility.

7. <u>Greenhouse Gas Reporting (40 CFR Part 98):</u>

Greenhouse gases (GHGs) from this facility come from the heat poly unit thermal oxidizer, seven process heaters, three packaging center heaters, and two boilers. Only three of the six GHG categories apply: CO_2, N_2O (nitrous oxide), and CH_4 (methane). Based on the calculation methodology in 40 CFR Part 98, §98.33(a)(1), potential emissions of CO_2e are 77,327 tpy. This is less than the 100,000 tpy major source threshold, therefore the facility is not considered a major source of GHG emissions.

The requirements contained in the GHG reporting rule are not considered applicable requirements under the Title V regulations. Furthermore, after reviewing the actual natural gas use over the past eight years (as reported in the Emissions Inventory), the highest actual CO_2e emissions, not including sources no longer in operation at the facility, was less than 17,200 metric tons in any given year, under the 25,000 metric ton applicability threshold for the reporting rule. Should the facility exceed 25,000 metric tons of CO_2e in any 12-month period, the facility would have to submit reports in accordance with 40 CFR Part 98.

8. <u>Compliance Assurance Monitoring (40 CFR Part 64):</u>

The Compliance Assurance Monitoring (CAM) rule found in 40 CFR 64 is not applicable to this facility. The processes at the facility are either uncontrolled or have an uncontrolled potential to-emit less than the major source thresholds.

9. <u>Environmental Justice:</u>

Parts of Neville Island and areas around Neville Island are considered an environmental justice (EJ) area, defined by the Pennsylvania DEP as "any census tract where 20 percent or more individuals live at or below the federal poverty line, and/or 30 percent or more of the population identifies as a non-white minority, based on data from the U.S. Census Bureau and the federal guidelines for poverty". Because this is an existing facility, alternative site location is not feasible. The operating permit contains all testing, monitoring, recordkeeping, and reporting requirements (as required under §70.6(a)(3)).

FACILITY EMISSIONS SUMMARY:

Table 30: Emissions Summary for Neville Chemical Company

Pollutant	Total (tpy*)
Particulate Matter	**9.63**
Particulate Matter <10 µm	**9.13**
Particulate Matter <2.5 µm ($PM_{2.5}$)	**9.13**
Nitrogen Oxides (NO_X)	**69.17**
Sulfur Oxides (SO_X)	**0.45**
Carbon Monoxide (CO)	**64.95**
Volatile Organic Compounds (VOC)	**181.80**
Hazardous Air Pollutants (HAP)	**16.40**
Benzene	**0.49**
Ethylbenzene	**2.22**
Naphthalene	**1.99**
Styrene	**1.67**
Xylenes	**7.15**
Greenhouse Gases (CO_2e)	**77,327**

*A year is defined as any consecutive 12-month period.

RECOMMENDATION:

All applicable Federal, State, and County regulations have been addressed in the permit application. The Title V Operating Permit for the Neville Chemical Company, Neville Island facility should be approved with the emission limitations, terms and conditions in Permit #0060-OP24.