ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

January 11, 2018

SUBJECT: **Ashland Inc.**
2650 Neville Road
Pittsburgh, PA 15225
Allegheny County

Title V Operating Permit No. 0037

TO: JoAnn Truchan
Chief Engineer

FROM: Bernadette Lipari
Air Quality Engineer

FACILITY DESCRIPTION:

The Ashland LLC Neville Island facility, located at 2650 Neville Road, Neville Township, PA, is a manufacturer of polyester resins. The Polyester Resins Plant consists of two (2) reactors, three (3) cooling tanks, and three (3) thinning tanks. Emissions from the Polyester Resins process are controlled by a 3.7 MMBtu/hr thermal oxidizer, which also acts as an incinerator for aqueous wastes. The Terminal portion of the facility loads,

stores, and off-loads various materials (including plasticizers and 2-ethyl hexanol). No plasticizers are produced on-site. In addition to numerous above-ground storage tanks, the facility also has three 10.206 MMBtu/hr natural gas-fired boilers, one temporary 28.8 MMBtu/hr natural gas-fired boiler, two 20.085 MMBtu/hr natural gas-fired boilers, one 16.5 MMBtu/hr natural gas-fired hot oil heater, and a 2,000 gallon/minute cooling tower.

The facility is a synthetic minor source of hazardous air pollutants (HAPs); and a minor source of particulate matter (PM), particulate matter less than 10 μm in diameter (PM_{10}), particulate matter less than 2.5 μm in diameter ($PM_{2.5}$), nitrogen oxides (NO_X), and sulfur oxides (SO_X), carbon monoxide (CO), and volatile organic compounds (VOCs) as defined in Article XXI, §2101.20. Synthetic minor status will be maintained with a limit on resin production in the Polyester Resins Plant and throughput limits on all HAPs in the PR Plant and Plasticizer Terminal. Although the facility is not a major source of any criteria pollutants, it is still subject to Title V under 40 CFR Part 62, §62.14830. The facility is also a minor source of greenhouse gas emissions (CO_2e) as defined in the U.S. EPA Greenhouse Gas Tailoring Rule.

OPERATING PERMIT DESCRIPTION

This is a Title V renewal for Ashland Inc. located on Neville Island, Allegheny County. The original operating permit was issued on February 5, 2007. The renewal permit will incorporate the conditions of Installation Permit (IP) #0037-I010, issued on October 14, 2016, for the installation of Boiler B007 and Installation Permit (IP) #0037-I011, issued on December 20, 2017 for the installation of the Maleic Anhydride Pastillation process and for the installation of Boilers B008 and B009.

The following determinations were also made by the Department since the last Title V Operating Permit issuance:

Determinations

1. October 5, 2016: Use of the raw material Ethox PYOL-2
   - Request for determination received on September 20, 2016
   - Exempted from permitting; Included in Section V.A.3.u of the amended TVOP

PERMIT APPLICATION COMPONENTS:

1. Title V Operating Permit #0037, issued February 5, 2007
2. Title V Operating Permit renewal application #0037, dated August 22, 2017
3. Installation Permit #0037-I001a, issued November 5, 1998, amended January 30, 2003 (Thermal Oxidizer)
4. Installation Permit #0037-I002, issued September 30, 1999 (Maleic Anhydride Process – *no longer in operation*)
5. Installation Permit #0037-I003, not issued (Maleic Anhydride Process – *no longer in operation*)
6. Installation Permit #0037-I004, issued January 13, 2009 (Back-Up Boiler Hours of Operation – *no longer in operation*)
7. Installation Permit #0037-I005, issued May 12, 2010 (Cooling Tower)
8. Installation Permit #0037-I006, issued April 5, 2011 (Tanks V-650 & V-651)
9. Installation Permit #0037-I007, issued February 23, 2012 (PR Batch Tank V-935, PVA Bead Addition)
10. Installation Permit #0037-I008, issued February 22, 2012 (3 Clever-Brooks Boilers)
11. Installation Permit #0037-I010, issued October 14, 2016 (York Shipley Boiler)
12. Installation Permit #0037-I011, issued December 20, 2017, (2 Clever-Brooks Boilers and Maleic Anhydride Pastillation Process)
13. RACT Plan Approval and Agreement #227, dated December 30, 1996
14. Maleic Anhydride Thermal Oxidizer Stack Test, dated May 17, 1996
15. Correspondence, dated September 13, 2017 (Phthalic anhydride loading)
16. Correspondence, dated September 11, 2017 (Updated equipment list and processes)
17. Correspondence, dated September 28, 2017 (Algaecide no longer used in cooling tower operations)
18. Correspondence, dated November 1, 2011 (Compliance Assurance Monitoring Plan)

EMISSION SOURCES:

Table 1: Emissions Sources

I.D.	Source Description	Control Device(s)	Maximum Capacity	Fuel/Raw Material	Stack I.D.
Polyester Resins Plant					
P001	2 – Reactors #41 & #42	thermal oxidizer	6,000 gal. ea.	phthalic anhydride, maleic anhydride, glycols, dicyclopentadiene	S-14
P001a	2 – Reactor Weigh Tanks V-865 & V-866	none	3,400 gal. ea.	phthalic anhydride	--
P001a	2 – Reactor Weigh Tanks V-867 & V-868	none	3,700 gal. ea.	maleic anhydride	--
P001a	2 – Reactor Weigh Tanks V-869 & V-870	none	4,200 gal. ea.	glycols, dicyclopentadiene	--
P001a	#42 Reactor Weigh Hopper	closed system	n/a	isophthalic acid	
P001a	3 – Cooling Tanks V-857, V-858, & V-859	thermal oxidizer	6,500 gal. ea.	polyester resin	S-14
P001a	3 – Thin Tanks V-860, V-861, & V-862	PR Plant PVA Baghouse	12,000 gal. ea.	polyester resin, styrene & vinyl toluene monomers	--
P001a	13 – Batch Tanks V-872 to V-879, V-930 to V-933, & V-935	PR Plant PVA Baghouse, nitrogen blanketing	12,500 gal. ea.	polyester resin; styrene, vinyl toluene, & methyl methacrylate monomers, misc. additives	--
P001a	9 – Blend Tanks V-880 to V-888	PR Plant PVA Baghouse, nitrogen blanketing	25,000 gal. ea.	polyester resin, monomers	--
P001b	PR Plant PVA Baghouse	Camfill Farr reverse pulse baghouse	6,000 lb/hr and 52.56 MMlb/yr of PVA Beads	polyvinyl acetate (PVA) beads	LPA DC
P001c	PR Plant Loading Racks	none	200 MMlbs/yr	polyester resin	--
P001d	PR Plant Hot Oil Heater	none	16.5 MMBtu/hr	natural gas	B-003
P001f	PR Plant Cooling Tower	drift eliminators	2,000 gal/min	cooling water	--
P001h	PR Plant Resin Recovery Areas	none	n/a		S-11a, S11b
P001	Aqueous Waste Tank V-904	thermal oxidizer	15,000 gal.	aqueous waste	S-14
PR Plant Storage Tanks					
P001g	V-2002[1]	chiller	500,000 gal.	styrene monomer	--
P001g	V-300	none	11,000 gal.	ethylene glycol	--
P001g	V-650 & V-651	nitrogen blanketing	12,000 gal. ea.	polyester resin, styrene	--
P001g	V-846 & V-847	none	30,000 gal. ea.	dicyclopentadiene, vinyl toluene monomer	--
P001g	V-848	none	550,000 gal.	propylene glycol	--
P001g	V-849, V-850, & V-851	none	30,000 gal. ea.	diethylene glycol, neopentyl glycol, dipropylene glycol	--

I.D.	Source Description	Control Device(s)	Maximum Capacity	Fuel/Raw Material	Stack I.D.
P001g	V-852	none	10,000 gal.	2-ethyl hexanol	--
P001g	V-916	none	30,000 gal.	glycol storage	--
P002d	F-4506	none	20,000 gal.	maleic anhydride	--
P002d	F-4602	none	150,000 gal.	maleic anhydride	--
D001	V-963	none	500 gal.	gasoline	--
Other Processes					
P002	Plasticizer Distribution (4 Loading Stations)	none	600 MMlbs/yr	plasticizer	--
P004	2-Ethyl Hexanol Distribution (1 Loading Station)	none	394.2 MMlb/yr	2-ethyl hexanol	--
P005	Maleic Anhydride Pastillator	baghouse and scrubber	15 MMlbs/yr	maleic anhydride	--
B004	Boiler	none	10.206 MMBtu/hr	natural gas	B-004
B005	Boiler	none	10.206 MMBtu/hr	natural gas	B-004
B006	Boiler	none	10.206 MMBtu/hr	natural gas	B-006
B007	Temporary Boiler	none	28.8 MMBtu/hr	natural gas	B-007
B008	New Boiler	none	20.085 MMBtu/hr	natural gas	B-008
B009	New Boiler	none	20.085 MMBtu/hr	natural gas	B-009
F001	Parking Lots & Roadways	none	n/a	n/a	--
G001	Laboratory Emissions Sources	none	n/a	acetone, styrene, polyester resin, misc. laboratory chemicals	--
G002	Painting Operations	none	7,700 lbs/yr	misc. paints	--
G003	Parts Cleaning	none	6,150 lbs/hr	misc. solvents	--
G004	Turnaround Maintenance	none	2,000 gal/yr	#2 fuel oil	--
G005	Blend Tanks Weigh Hopper	closed system	n/a	fumed silica	
G005	Isophthalic Acid Silo	closed system	n/a	isophthalic acid	
G005	Fumed Silica Silo	closed system	n/a	fumed silica	
Terminal Storage Tanks					
D002	T-11, T-12 & T-22	none	500,000 gal. ea.	plasticizer	--
D002	T-13 & T-14	none	250,000 gal. ea.	plasticizer	--
D002	T-15, T-16, & T-17	none	125,000 gal. ea.	plasticizer	--
D002	T-201	none	102,000 gal.	plasticizer	--
D002	T-203	none	80,000 gal.	plasticizer	--

I.D.	Source Description	Control Device(s)	Maximum Capacity	Fuel/Raw Material	Stack I.D.
D002	T-204	none	50,000 gal.	plasticizer	--
D002	T-205	none	12,000 gal	plasticizer	
D002	T-208	none	25,000 gal.	plasticizer	--
D002	T-209 to T-211	none	11,000 gal. ea.	plasticizer	--
D002	T-222	none	10,000 gal	plasticizer	--
D002	T-227, T-231, & T-232	none	100,000 gal. ea.	plasticizer	--
D002	T-228, T-229, & T-230	none	200,000 gal. ea.	plasticizer	--
D002	T-501	none	13,000 gal.	plasticizer	--
D002	T-511 to T-516, T-521 to T-524, T-531, T-532, & T-534	none	40,000 gal. ea.	plasticizer	--
D002	T-517	none	80,000 gal.	plasticizer	--
D002	T-525 & T-533	none	50,000 gal. ea.	plasticizer	--
D002	T-540 to T-542	none	100,000 gal. ea.	plasticizer	--
D002	T-543	none	79,000 gal.	plasticizer	--
D002	T-551 & T-552	none	200,000 gal. ea.	plasticizer	--
D008	T-109 to T-112	none	200,000 gal. ea.	2-ethyl hexanol	--
D008	T-113	none	50,000 gal.	2-ethyl hexanol	--
D008	T-119 & T-120	none	100,000 gal. ea.	2-ethyl hexanol	--
D008	T-121 & T-122	none	400,000 gal. ea.	2-ethyl hexanol	--
D009	MF-402C	solidification box	49,000 gal.	phthalic anhydride	--

1. Styrene monomer tank V-2002 is chilled for 6 months of the year.

STACKS:

Table 2: Stacks

Stack ID	Stack Height (ft)	Stack Diameter (ft)	Exhaust Rate (acfm)	Exhaust Temp. (°F)	Lining/Outer Material
B-002	40	1.7	17,500	550	carbon steel / none
B-003	--	2.0	3,351	--	carbon steel / refractory
B-004, B-005, B-006	23	1.7	3,671	502	carbon steel / none
B-007	23	1.7	3,671	502	carbon steel / none
B-008	23	1.7	3,671	502	carbon steel / none
B-009	23	1.7	3,671	502	carbon steel / none
S-14	110	3.5	3,640	1,450	carbon steel / refractory

METHOD OF DEMONSTRATING COMPLIANCE:

Methods of demonstrating compliance with the emission standards set in this permit are summarized in Table 3 below. See operating permit No. 0037 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.

Table 3: Method(s) of Demonstrating Compliance

TVOP Section	Process	Method(s) of Demonstrating Compliance
V.A.	P001: Polyester Resins Plant	• Testing of the thermal oxidizer (CISWI) at least once every 5 years • Continuous monitoring of thermal oxidizer temperature and waste flow into the thermal oxidizer • Visual inspections of equipment semiannually • Daily readings of the liquid level on Tank V-904 • Record keeping of production and raw materials
V.B.	P001a: PR Plant Batch, Blend & Thin Tanks	• Daily monitoring of each batch and blend tank operating temperature • Continuous monitoring of thin tank operating temperature • Recordkeeping of production and raw materials
V.C.	P001b: PR Plant PVA Baghouse	• Continuous monitoring of the differential pressure drop across the baghouse • Recordkeeping of PVA bead use and semiannual preventative maintenance inspections of the baghouse • Recordkeeping of baghouse operation hours
V.D.	P001c: PR Plant Loading Operations	• Daily monitoring of Tank V-2002 temperature • Recordkeeping of material throughput and resin monomer vapor pressure, temperature, and molecular weight
V.E.	P001d: PR Plant Hot Oil Heater	• Recordkeeping of fuel use
V.F.	P001e: PR Plant Pumps, Valves, etc.	• Implementation of LDAR system
V.G.	P001f: PR Plant Cooling Tower	• Monthly monitoring of TDS concentration • Recordkeeping of monthly make-up water use
V.H.	P001g: PR Plant Storage Tanks	• Recordkeeping of material, material vapor pressure, and throughput
V.I.	P002 & P004: Plasticizer Terminal Loading Operations	• Recordkeeping of material, material vapor pressure, and throughput • Recordkeeping of the amount of topanol added
V.J.	P002d: Maleic Anhydride Storage Tanks	• Recordkeeping of material, material vapor pressure, and throughput • Continuous measurement of the temperature of tanks F-4506 and F-4602
V.K.	P005: Maleic Anhydride Pastillation	• Wet scrubber testing shall be performed simultaneously at the inlet and outlet of the scrubber for VOC and maleic anhydride in accordance with EPA Reference Methods 25 and 18 and in accordance with the Allegheny County Health Dept. Source Testing Manual • Recordkeeping of wet scrubber operating parameters • Continuous monitoring of the differential pressure drop across the baghouse • Recordkeeping of baghouse operation hours
V.L.	D002, D008, & D009: Plasticizer Terminal Storage	• Recordkeeping of material, material vapor pressure, and throughput

TVOP Section	Process	Method(s) of Demonstrating Compliance
	Tanks	
V.M.	B004, B005, & B006: Boilers	• Recordkeeping of fuel use
V.N.	B007: York Shipley Boiler	• Recordkeeping of fuel use
V.0.	B008 & B009: Cleaver Brookes Boilers	• Recordkeeping of fuel use
VI.B.	G005: PR Plant Solids Charging	• Recordkeeping of weigh hopper and silo throughput

EMISSION CALCULATIONS

Polyester Resins Plant

Emissions from the waste incinerator (thermal oxidizer) in the polyester resins plant are those numbers permitted under installation permit #0037-I001a, issued November 5, 1998 and amended January 30, 2003. The short-term limits are from 40 CFR Part 62, Subpart III, Table 1. The short-term limits are measured at 7% O_2, dry basis at standard conditions. The following table gives the permitted limits:

Table 4: PR Plant Thermal Oxidizer Emission Limits

Pollutant	Short-Term Emission Limit	Hourly Emission Limit N.G. (lb/hr)	Annual Emission Limit (tons/year)
Particulate Matter	70 mg/dscm	0.23	0.99
PM_{10}	n/a	0.23	0.99
$PM_{2.5}$	n/a	0.23	0.99
Nitrogen Oxides	388 ppm	8.74	36.28
Sulfur Oxides	20 ppm	0.50	2.00
Carbon Monoxide	157 ppm_{dv}	4.3	19.0
Volatile Organic Compounds	n/a	5.72	9.85
Total HAP	n/a	0.23	0.49
Ethylene glycol	n/a	0.2	0.36
Cadmium	0.004 mg/dscm	0.18×10^{-4}	0.79×10^{-4}
Dioxins/furans (toxic equivalency basis)	0.41 ng/dscm	2.37×10^{-8}	10.39×10^{-8}
Hydrogen chloride	62 ppm_{dv}	0.03	0.13
Lead	0.04 mg/dscm	0.17×10^{-4}	0.74×10^{-4}
Mercury	0.47 mg/dscm	0.61×10^{-4}	2.67×10^{-4}

PR Plant Batch, Blend, Thin & Weigh Tanks

Emissions from the batch, blend, and thin tanks were estimated using the USEPA Tanks 4.0.9d program for each storage tank. See Title V Operating Permit application #0037 (dated August 22, 2017), Appendix A for a complete breakdown of Tanks 4.0.9d inputs and emissions for each tank.

Batch tanks consist of the following 13 tanks: V-872 to V-879, V-930 to V-933, & V-935.

Table 5: Batch Tank Emission Limits

Pollutant	Annual Emission Limit (tons/year)
Volatile Organic Compounds	2.422
Hazardous Air Pollutants	2.422
Styrene	0.792
Methyl Methacrylate	1.523
Vinyl Toluene	0.107

Blend tanks consist of the following nine (9) tanks: V-880 to V-888.

Table 6: Blend Tank Emission Limits

Pollutant	Annual Emission Limit (tons/year)
Volatile Organic Compounds	1.227
Hazardous Air Pollutants	1.227
Styrene	0.712
Methyl Methacrylate	0.390
Vinyl Toluene	0.125

Thin tanks consist of the following three (3) tanks: V-860, V-861, and V-862.

Table 7: Thin Tank Emission Limits

Pollutant	Annual Emission Limit (tons/year)
Volatile Organic Compounds	2.229
Hazardous Air Pollutants	2.229
Styrene	2.100
Vinyl Toluene	0.129

Weigh tanks consist of the following six (6) tanks: V-865, V-866, V-867, V-868, V-869, and V-870.

Table 8: Weigh Tank Emission Limits

Pollutant	Annual Emission Limit (tons/year)
Volatile Organic Compounds	0.77
Hazardous Air Pollutants	0.71
Maleic Anhydride	0.066
Phthalic Anhydride	0.63

PR Plant Resins PVA Baghouse

All emissions for the PVA Baghouse are from Installation Permit #0037-I007.

Baghouse flow rate: 1,200 acfm ≈ 1,200 dscfm (temperature and moisture are ambient)
Outlet grain loading: 0.01 gr/scf
Hours of operation: 8,760 hrs/yr

PM Emissions (lb/hr) = 1,200 ft^3/min × 60 min/hr × 0.01 gr/dscf ÷ 7,000 gr/lb = 0.10 lb/hr
PM Emissions (tpy) = 0.10 lb/hr × 8,760 hr/yr ÷ 2,000 lb/ton = **0.45 tpy**

All PM is assumed to be PM_{10}; all PM_{10} is assumed to be $PM_{2.5}$.

PR Plant Resins Loading Operations

Calculated emissions from liquid loading operations were based on emission factors derived from AP-42 *Section 5.2: Transportation and Marketing of Petroleum Liquids (6/08)*. The following equation was used:

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

Where:

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

The following two tables summarize the operating parameters, calculated loading loss factors, and potentials-to-emit for loading operations of styrene monomer and other loading materials:

Table 9a: Styrene Monomer Liquid Loading Operating Parameters and Emission Limits (tpy)

	PR Plant	A (submerged fill)	B (submerged fill)	Laboratory
P (psia)	0.2518	0.1184	0.063	0.4796
MW (lb/lb·mol)	104.15	104.15	104.15	104.15
T (°R)	559	537	518.6	583
S	1.45	0.50	0.50	1.45
L_L (lbs/10^3 gal)	0.848	0.143	0.079	1.548
Loading (gal/yr)	4,573,800	2,523,240	2,523,240	956
PTE (tpy)	**1.939**	**0.180**	**0.100**	**0.001**

Total: 2.22 tpy of styrene

Table 9b: Other PR Plant Liquid Loading Operating Parameters and Emission Limits (tpy)

	Maleic Anhydride	Vinyl Toluene	Methyl Methacrylate	Propylene Glycol
P (psia)	0.0684	0.07729	1.3776	0.00076
MW (lb/lb·mol)	98.06	118.07	100.24	76.11
T (°R)	600	559	559	516.1
S	1.45	1.45	1.45	1.45
L_L (lbs/10^3 gal)	0.202	0.295	4.463	0.002
Loading (gal/yr)	4,936,413	563,558	86,467	1,054,080
PTE (tpy)	**0.499**	**0.083**	**0.193**	**0.001**

Total VOC (including styrene): 2.99 tpy

Short-term emission limits for unprocessed styrene monomer are based on the following:

P = 0.2235 psia
MW = 104.15 lb/lb·mol
S = 0.50
T = 555 °R
Throughput = 9,000 gal/hr

$L_L = 12.46 \times 0.2235 \times 104.15 \times 0.50 \div 555 = 0.261$ lbs/10^3 gal

PTE = 0.261 lbs/10^3 gal × 9,000 gal/hr ÷ 1000 = **2.35 lb/hr of styrene**

PR Plant Hot Oil Heater

Emissions of NO_X from the PR Plant Hot Oil heater are based on a factor of 27.82 lb/mmscf established during the May 17, 1996 stack test and a natural gas value of 1,050 Btu/scf. A 15% adjustment factor was added to account for operational variability.

27.82 lb/mmscf ÷ 1,050 Btu/scf × 16.5 MMBtu/hr = 0.4372 lb/hr = **1.916 tpy of NO_X**

Potential GHG mass and CO2e Emissions:

Calculations of greenhouse gases (GHG) 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 C-1 and Table C-2 of that subpart.

Total rated heat input capacity of the process heaters = 16.5 MMBtu/hr × 8,760 hr/yr = 144,540 MMBtu/yr
Emission Factors: CO_2 = 53.02 kg/MMBtu
$N_2O = 1\times10^{-4}$ kg/MMBtu
$CH_4 = 1\times10^{-3}$ kg/MMBtu

CO_2: 144,540 MMBtu/yr × 53.02 kg/MMBtu ÷ 1,000 kg/metric ton = 7,664 metric tons/year
NO_2: 144,540 MMBtu/yr × 1×10^{-4} kg/MMBtu ÷ 1,000 kg/metric ton = 0.0145 metric tons/year
CH_4: 144,540 MMBtu/yr × 1×10^{-3} kg/MMBtu ÷ 1,000 kg/metric ton = 0.1445 metric tons/year

Global Warming Potential (GWP) Factors (from Part 98, Subpart A, Table A-1):
CO_2 = 1
N_2O = 298
CH_4 = 25

$CO_2e = (7{,}664 \times 1) + (0.0145 \times 298) + (0.1445 \times 25)$ = **7,672 metric tons/year of CO_2e**
= 8,457 tpy of CO_2e

PR Plant Fugitives (Pumps, Valves, etc.)

Fugitive emissions were based on Synthetic Organic Chemical Manufacturing Industry (SOCMI) emission factors, pumping rates (where applicable), and throughput factors to account for actual usage times. See Title V Operating Permit application #0037 (dated August 5, 2011), Appendix A for a complete table of components, pumping rates, throughput factors, and individual emission rates. Total fugitive emissions are as follows:

Table 10: Fugitive Emissions Limits

Pollutant	lb/yr	tpy
Ammonia	190.53	0.095
Styrene Monomer	1,688.44	0.844
Ethylene Glycol	234.31	0.117
Phthalic Anhydride	72.48	0.036
Maleic Anhydride	106.17	0.053

Pollutant	lb/yr	tpy
Dicyclopentadiene (DCPD)	319.58	0.160
Polyester Resin Product	5,598.98	2.799
Styrene*	2,238.27	1.119
Total VOC	8,019.97	4.010
Total HAP	4,339.67	2.170
Total Styrene	3,926.71	1.963

* This represents the styrene portion of PR product.

Sample calculation with no pumping (ammonia)

Ammonia	Pumps	Valves	Relief Valves	Flanges	Open Lines
No. of Components	0	15	0	45	0
Factor (lb/hr/#)	1.97×10^{-1}	1.06×10^{-3}	9.80×10^{-2}	1.30×10^{-4}	3.30×10^{-3}
Throughput Factor	1.0				
Operation	8,760 hrs/yr				

PTE = $1.0 \times 8{,}760 \times [(0 \times 1.97\times10^{-1}) + (15 \times 1.06\times10^{-3}) + (0 \times 9.80\times10^{-2}) + (45 \times 1.30\times10^{-4}) + (0 \times 3.30\times10^{-3})]$
= 190.53 lb/yr = **0.0953 tpy of ammonia**

Sample calculation with pumping (maleic anhydride)

Maleic Anhydride	Pumps	Valves	Relief Valves	Flanges	Open Lines
No. of Components	1	14	0	56	2
Factor (lb/hr/#)	4.70×10^{-2}	5.10×10^{-4}	2.30×10^{-1}	1.80×10^{-3}	3.70×10^{-3}
Throughput Factor	0.091				
Operation	36,925,775 lbs/yr				
Pump Rate	100 gpm = 6,000 gal/hr				

PTE = $0.091 \times 36{,}925{,}775 \div 6{,}000 \times [(1 \times 4.70\times10^{-2}) + (14 \times 5.10\times10^{-4}) + (56 \times 1.80\times10^{-3}) + (2 \times 3.70\times10^{-3})]$
= 106.173 lb/yr = **0.0531 tpy of maleic anhydride**

PR Plant Cooling Tower

Basis:

Total Throughput: 1,800 gpm
Drift Loss: 0.02%
Assumed TDS (max): 0.599 g/l

Maximum TDS concentration was assumed to be 1.5× the measured value to account for variability in the TDS concentration. All PM is assumed to be PM_{10}.

0.599 g/l ÷ 453.593 g/lb × 3.785 l/gal × 0.02% × 1,800 gal/min × 60 min/hr = **0.119 lb/hr PM**

0.119 lb/hr ÷ 2,000 lb/ton × 8,760 hrs/yr = **0.472 tpy PM**

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. See Title V Operating Permit application #0037 (dated August 22, 2017), Appendix A for a complete breakdown of Tanks 4.0.9d inputs and emissions for each tank.

Because HAP emissions from dicyclopentadiene, ethylene glycol, propylene glycol, and diethylene glycol were small enough to be considered insignificant, no throughput limits were included in the operating permit. Because of the low vapor pressures and low estimated emissions, any additional HAP emissions due to extra throughput of these materials is unlikely to cause an exceedance of the HAP synthetic minor limit. Throughput limits were included for styrene, vinyl toluene, methyl methacrylate, and maleic anhydride.

PR Plant storage tanks consist of the following tanks: V-2002, V-300, V-650, V-651, V-846, V-847, V-848, V-849, V-850, V-851, V-852, and V-916.

Table 11: PR Plant Storage Tank Emission Limits

Pollutant	Annual Emission Limit (tons/year)
Volatile Organic Compounds	1.42
Hazardous Air Pollutants	1.18
Styrene	1.14

Maleic anhydride storage tanks are F-4506 and F-4602.

Table 12: Maleic Anhydride Storage Tank Emission Limits

Pollutant	Annual Emission Limit (tons/year)
Volatile Organic Compounds	0.43
Hazardous Air Pollutants	0.43

Plasticizer Terminal storage tanks include the plasticizer storage (D002), the oxo-alcohol tank farm (D008), and phthalic anhydride storage (D009). Plasticizer storage includes the following tanks: T-11 to T-17, T-22, T-201, T-203, T-204, T-205, T-208 to T-211, T-222, T-227 to T-232, T-501, T-511 to T-517, T-521 to T-525, T-531 to T-534, T-540 to T-543, T-551, & T-552. The oxo-alcohol tank farm consists of the following tanks: T-109 to T-113, T-119 to T-122. The phthalic anhydride tank is MF-402C.

Table 13: Plasticizer Storage Tank Emission Limits

Pollutant	Annual Emission Limit (tons/year)
Volatile Organic Compounds	0.71

Table 14: 2-Ethyl Hexanol Storage Tank Emission Limits

Pollutant	Annual Emission Limit (tons/year)
Volatile Organic Compounds	0.26

Table 15: Phthalic Anhydride Storage Tank Emission Limits

Pollutant	Annual Emission Limit (tons/year)
Volatile Organic Compounds	1.86
HAP	1.86

Plasticizer Terminal Loading Operations

Plasticizer Terminal loading operations consist of liquid loading to the plasticizer storage tanks, liquid loading to the 2-ethyl hexanol storage tanks, and solids addition/blending in plasticizer tank T-501.

Solids Addition/Blending

Basis: Topanol addition: 150,000 lbs/yr
Percent to atmosphere: 1%

150,000 lbs/yr × 0.01 = 1,500 lbs/yr = **0.75 tpy of particulate**

Emissions of VOC from the solids addition and blending operation are calculated below under "Liquid Loading".

Liquid Loading

Calculated emissions from liquid loading operations were based on emission factors derived from AP-42 *Section 5.2: Transportation and Marketing of Petroleum Liquids (6/08)*. The following equation was used:

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

Where:

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

The following table summarizes the operating parameters, calculated loading loss factors, and potentials-to-emit for loading operations as well as VOC emissions from the solids addition/blending:

Table 16: Terminal Liquid Loading Operating Parameters and Emission Limits

	Solids Addition	Plasticizer	2-Ethyl Hexanol
P (psia)	0.135	0.0015	0.007
MW (lb/lb·mol)	229.28	390	123
T (°R)	672	600	537
S	1.45	1.45	1.45
L_L (lbs/10^3 gal)	0.832	0.018	0.029
Loading (lbs/yr)	n/a	600,000,000	394,200,000
Density (lbs/gal)	n/a	8.0	6.51
Loading (gal/yr)	61,527	75,000,000	60,552,995
PTE (tpy)	**0.026**	**0.661**	**0.877**

Maleic Anhydride Pastillation

All emissions for the Maleic Anhydride Pastillation process are from Installation Permit #0037-I011.

Emissions for the Maleic Anhydride process are based on the following assumptions:

- Annual throughput of Maleic Anhydride of 15,000,000 lbs/year
- 99.5% of the Maleic Anhydride produced goes through the pastillation belt
- 0.5% of the Maleic Anhydride produced vents to the atmosphere
- 95% efficiency for the absorber
- 99.9% efficiency for the dust collector (based on manufacturer information)

Table 17: Maleic Anhydride Pastillation Controlled Emissions

Pollutant	Short-Term Emissions (lb/hr)	Long-Term Emissions (tons/year)*
Maleic Anhydride	0.429	1.88
Particulate Matter/ PM_{10}	0.009	0.04

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

Controlled Emissions:
Maleic Anhydride Emissions (tpy) = [(15,000,000 lbs/yr × (1-0.995) × (1-0.95))/2000 lbs] = **1.88 tpy**

Controlled Emissions:
PM Emissions (tpy) = [(15,000,000 lbs/yr × (1-0.995) × (1-0.999))/2000 lbs] = **0.04 tpy**

Boilers B004, B005, and B006
All emissions for boilers B004, B006, and B006 are from Installation Permit #0037-I008.
Basis:

Heating rate:	10.206 MMBtu/hr per boiler
Natural gas heating value:	1,050 Btu/scf
No. of Units:	3 (three)
Operation:	8,760 hrs/yr

Emission calculations for SO_X and VOC were based on emission factors of 0.6 lb/MMscf and 5.5 lb/MMscf respectively found in U.S. EPA AP-42 Section 1.4: *Natural Gas Combustion (7/98)*; PM emissions were based on Article XXI emission limits (§2104.02) of 0.008 lb/MMBtu; and NO_X and CO were based on limits of 20 ppm_{dv} and 50 ppm_{dv} respectively at 3% O_2. A 15% adjustment was added to all emissions calculated with AP-42 factors to account for operational variability. All PM was assumed to be PM_{10}; all PM_{10} was assumed to be $PM_{2.5}$.

NO_X MW:	45.2 lb/lb·mol (based on 5% NO and 95% NO_2)
CO MW:	28 lb/lb·mol
F_d-Factor:	8,710 scf_{eg}/MMBtu
Density:	385 scf/lb·mol
Oxygen:	3%

NO_X Emissions:
(20 ppm ÷ 10^6) × 8,710 scf/MMBtu × 14.288 MMBtu/hr ÷ 385 scf/lb·mol × 45.2 lb/lb·mol × [20.9/(20.9 – 3)] =
= **0.2437 lb/hr NO_X per boiler**

CO Emissions:
(50 ppm ÷ 10^6) × 8,710 scf/MMBtu × 14.288 MMBtu/hr ÷ 385 scf/lb·mol × 28 lb/lb·mol × [20.9/(20.9 – 3)] =
= **0.3774 lb/hr CO per boiler**

Table 18: Boiler Emission Limits

Pollutant	**Short-Term Emissions** (lb/hr – per boiler)	**Long-Term Emissions** (tpy – per boiler)	**Total Emissions tons/year**
Particulate Matter	0.082	0.358	**1.073**
PM_{10}	0.082	0.358	**1.073**
$PM_{2.5}$	0.082	0.358	**1.073**
Nitrogen Oxides	0.244	1.068	**3.202**
Sulfur Oxides	0.007	0.029	**0.088**
Carbon Monoxide	0.377	1.653	**4.959**
Volatile Organic Compounds	0.062	0.269	**0.808**

GHG Mass and CO2e Emissions:
Calculations of greenhouse gases (GHG) 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 C-1 and Table C-2 of that subpart.

Total rated heat input capacity of the boilers = 30.618 MMBtu/hr × 8,760 hr/yr = 268,214 MMBtu/yr
Emission Factors: CO_2 = 53.02 kg/MMBtu
$N_2O = 1\times10^{-4}$ kg/MMBtu
$CH_4 = 1\times10^{-3}$ kg/MMBtu

CO_2: 268,214 MMBtu/yr × 53.02 kg/MMBtu ÷ 1,000 kg/metric ton = 14,221 metric tons/year
NO_2: 268,214 MMBtu/yr × 1×10^{-4} kg/MMBtu ÷ 1,000 kg/metric ton = 0.027 metric tons/year
CH_4: 268,214 MMBtu/yr × 1×10^{-3} kg/MMBtu ÷ 1,000 kg/metric ton = 0.268 metric tons/year

Global Warming Potential (GWP) Factors (from Part 98, Subpart A, Table A-1):
CO_2 = 1
N_2O = 298
CH_4 = 25

$CO_2e = (14{,}221 \times 1) + (0.027 \times 298) + (0.268 \times 25)$ = **14,235 metric tons/year of CO_2e**
= 15,691 tpy of CO_2e

Note: Number is not exact due to rounding.

Boiler B007
All emissions for boiler B007 are from Installation Permit #0037-I010.
Basis:

Heating rate:	28.8 MMBtu/hr
Natural gas heating value:	1,050 Btu/scf
Operation:	8,760 hrs/yr

Emissions of SO_X were based on an emission factor of 0.6 lb/MMscf from U.S. EPA AP-42 Section 1.4: *Natural Gas Combustion (7/98)* with a 15% adjustment added to account for operational variability. Emissions of PM were based on Article XXI emission limits (§2104.02) of 0.008 lb/MMBtu. All PM was assumed to be PM_{10}; all PM_{10} was assumed to be $PM_{2.5}$. PM emissions represent total particulate (condensable and filterable).

All other emissions were given by the manufacturer. Manufacturer PM_{10} emissions of 0.01 lb/MMBtu are greater than those in Article XXI, so the Article XXI limits are used.

Table 19: Boiler B007 Emission Limits

Pollutant	**Emission Rate** (lb/MMBtu)	**Short-Term Emissions** (lb/hr)	**Long-Term Emissions** (tpy)
Particulate Matter	0.008	0.230	**1.009**
PM_{10}	0.008	0.230	**1.009**
$PM_{2.5}$	0.008	0.230	**1.009**
Nitrogen Oxides	0.011	0.317	**1.388**
Sulfur Oxides	--	0.019	**0.083**
Carbon Monoxide	0.037	1.066	**4.667**
Volatile Organic Compounds	0.004	0.115	**0.505**

GHG Mass and CO_2e Emissions:
Calculations of greenhouse gases (GHG) 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 C-1 and Table C-2 of that subpart.

Total rated heat input capacity of the boiler = 28.8 MMBtu/hr × 8,760 hr/yr = 252,288 MMBtu/yr

Emission Factors: CO_2 = 53.06 kg/MMBtu
$N_2O = 1\times10^{-4}$ kg/MMBtu
$CH_4 = 1\times10^{-3}$ kg/MMBtu

CO_2: 252,288 MMBtu/yr × 53.06 kg/MMBtu ÷ 1,000 kg/metric ton = 13,386.40 metric tons/year
NO_2: 252,288 MMBtu/yr × 1×10^{-4} kg/MMBtu ÷ 1,000 kg/metric ton = 0.025 metric tons/year
CH_4: 252,288 MMBtu/yr × 1×10^{-3} kg/MMBtu ÷ 1,000 kg/metric ton = 0.252 metric tons/year

Global Warming Potential (GWP) Factors (from Part 98, Subpart A, Table A-1, 11/29/13):
CO_2 = 1
N_2O = 298
CH_4 = 25

$CO_2e = (13{,}386.4 \times 1) + (0.025 \times 298) + (0.252 \times 25)$ = **13,400 metric tons/year of CO_2e**
= 14,771 tpy of CO_2e

Note: Number is not exact due to rounding.

Boilers B008 and B009
All emissions for boilers B008 and B009 are from Installation Permit #0037-I011.
Basis

Heating rate:	20.085 MMBtu/hr per boiler
Natural gas heating value:	1,000 Btu/scf
No. of Units:	2 (two)
Operation:	8,760 hrs/yr

Emissions of NO_X are based on manufacturer guarantees of 9 $ppm_{dv.}$ All PM is assured to be PM_{10}, and all PM_{10} is assured to be $PM_{2.5}$.

The vendor provided a manufacturer guarantee in the application. All pollutants are based on a 100% firing rate.

Table 20: Boilers B008 and B009 Emission Limits

Pollutant	Short-Term Emissions (lb/hr)	Long-Term Emissions (500 hours/year) (tons/year)	Total Emissions tons/year
Particulate Matter	0.16	0.7008	1.401
PM_{10}	0.16	0.7008	1.401
Sulfur Oxides	0.012	0.0526	0.105
Carbon Monoxide	0.75	3.285	6.57
Nitrogen Oxides	0.21	0.9198	1.83
Volatile Organic Compounds	0.072	0.3153	0.630

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

PM/PM_{10} = (0.008 lb/MMBtu) * (20.085 MMBtu/hr) = **0.16 lb/hr**

PM/PM_{10} = (0.16 lb/hr) * (8,760 hrs)/(2000) = **0.7008 tons/yr**

Note: The issued permit #0037-I011 incorrectly showed the PM/PM_{10} limit as 0.71 tons/year. The correct limit is 0.7008 tons/year. The issued permit #0037-I011 incorrectly showed the Sulfur Oxides limit as 0.02 lb/hr. The correct limit is 0.012 lb/hr.

GHG Mass and CO_2e Emissions:
Calculations of greenhouse gases (GHG) 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 C-1 and Table C-2 of that subpart.

Total rated heat input capacity of the boiler = 20.085 MMBtu/hr × 8,760 hr/yr = 175,945 MMBtu/yr
Emission Factors: CO_2 = 53.02 kg/MMBtu
$N_2O = 1\times10^{-4}$ kg/MMBtu
$CH_4 = 1\times10^{-3}$ kg/MMBtu

CO_2: 175,945 MMBtu/yr × 53.02 kg/MMBtu ÷ 1,000 kg/metric ton = 9,329 metric tons/year
NO_2: 175,945 MMBtu/yr × 1×10^{-4} kg/MMBtu ÷ 1,000 kg/metric ton = 0.0176 metric tons/year
CH_4: 175,945 MMBtu/yr × 1×10^{-3} kg/MMBtu ÷ 1,000 kg/metric ton = 0.176 metric tons/year

Global Warming Potential (GWP) Factors (from Part 98, Subpart A, Table A-1):
CO_2 = 1
N_2O = 298
CH_4 = 25

CO_2e = (9,329 × 1) + (0.0176 × 298) + (0.176 × 25) = **9,339 metric tons/year of CO_2e**
= 10,294 tpy of CO_2e

Note: Number is not exact due to rounding.

Sources of Minor Significance
Table 21 lists sources determined to be of minor significance.

Table 21: Sources of Minor Significance

Facility ID	Source Description	Basis for Exemption
G001	Gasoline Tank V-963	Total PTE is <0.15 tpy of VOC
F001	Roads and Vehicles	Total PTE is <1.8 tpy of PM and <0.34 tpy of PM_{10}

G001	Laboratory Emission Sources	Laboratory equipment used exclusively for chemical or physical analyses with minimal VOC emissions
G002	Painting Operations	Total PTE is <0.5 tpy of VOC
G003	Parts Cleaning	Only non-VOC/non-HAP solvents are used
G004	Turnaround Maintenance	Total PTE is <5 lbs/yr of PM and < 3 lbs/yr of PM_{10}
G006	Sandblasting	Total PTE is <0.2 tpy of PM_{10}

REGULATORY APPLICABILITY:

1. **Article XXI Requirements for Issuance:**
   See Permit Application No. 0037, Section 5. 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.

2. **Testing Requirements:**
   Testing for criteria pollutants, as well as ethylene glycol, styrene, and dioxins/furans is required on the thermal oxidizer (CISWI) at least once every five (5) years. Testing is also required for NO_X and CO on the Back-Up Boiler at least once every five (5) years. 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. **Applicable New Source Performance Standards (NSPS):**
   The facility is subject to 40 CFR Part 60, Subpart DDDD – *Emissions Guidelines and Compliance Times for Commercial and Industrial Solid Waste Incineration Units That Commenced Construction On or Before November 30, 1999* as referenced by 40 CFR Part 62, Subpart III – F*ederal Plan Requirements for Commercial and Industrial Solid Waste Incineration Units that Commenced Construction On or Before November 30, 1999.*

4. **Non-Applicable New Source Performance Standards (NSPS):**
   No storage tanks meet the applicability requirements of 40 CFR Part 60, Subpart Kb – *Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984*. All tanks at the facility were constructed prior to the applicability date of Subpart Kb.

   Boilers B004, B005, B006, B007, B008, and B009 are subject to 40 CFR Part 60, Subpart Db – *Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units* and Dc – *Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units*. Because only natural gas is used as a fuel, only the recordkeeping requirements of §60.47c(g), (i), and (j) apply. Condition §60.47c(i) is streamlined into §2103.12.j.2, as the Article XXI requirement for retention of records is more stringent (5 years versus 2 years) than the NSPS.

   The PR Plant Hot Oil Heater is not subject to 40 CFR Part 60, Subpart Db or Dc *Standards of Performance for Industrial Commercial Institutional Steam Generating Units*, as they are not a steam-generating units.

5. **Applicable NESHAP and MACT Standards:**
   The facility is not subject to any NESHAP or MACT standards.+
6. **Non-Applicable NESHAP and MACT Standards:**
   The following MACT standards are not applicable to this facility because it is not a major source of HAPs: Subpart EEEE – *National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution*; 40 CFR Part 63, Subpart FFFF – *National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing*; 40 CFR Part 63, and 40 CFR Part 63, Subpart DDDDD – *National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and*

Process Heaters.

Boilers B004, B005, B006, B007, B008, and B009 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* per §63.11195(e) because all units combust only natural gas, and are defined as "gas-fired boilers" under §63.11237.

7. **Risk Management Plan; CAA Section 112(r):**
The facility is not required to have a risk management plan at this time because none of the regulated chemicals exceed the thresholds in the regulation.

8. **Greenhouse Gas Reporting (40 CFR Part 98):**
There are presently no Title V applicable requirements for greenhouse gases. Upon review the actual natural gas use over the past ten (10) years (as reported in the Emissions Inventory), the average actual CO_2e emissions was less than 19,000 metric tons. Furthermore, the largest combustion source (the Main Boiler) was shut down in 2007. Should the actual emissions at 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.

9. **Compliance Assurance Monitoring (40 CFR Part 64):**
The Compliance Assurance Monitoring (CAM) rule found in 40 CFR 64 is applicable to this facility. CAM applies to VOC emissions from the polyester resins manufacturing process due to the presence of a thermal oxidizer (control device) and the magnitude of emissions. A CAM plan was submitted on November 1, 2011, and includes details for continuous monitoring of thermal oxidizer temperature, recordkeeping of production, regular inspections of the thermal oxidizer, regular calibrations of the thermocouple, and testing of the thermal oxidizer. All monitoring conditions have been included in the Title V Operating Permit.

EMISSIONS SUMMARY:

Table 22: Emissions Summary for Ashland Inc.

Pollutant	Total (tpy*)
Particulate Matter	**10.71**
Particulate Matter <10 µm (PM_{10})	**9.25**
Particulate Matter <2.5 µm ($PM_{2.5}$)	**9.25**
Nitrogen Oxides (NO_X)	**44.61**
Sulfur Oxides (SO_X)	**2.27**
Carbon Monoxide (CO)	**35.19**
Volatile Organic Compounds (VOC)	**33.42**
Hazardous Air Pollutants (HAP)	**17.23**
Styrene	**6.96**
Phthalic Anhydride	**1.89**
Maleic Anhydride	**2.85**
Methyl Methacrylate	**2.1**
Vinly Toluene	**0.44**
Ethylene Glycol	**0.48**
Greenhouse Gases (CO_2e)	**59,596**

* 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, and the facility is not in violation of the provisions of Article XXI, §2102.04.k. The Title V Renewal Operating Permit for Ashland Inc. should be approved with the emission limitations, terms and conditions in Permit No. 0037.

Appendix A: Emissions Summary

		PM	PM_{10}	$PM_{2.5}$	NO_X	SO_X	CO	VOC	HAP
Polyester Resins Plant									
P001	Polyester Resins Plant	0.99	0.99	0.99	36.28	2	19	9.85	0.49
P001a	PR Plant Batch Tanks							2.42	2.42
P001a	PR Plant Blend Tanks							1.227	1.227
P001a	PR Plant Thin Tanks							2.23	2.23
P001b	PR Plant PVA Baghouse	0.45	0.45	0.45					
P001c	PR Plant Loading Operations							2.99	2.99
P001d	PR Plant Hot Oil Heater				1.916				
P001e	PR Plant Pumps, Valves, etc.							4.01	2.17
P001f	PR Plant Cooling Tower	0.472	0.472	0.472					
P001g	PR Plant Storage Tanks							1.42	1.18
P002d	MA Storage Tanks							0.43	0.43
B004, B005, B006	Boilers (total emissions)	1.073	1.073	1.073	3.202	0.088	4.959	0.808	
B007	Boiler	1.009	1.009	1.009	1.388	0.083	4.667	0.505	
B008, B009	Boilers (total emissions)	1.401	1.401	1.401	1.83	0.105	6.57	0.63	
Plasticizer Terminal									
P002	Plasticizer Terminal Distribution	3.28	3.28	3.28				0.66	
P004	2EH Distribution							0.88	
P005	Maleic Anhydride Pastillator	0.04	0.04	0.04				1.88	1.88
D002	Plasticizer Storage Tanks							0.71	0.36
D008	2EH Storage Tanks							0.26	
D009	PA Tanks							1.86	1.86
Sources of Minor Significance									
D001	Gasoline Tank V-963							0.15	
F001	Roads & Vehicles	1.8	0.34	0.34					
G002	Painting Operations							0.5	
G004	Turnaround Maintenance	0.003	0.002	0.002					
G006	Sandblasting	0.2	0.2	0.2					
Totals:		**10.718**	**9.257**	**9.257**	**44.616**	**2.276**	**35.196**	**33.42**	**17.237**

Appendix B: Emissions Summary – Main Contributors of HAPs

		Total HAP	Styrene	Phthalic Anhydride	Methyl Methacrylate	Maleic Anhydride	Vinyl Toluene	Ethylene Glycol
Polyester Resins Plant								
P001	Polyester Resins Plant	0.49						0.36
P001a	PR Plant Batch Tanks	2.42	0.79		1.52		0.107	
P001a	PR Plant Blend Tanks	1.227	0.712		0.39		0.125	
P001a	PR Plant Thin Tanks	2.23	2.1				0.129	
P001b	PR Plant PVA Baghouse							
P001c	PR Plant Loading Operations	2.99	2.22		0.19	0.499	0.083	
P001d	PR Plant Hot Oil Heater							
P001e	PR Plant Pumps, Valves, etc.	2.17	1.960	0.036		0.05		0.12
P001f	PR Plant Cooling Tower							
P001g	PR Plant Storage Tanks	1.18	1.14					
P002d	MA Storage Tanks	0.43				0.43		
Plasticizer Terminal								
P002	Plasticizer Terminal Distribution							
P004	2EH Distribution							
P005	Maleic Anhydride Pastillator	1.88				1.88		
D002	Plasticizer Storage Tanks	0.36						
D008	2EH Storage Tanks							
D009	PA Tanks	1.86		1.86				
Sources of Minor Significance								
D001	Gasoline Tank V-963							
F001	Roads & Vehicles							
G002	Painting Operations							
G004	Turnaround Maintenance							
G006	Sandblasting							
Totals:		**17.237**	**6.962**	**1.896**	**2.1**	**2.859**	**0.444**	**0.48**