www.erg.com

TECHNICAL MEMORANDUM

TO: Jodi Howard, US EPA/OAQPS/SPPD/RCG

FROM: Eastern Research Group, Inc.

DATE: February 8, 2012

SUBJECT: **Revised Baseline Emission Estimates for Major Sources in the Polyvinyl Chloride and Copolymers (PVC) Production Source Category**

1.0 Introduction

The U.S. Environmental Protection Agency (EPA), under section 112 of the Clean Air Act (CAA), is required to establish National Emissions Standards for Hazardous Air Pollutants (NESHAP) emitted from polyvinyl chloride and copolymer (PVC) production facilities. The complete set of hazardous air pollutants (HAP) is listed under CAA section 112(b). To assess the effects of regulatory requirements on these HAP, it is first necessary to determine HAP emissions at the current level of control at each PVC production facility. These emissions are referred to as the baseline emissions.

This memorandum describes the development of revised baseline emissions estimates for existing sources in the PVC production source category. Section 2.0 discusses the sources of data used in the development of the baseline emission estimates, Section 3.0 presents the methodology used to estimate baseline emissions, and Section 4.0 summarizes the results of this analysis.

Each facility was required to conduct tests for vinyl chloride (VC) and other HAP at the inlet and outlet of the control systems (e.g. thermal oxidizers in series with an acid gas scrubber). Additionally, stack testing was also required to determine hydrogen chloride (HCl) and chlorinated dibenzodioxin and dibenzofuran (CDD/CDF) emissions at the control system's outlet. The stack tests consisted of 3 runs and the facilities were required to provide PVC production rates, the exhaust gas flow rate and oxygen concentration during testing. Some of the facilities are co-located with other manufacturing processes such as vinyl chloride monomer (VCM) and ethylene dichloride (EDC) and also share a common control device.

Each facility was required to conduct stripped resin sampling for 30 days as a part of the August 21, 2009 section 114. The August 21 section 114 required each facility to take samples of the stripped resin being produced daily over a 30-day period at the outlets of the resin stripper(s) and the resin dryer(s). The facilities analyzed the samples for the concentration(s) of HAP present in the resin and then calculated the corresponding mass of each HAP present in the stripped resin, based on the analysis of the concentration in each of the samples.

2.0 Data Sources

The data sources used in the baseline emissions analysis are described in a separate memo[1].

3.0 Methodology for Estimating Baseline Emissions

Baseline emissions were estimated for 7 emission points in the PVC production source category: process vents, stripped resins, storage tanks, heat exchange systems, equipment leaks, other emission sources, and wastewater. The general methodology consisted of multiplying a HAP concentration by the emission point flow rate and assuming an operating time of 8,400 hours per year (with 2 weeks or 336 hours of downtime). Baseline emissions from certain emission points or sources, such as equipment leaks, were determined using EPA supplied factors; other emission estimates were supplied by facilities in their section 114 (survey and testing) responses. In multiple instances, a complete emissions data set did not exist for a given emission point or source. Average factors were used to estimate facility emissions where data did not exist. A description of how baseline emissions were determined is provided below.

3.1 Process Vents

Annual baseline emissions from process vents were estimated in the PVC production source category for VC, HCl, chlorine (Cl_2), CDD/CDF, and total organic HAP. The total organic HAP estimated includes VC and CDD/CDF emissions, but does not include HCl or other non-organic HAP. Baseline emissions estimates were calculated using the facility submitted process vent stack testing information reported in the August 21, 2009 PVC section 114 testing report and March 16, 2011 VCM/EDC section 114 testing report which included HAP concentrations, exhaust gas flow rates, and oxygen concentrations. The determination of HAP concentrations is described in a separate memo[2].

As noted in a separate memo, several PVC-combined facilities (Formosa Baton Rouge, Westlake Calvert City, Formosa Point Comfort, and OxyVinyls Deer Park) isolated their process vent control device while performing stack testing in response to the August 21, 2009 section 114 for the PVC production industry. In response to the March 16, 2011 section 114 for the VCM/EDC manufacturing industries, 3 facilities (Formosa Point Comfort, OxyVinyls Deer Park, and Shintech Plaquemine) conducted testing for VC and CDD/CDF with their process vent control device operating under normal conditions (i.e., no normally controlled streams were excluded). Therefore, the EPA did not receive VC and CDD/CDF concentration data as a result of testing under normal operating conditions from 2 of the PVC-combined facilities (Formosa Baton Rouge, Westlake Calvert City). The EPA also did not receive HCl or total organic HAP concentration data as a result of testing under normal operating conditions from 4 PVC-combined facilities (Formosa Baton Rouge, Westlake Calvert City, Formosa Point Comfort and OxyVinyls Deer Park).

Shintech Plaquemine reported VC emissions concentrations that were above the 40 CFR Part 61, subpart F emission limit of 10 parts per million (PPM); therefore, all pollutant concentrations reported by Shintech Plaquemine in response to the August 21, 2009 section 114 were excluded from the baseline emission analysis. Although Shintech Plaquemine conducted process vent testing in response to the March 16, 2011 section 114, results for VC were not used in the analysis because the facility reported abnormally low concentrations as non-detect (ND).

To calculate baseline emissions for PVC-combined facilities that did not report data under normal operating conditions, average factors were applied to these facilities based on available data from PVC-combined facilities that reported data under normal operating conditions. Therefore, baseline emission estimates for all PVC-combined facilities includes process vent streams from PVC production and other source category processes (e.g., EDC/VCM). A process vent exhaust gas flow rate was calculated for each facility and used to estimate baseline emissions. Since a single test method cannot be used to determine all of the HAP concentrations in an emission stream, each facility used multiple test methods to determine the concentrations of HAP present in their exhaust gas stream. Not all test methods can be conducted concurrently; therefore, multiple volumetric flow rates were reported for each process vent at every facility. Facilities were required to perform 3 test runs for each test method they conducted, so 3 volumetric flow rates were reported for each test method. The volumetric flow rate used in the baseline emission estimation was determined by calculating the average flow rate for each test method for each facility. The maximum average flow rate was then selected for each facility and used to estimate baseline emissions. For example, one facility may have determined the concentration of VC, HCl, and CDD/CDF using Method 0031, Method 26, and Method 23 respectively. Each method was comprised of 3 test runs, for a total of 9 individual volumetric flow rates. The volumetric flow rates were averaged for each test method, resulting in 3 volumetric flow rate averages. The maximum average value was then selected for the baseline emissions calculation. The maximum average volumetric flow rate was used to calculate a conservatively high baseline emissions estimate.

A process vent exhaust gas oxygen concentration was also calculated for each facility and used to estimate baseline emissions. Facilities were required to report HAP concentrations corrected to a 3 percent oxygen basis. Concentration data are not directly comparable if reported on various oxygen concentration bases; however, to calculate a HAP mass flow rate, it is necessary to convert the concentration data point to the actual oxygen concentration of the exhaust gas. As stated in the exhaust gas volumetric flow rate discussion, facilities used multiple test methods to determine HAP concentrations and reported multiple oxygen concentrations in their exhaust gas stream. The oxygen concentration used in the baseline emissions estimation was determined by calculating the average oxygen concentration for all test methods for each facility. It was assumed that facilities would more than likely control oxygen concentration (i.e., excess air) to a relatively constant level, regardless of flow rate; therefore, an average oxygen concentration was used in the baseline emissions estimate.

Using the equations presented in Appendix A and the average exhaust gas flow rate and oxygen concentrations previously discussed, baseline emissions were determined for VC, HCl, Cl_2, CDD/CDF and total organic HAP.

Baseline emissions for CDD/CDF were estimated on a toxic equivalency (TEQ) basis. For each facility, the 17 CDD/CDF congeners were converted from a total mass basis to a TEQ basis as described in a separate memo[2]. CDD/CDF compounds vary in toxicity. Converting mass based CDD/CDF values to TEQ allows one to compare releases of total CDD/CDF on a toxicity basis[3]. The concentrations of the 17 congeners were summed to obtain the total CDD/CDF TEQ concentration for each facility. Annual baseline emissions were then calculated using the equations presented in Appendix A.

Total organic HAP baseline emissions were calculated by determining and summing the annual baseline emissions for each organic HAP compound reported by facilities using the equations presented in Appendix A. HCl and Cl_2 were not included in the total organic HAP baseline estimate, as HCl and Cl_2 are not organic compounds. CDD/CDF was not converted to a TEQ basis for the total organic HAP sum to reflect the actual tonnage of total organic HAP.

Details of the analysis can be found in Attachment A. Results of the baseline emissions estimation for process vents are presented in Section 4.0.

3.2 Stripped Resin

After polymerization, most resin slurries are sent to a steam stripper that removes residual vinyl chloride and other HAP before the resin is dried. HAP emissions from processes downstream of the resin stripper are dependent on the concentration of HAP remaining in the stripped resin. That is, the greater the HAP concentration in the stripped resin, the greater the HAP emissions from downstream process components. Similarly, the lower the HAP concentration in the stripped resin, the lower the HAP emissions from downstream process components.

Annual baseline emissions resulting from residual VC and total non-vinyl chloride organic HAP (total non-VC organic HAP) remaining in the stripped resin were estimated for each PVC production facility. As discussed above, it was assumed that the total amount of all residual VC and other organic HAP in the stripped resin would be emitted from process equipment downstream of the resin stripper (or in process equipment following polymerization if there is no separate resin stripper). For facilities that manufacture a type of resin other than a bulk resin, the majority of these emissions would likely occur from the resin centrifuge and/or dryer vents as the resin slurry is dried. For all non-bulk PVC facilities, baseline emissions from stripped resins were estimated based on the calculated or reported residual VC and total non-VC organic HAP concentrations in the stripped resin(s) for each facility and assuming that 100 percent of the pollutant mass is subsequently emitted from the facility from operations downstream of the resin stripper.

To conservatively estimate emissions, the maximum resin flow rates were extracted from Form K-2-A of the section 114 survey responses. For facilities with multiple resin strippers, all the stripped resin stream flow rates were totaled for each facility. If a facility did not report a maximum resin flow rate (or reported resin flow rates as confidential business information), publically available facility capacity data from year 2006 was used to estimate resin production. If a facility produces more than 1 type of resin, the total resin production was divided by the number of types of resins produced at the facility to estimate emissions from each resin type. The residual VC and total non-VC organic HAP concentrations in the stripped resin for each facility that were calculated for the MACT floor analysis[2] were also used with the resin flow rate to estimate the annual mass emissions using Equation 5, found in Appendix A.

Details of this analysis can be found in Attachment B. Results of the baseline emissions estimation for resins are presented in Section 4.0.

3.3 Storage Vessels

VC and total organic HAP baseline emissions from storage vessels were provided by each facility on Form O of the section 114 survey responses[1]. Total organic HAP was estimated by summing all the organic HAP pollutants for each facility. A percentage of facilities indicated that storage vessel emissions were not calculated or recorded. A number of facilities reported pollutant vapor pressures and concentrations, but did not provide an estimate for annual emissions. To estimate the industry total baseline emissions from storage vessels, the average factors were applied to those facilities which did not report annual emissions.

Details of this analysis can be found in Attachment C. Results of the baseline emissions estimation for storage vessels are presented in Section 4.0.

3.4 Heat Exchange Systems

VC and total organic HAP baseline emissions from heat exchange systems were calculated for each facility by extracting data from the August 21, section 114 survey form's C-1-A, D, and K-1-C. Only one facility provided emissions estimates of VC from cooling towers. The emission estimates were used to back-calculate a cooling tower water VC concentration. The percentage of VC in the cooling tower water to the reported leak action level was then determined. For any facility that reported a leak action level, their cooling tower water VC concentration was estimated by multiplying the reported leak action level by concentration percentage. For facilities that did not report a leak action level, an average VC concentration was calculated using the average leak action level. Cooling towers for each facility were then identified using form C-1-A of the section 114 survey. Cooling water recirculation rates were extracted for each cooling tower identified in the section 114 survey and multiplied by the previously determined VC concentration to obtain estimated emissions for each cooling tower. Emissions from each cooling tower were summed to obtain a baseline emission estimate from heat exchange systems for each facility.

Details of this analysis can be found in Attachment D. Results of the baseline emissions estimation for heat exchange systems are presented in Section 4.0.

3.5 Equipment Leaks

Baseline emissions from equipment leaks were calculated by applying emission factors associated with leak detection and repair (LDAR) programs used by each facility. Emissions were calculated on an equipment basis (e.g., valves, pumps, compressors, open-ended lines, sampling connections, connectors) and then summed over all equipment to calculate facility emissions.

Emission factors were obtained from the memo titled "Analysis of Emissions Reduction Techniques for Equipment Leaks" from Cindy Hancy, RTI International, to Jodi Howard, EPA[4]. The memo was developed under the technology review required by Section 112(d)(6) of the CAA for equipment leaks. Emission factors were developed using facility data from the

Miscellaneous Organic NESHAP MACT floor development and the EPA Office of Air Quality and Planning 1995 Standards Protocol for Equipment Leak Emission Estimates[5]. Emission factors labeled as "Baseline" from Table 6 of the memo were used to estimate emission from facilities currently complying with 40 CFR subpart F. Emission factors for "Option 1" for valves, pumps and connectors were used to estimate emission from facilities currently complying with 40 CFR subpart UU.

Information on actual equipment counts at each PVC facility were not collected in the August 21, 2009 section 114. Consequently, model equipment counts developed by EPA for other chemical facilities were used in this analysis[4]. The model equipment counts are associated with 3 categories of chemical manufacturing facilities: (1) facilities with highly complex processes that require a number of pipelines and equipment, (2) facilities with moderately complex processes (which have less process lines or equipment), and (3) facilities with low complexity processes (which have a basic level of process lines or equipment). For this analysis, it was assumed that PVC facilities would fit into the second category, moderately complex, because, while the processes are basic, a facility could have a number of different process lines to make different grades of PVC resin.

Attachment E summarizes the model components used in the analysis, the LDAR program the facility is currently using, and the baseline emissions estimated for the facility. Results of the baseline emissions estimation for equipment leaks are presented in Section 4.0.

3.6 Other Emission Sources

Annual baseline emissions of VC and total organic HAP from reactor openings and process component openings were estimated by most facilities and submitted as part of their survey responses. For those facilities, emissions data were reported for either VC, total VOC, or both. One facility also reported estimated emissions for vinyl acetate and methanol in addition to VC and total VOC. Estimates for total organic HAP emissions for each facility were calculated as the sum of all reported HAP emissions. Emission factors for VC and for methanol were calculated based on the provided data and were used to estimate VC and total organic HAP emissions for those facilities that did not provide emissions estimates from reactor openings or process component openings. Two different emission factors were calculated; one for suspension resin facilities and another for dispersion resin facilities. The calculated emission factors for VC and methanol were then applied to the facilities according to the type of resin manufactured (suspension or dispersion) and total annual emissions for VC and total organic HAP were calculated.

Annual baseline emissions for gasholders were estimated using the average VC emission factor for large and small gasholders and the number of gasholders in operation provided by the VI.

Details of this analysis can be found in Attachment F. Results of the baseline emissions estimation for other emission sources are presented in Section 4.0.

3.7 Wastewater

Baseline wastewater generation of VC and total non-VC organic HAP emissions were determined for three categories of wastewater; stripper outlets, uncontrolled streams, and maintenance wastewater. Only a small percentage of facilities reported adequate information for each category. The emissions of the remaining facilities were estimated by calculating average factors from the wastewater data set.

The following steps were taken to calculate baseline wastewater generation:

1. Each reported wastewater stream was identified as one of 3 categories: stripper outlet, uncontrolled, or maintenance.

2. Facility supplied process flow diagrams and originating equipment designations were used to identify stripper outlet streams.

3. A stream was assumed uncontrolled if it was exposed to the atmosphere and not previously identified as a stripper outlet.

4. Facilities reported maintenance wastewater in a separate section of the survey; therefore, no additional categorization was needed.

The summation of the stripper outlet, uncontrolled, and maintenance wastewater streams were assumed to represent the total wastewater generated by a facility. Annual generation of VC and total non-VC organic HAP emissions in each wastewater stream was calculated using Equation 6, found in Appendix A.

To estimate the VC and total non-VC organic HAP emissions generated by facilities that did not report sufficient wastewater information, the available data set was used to develop and apply average factors to the under-reported facilities. Three factors were developed for each wastewater category: the average amount of wastewater generated per pound of resin produced, the average concentration of VC, and the average concentration of total non-VC organic HAP.

Only a percentage of facilities reported total annual wastewater generation for each wastewater category. Therefore, it was necessary to estimate the annual wastewater generation for facilities that did not provide information. For each wastewater category, the average tonnage of wastewater generated per pound of resin produced was calculated by dividing the total tons of wastewater generated by the total pounds of resin produced in 2008 for each facility that provided adequate wastewater information and non-confidential production data. The values were then averaged to obtain a wastewater generation factor based on resin production for each wastewater category.

Similar to wastewater generation, only a fraction of facilities reported the VC and total non-VC organic HAP concentrations in each wastewater category. Therefore, it was necessary to estimate the average annual VC and total non-VC organic HAP concentration for the remainder of the facilities. All categorized data provided by industry were used to develop average factors.

The amount of wastewater generated was calculated by multiplying the average tonnage of wastewater generated per pound of resin produced factor by the 2008 resin production of 2006 capacity rating for each facility that did not report adequate wastewater data. Once the total amount of wastewater generated was calculated for each facility, the total amount of VC and total non-VC organic HAP were estimated by multiplying the average factors by the estimated wastewater generation rate.

Details of this analysis can be found in Attachment G. Results of the baseline emissions estimation for wastewater are presented in Section 4.0.

4.0 Results

The following tables present the results of the baseline emissions analysis for the PVC production source category. Baseline emissions estimates are provided for each facility by emission point in Tables 4-1 through 4-7. Total baseline emissions by pollutant are summarized in Table 4-8. Total baseline emissions by facility are summarized in Table 4-9, and total baseline emissions by emission point are summarized in Table 4-10.

Table 4-1. Baseline Emissions from Process Vents

Company/Facility	**Baseline Emissions (Tons Per Year)**				
	VC	**HCl**	**Cl_2**	**CDD/CDF**	**Total Organic HAP**
Dow - Midland	1.01E-04	No Data	5.68E-02	1.44E-11	5.98E-03
Formosa - Delaware City	4.88E-03	1.41	2.92E-03	2.05E-11	4.99E-02
Formosa - Point Comfort	5.74E-02	7.03	3.30E-01	1.54E-08	1.57E-01
Formosa - Baton Rouge	5.03E-02	21.1	9.93E-01	1.05E-08	4.76E-01
Georgia Gulf - Plaquemine	6.52E-04	29.8	7.01E-01	4.95E-09	2.75E-01
Georgia Gulf - Aberdeen	2.27E-02	1.04E+00	5.00E-01	2.04E-11	7.60E-02
OxyVinyls - Pasadena	1.64E-02	3.55E+00	1.16E-01	5.00E-11	2.82E-01
PolyOne - Henry	1.12E-04	1.59E-05	1.97E-05	No Data	9.14E-01
PolyOne - Pedricktown	2.05E-05	5.94E-06	3.39E-04	No Data	3.55E-01
Shintech - Freeport	8.32E-05	1.16E-03	1.06E-03	7.34E-11	3.76E-03
Shintech - Addis	3.77E-03	7.67E-04	6.81E-04	1.02E-10	2.62E-01
Shintech - Plaquemine	3.71E-02	15.6	7.32E-01	2.15E-09	2.90E-01
Westlake - Calvert City	5.03E-02	21.1	9.93E-01	1.05E-08	4.76E-01
Westlake - Geismar	3.71E-04	1.20E-01	1.28	5.62E-09	1.62
TOTAL*	**2.44E-01**	**101**	**5.71**	**4.95E-08**	**5.24**

*Totals may not add exactly due to rounding

VC – Vinyl Chloride
HCl – Hydrogen Chloride
Cl_2 - Chlorine
CDD/CDF – Chlorinated dibenzodioxin and chlorinated dibenzofurans
TOHAP – Total organic hazardous air pollutant

Table 4-2. Baseline Emissions from Stripped Resins

Company/Facility	Resin Type	Baseline Emissions (Tons Per Year)	
		VC	Total Non-VC Organic HAP
Dow - Midland	Copolymer (VDCO-S)	3.96E-03	2.01E-02
Formosa - Baton Rouge	Suspension	2.47E-01	18.2
Formosa - Delaware City	Dispersion	19.1	1.04
Formosa - Delaware City	Copolymer (VACO-D)	12.9	32.0
Formosa - Point Comfort	Suspension	1.31	14.9
Georgia Gulf - Aberdeen	Suspension	9.29	113
Georgia Gulf - Plaquemine	Suspension	2.20	141
OxyVinyls - Pasadena	Suspension	5.79	81.1
OxyVinyls - Pedricktown	Suspension	1.21	6.94
PolyOne - Henry	Suspension	1.11E-02	1.93
PolyOne - Henry	Dispersion	4.82	3.33E-01
PolyOne - Henry	Suspension Blending	1.98E-01	8.13E-01
PolyOne - Pedricktown	Dispersion	2.87	1.29
Shintech - Addis	Suspension	1.91	21.3
Shintech - Freeport	Suspension	5.82	108
Shintech - Plaquemine	Suspension	2.20	44.2
Westlake - Calvert City	Suspension	7.45	136
Westlake - Geismar	Suspension	16.4	2.60E-01
TOTAL*		93.7	723

Table 4-3. Baseline Emissions from Storage Vessels for the PVC Production Source Category

Company/Facility	Baseline Emissions (Tons Per Year)	
	VC	Total Organic HAP
Formosa - Delaware City	0	3.53E-01
PolyOne – Henry	0	3.53E-01
PolyOne - Pedricktown	0	3.53E-01
Dow – Midland	0	0
Formosa - Baton Rouge	3.36E-01	1.22
Formosa - Point Comfort	0	0
Georgia Gulf - Aberdeen	3.36E-01	4.92E-01
Georgia Gulf - Plaquemine	3.36E-01	4.92E-01
OxyVinyls - Pasadena	3.36E-01	4.92E-01
OxyVinyls - Pedricktown	3.36E-01	4.92E-01
Shintech – Addis	8.99E-01	1.06
Shintech - Freeport	3.36E-01	2.02E-01
Shintech - Plaquemine	9.02E-02	9.02E-02
Westlake - Calvert City	3.36E-01	0
Westlake - Geismar	1.97E-02	2.32E-02
TOTAL*	**3.36**	**5.62**

VC – Vinyl Chloride
*Totals may not add exactly due to rounding

Table 4-4. Baseline Emissions from Heat Exchange Systems for the PVC Production Source Category

Company/Facility	Baseline Emissions (Tons Per Year)	
	VC	Total Organic HAP
Dow – Midland	42.9	42.9
Formosa - Baton Rouge	1.25E-01	1.25E-01
Formosa – Delaware City	3.19E+00	3.19E+00
Formosa – Point Comfort	56.2	56.2
Georgia Gulf – Aberdeen	3.22	3.22
Georgia Gulf – Plaquemine	0	0
OxyVinyls – Pasadena	2.75E-01	2.75E-01
OxyVinyls - Pedricktown	3.47	3.47
PolyOne – Henry	13.8	13.8
PolyOne – Pedricktown	1.33	1.33
Shintech – Addis	1.59E-01	1.59E-01
Shintech – Freeport	1.28E-01	1.28E-01
Shintech – Plaquemine	1.53E-01	1.53E-01
Westlake – Calvert City	8.15	8.15
Westlake - Geismar	1.39E-01	1.39E-01
TOTAL*	133	133

VC – Vinyl Chloride
*Totals may not add exactly due to rounding

Table 4-5. Baseline Emissions from Equipment Leaks in the PVC Production Source Category

Company/Facility	LDAR Program	Baseline Emissions Total Organic HAP (Tons Per Year)[1,2]
Dow – Midland	40CFR61 V	15.3
Formosa - Baton Rouge	40CFR61 V	15.3
Formosa – Delaware City	40CFR63 UU	8.44
Formosa – Point Comfort	40CFR61 V	15.3
Georgia Gulf – Aberdeen	40CFR61 V	15.3
Georgia Gulf – Plaquemine	40CFR63 UU	8.44
OxyVinyls – Pasadena	40CFR61 V	15.3
OxyVinyls - Pedricktown	40CFR61 V	15.3
PolyOne – Henry	40CFR61 V	15.3
PolyOne – Pedricktown	40CFR61 V	15.3
Shintech – Addis	40CFR61 V	15.3
Shintech – Freeport	40CFR63 UU	8.44
Shintech – Plaquemine	40CFR61 V	15.3
Westlake – Calvert City	40CFR61 V	15.3
Westlake - Geismar	40CFR61 V	15.3
TOTAL*		**209**

[1] - Based on average VOC emission factors, and assuming all VOC emissions are organic HAP emissions.

[2] - Based on model equipment counts from a moderately complex chemical facility.

LDAR – Leak detection and repair

*Totals may not add exactly due to rounding

Table 4-6. Baseline Emissions from Other Emission Sources for the PVC Production Source Category

Company/Facility	Baseline Emissions (Tons Per Year)	
	VC	Total Organic HAP
Certain Teed - Lake Charles	3.35E-02	3.35E-02
Dow – Midland	5.06E-02	5.10E-02
Formosa - Baton Rouge	1.46E-01	1.47E-01
Formosa – Delaware City	1.79E-05	1.79E-05
Formosa – Point Comfort	1.13E-01	1.14E-01
Georgia Gulf – Aberdeen	5.06E-02	5.10E-02
Georgia Gulf – Plaquemine	5.06E-02	5.10E-02
OxyVinyls – Deer Park	3.04E-01	3.06E-01
OxyVinyls – Pasadena	2.02E-01	2.05E-01
OxyVinyls - Pedricktown	1.57E-01	1.59E-01
PolyOne – Henry	5.06E-02	5.10E-02
PolyOne – Pedricktown	3.79E-05	3.79E-05
Shintech – Addis	6.65E-03	7.09E-03
Shintech – Freeport	1.98E-01	1.99E-01
Shintech – Plaquemine	2.50E-01	2.50E-01
Westlake – Calvert City	9.01E-02	9.14E-02

Company/Facility	Baseline Emissions (Tons Per Year)	
	VC	Total Organic HAP
Westlake - Geismar	5.25E-02	5.30E-02
Gasholders[1]	31.4	31.4
TOTAL*	**32.9**	**32.9**

[1] - Information on gasholder emissions were provided on an industry basis, rather than a facility basis. Therefore, total gasholder emissions are shown in the table.
VC – Vinyl Chloride
*Totals may not add exactly due to rounding

Table 4-7. Baseline Generation of HAP in Wastewater for the PVC Production Source Category

Company/Facility	Baseline Generation (Tons Per Year)	
	VC	Total Non-VC Organic HAP
Dow - Midland	2.65E-02	4.03E-01
Formosa - Baton Rouge	9.52E-01	19.7
Formosa - Delaware City	1.76E-01	2.67
Formosa - Point Comfort	2.10	29.2
OxyVinyls - Pasadena	1.84	6.95
OxyVinyls - Pedricktown	4.30E-01	6.54
PolyOne - Henry	5.61E-01	2.80
PolyOne - Pedricktown	4.70E-02	6.57E-01
Shintech - Addis	5.53E-01	5.01
Shintech - Freeport	1.79E-02	8.85
Shintech - Plaquemine	1.14	1.30
Westlake - Calvert City	1.33E-01	8.83E-01
Westlake - Geismar	8.02E-02	7.47
Georgia Gulf - Aberdeen	9.13E-01	2.52
Georgia Gulf - Plaquemine	1.51	22.4
TOTAL*	**10.5**	**117**

VC – Vinyl Chloride
Total Non-VC HAP – Total non-vinyl chloride HAP (does not include vinyl chloride)
*Totals may not add exactly due to rounding

Table 4-8. Summary of Baseline Emissions for the PVC Production Source Category by Pollutant

Pollutant	Baseline Emissions (Tons Per Year)
Vinyl Chloride (VC)	274
Hydrogen Chloride (HCl)	101
Chlorine (Cl_1)	5.71
Chlorinated Dibenzodioxin / Chlorinated Dibenzofuran (CDD/CDF)	4.95E-08
Total HAP	1,330

Table 4-9. Summary of Baseline Emissions for the PVC Production Source Category by Facility

Company/Facility	Baseline Emissions (Tons Per Year)				
	VC	HCl	Cl_2	CCD/CDF	Total Organic HAP
Dow – Midland	43.0	0	5.68E-02	1.44E-11	58.7
Formosa – Baton Rouge	1.86	21.1	2.92E-03	1.05E-08	56.4
Formosa – Delaware City	35.4	1.41	3.30E-01	2.05E-11	80.0
Formosa – Point Comfort	59.8	7.03	9.93E-01	1.54E-08	119
Georgia Gulf – Aberdeen	13.8	1.04	7.01E-01	2.04E-11	145
Georgia Gulf – Plaquemine	4.10	29.8	5.00E-01	4.95E-09	177
OxyVinyls – Pasadena	8.46	3.55	1.16E-01	5.00E-11	112
OxyVinyls – Pedricktown	5.60	0	1.97E-05	0	34.5
Poly One – Henry	19.5	1.59E-05	0	0	41.9
Poly One – Pedricktown	4.25	5.94E-06	3.39E-04	0	22.2
Shintech – Addis	3.53	7.67E-04	1.06E-03	1.02E-10	45.5
Shintech – Freeport	6.50	1.16E-03	6.81E-04	7.34E-11	132
Shintech – Plaquemine	3.87	15.6	7.32E-01	2.15E-09	64.9
Westlake – Calvert City	16.2	21.1	9.93E-01	1.05E-08	169
Westlake – Geismar	16.6	1.20E-01	1.28	5.62E-09	41.3
TOTAL*	**274**	**101**	**5.71**	**4.95E-08**	**1,330**

*Totals may not add exactly due to rounding
VC – Vinyl Chloride
HCl – Hydrogen Chloride
Cl_2 - Chlorine
CDD/CDF – Chlorinated dibenzodioxin and chlorinated dibenzofurans
Total Organic HAP – Total Organic HAP does not include HCl from process vents. Total HAP includes vinyl chloride from stripped resins and wastewater.

Table 4-10. Summary of Baseline Emissions for the PVC Production Source Category by Emission Point

Emission Point	Baseline Emissions (Tons Per Year)				
	VC	HCl	Cl_2	CCD/CDF	Total Organic HAP
Process Vents	2.44E-01	101	5.71	4.95E-08	5.24
Resin	93.7	0	0	0	817
Wastewater	10.5	0	0	0	128
Equipment Leaks	0	0	0	0	209
Storage	3.36	0	0	0	5.62
Heat Exchange Systems	133	0	0	0	133
Other Emission Sources	32.8	0	0	0	32.8
TOTAL*	**274**	**101**	**5.71**	**4.95E-08**	**1,330**

*Totals may not add exactly due to rounding
VC – Vinyl Chloride

Cl_2 - Chlorine

HCl – Hydrogen Chloride
CDD/CDF – Chlorinated dibenzodioxin and chlorinated dibenzofurans

5.0 References

1. "Updated Information Collection and Additional Data Received for the Polyvinyl Chloride and Copolymers (PVC) Production Source Category" Memorandum from Eastern Research Group, Inc. to Jodi Howard, U.S. Environmental Protection Agency. February 2012.

2. "Revised Maximum Achievable Control Technology (MACT) Floor Analysis for the Polyvinyl Chloride and Copolymers (PVC) Production Source Category" Memorandum from Eastern Research Group, Inc. to Jodi Howard, U.S. Environmental Protection Agency. February 2012.

3. "TRI Dioxin and Dioxin-like Compound Toxic Equivalency (TEQ) Information Rule – Final rule." U.S. EPA, 22 April, 2009. Web. 13 Jan. 2011. http://www.epa.gov/tri/lawsandregs/teq/teqpfinalrule.html

4. "Analysis of Emissions Reduction Techniques for Equipment Leaks" Memorandum from Cindy Hancy, RTI International to Jodi Howard, U.S. Environmental Protection Agency. December 21, 2011.

5. 1995 Protocol for Equipment Leak Emission Estimates. U.S. Environmental Protection Agency. November 1995. EPA-453/R-95-017.

Appendix A. Equations Used in Baseline Calculations

Process Vents

Vinyl Chloride, HCl, and Total Organic HAP

Baseline Emissions:

$$B_E = C_i \times \frac{1}{10^6} \times \frac{20.9 - O_2}{20.9 - 3} \times \frac{1\,ft^3}{0.028\,m^3} \times \frac{1\,lb\,mol}{385.3\,ft^3} \times MW_i \times \dot{V} \times \frac{60\,min}{hr} \times \frac{8400hrs}{yr} \times \frac{1\,ton}{2000\,lbs} \qquad \textbf{(Eq. 1)}$$

where,

B_E = Annual baseline emissions in tons per year,
C_i = pollutant concentration in parts per million volume at 3 percent oxygen,
O_2 = average oxygen concentration of all pollutant three run tests,
385.3 ft^3 = volume, in cubic feet, of one pound mole of ideal gas at 20 °C (68 °F) and one atmosphere of pressure,
MW_i = molecular weight of the pollutant in pounds per pound mole, and
$\dot{V}$ = volumetric flow rate of the exhaust gas in dry standard cubic meters per minute.

CDD/CDF (TEQ)

Baseline Emissions:

$$B_E = C_i \times \frac{20.9 - O_2}{20.9 - 3} \times \frac{1E(-9)\,g}{1\,ng} \times \frac{2.20462\,lbm}{1000\,g} \times \frac{1\ Ton}{2000\ lbm} \times \dot{V} \times \frac{60\,min}{hr} \times \frac{8400\,hr}{yr} \qquad \textbf{(Eq. 2)}$$

where,

B_E = Annual baseline emissions in tons per year,
C_i = pollutant concentration in nanograms per dry standard cubic meter at 3 percent oxygen, TEQ
O_2 = average oxygen concentration of all pollutant three run tests, and
$\dot{V}$ = volumetric flow rate of the exhaust gas in dry standard cubic meters per minute.

Conversion of CDD/CDF Concentration from a Mass to Volumetric Basis:

$$PPMVD\ @\ 3\%O_2 = C_i \times \frac{1g}{10^6\,\mu g} \times \frac{1mol}{MW_g} \times \frac{22.4dsL}{1mol} \times \frac{1m^3}{1000L} \times 10^6\,PPM \qquad \textbf{(Eq. 3)}$$

where,

C_i = pollutant concentration in micrograms per dry standard cubic meter at 3 percent oxygen,
MW_g = molecular weight of the compound in grams per gram mole

$$PPMVD @ 3\%O_2 = C_i \times \frac{1\mu g}{1000ng} \times \frac{1g}{10^6 \mu g} \times \frac{1mol}{MW_g} \times \frac{22.4dsL}{1mol} \times \frac{1m^3}{1000L} \times 10^6 PPM \quad \textbf{(Eq. 4)}$$

where,

C_i = pollutant concentration in nanograms per dry standard cubic meter at 3 percent oxygen,
MW_g = molecular weight of the compound in grams per gram mole

<u>Resin</u>

Vinyl Chloride and Total Non-Vinyl Chloride HAP

Calculation for Vinyl Chloride and Total Non-Vinyl Chloride HAP Resin Emissions on a Tons per Year Basis:

$$B_E = C_i \times \frac{1}{10^6} \times \dot{M} \times \frac{1ton}{2000lb} \quad \textbf{(Eq. 5)}$$

where:

B_E = Annual baseline emissions in tons per year,
C_i = pollutant concentration in PPM (mass basis), and
$\dot{M}$ = Annual mass rate of stripped resin produced in pounds per year.

<u>Wastewater</u>

Vinyl Chloride and Total Non-Vinyl Chloride HAP

Calculation of Annual Generation of Vinyl Chloride and Total Non-Vinyl Chloride HAP in Individual Wastewater Streams:

$$B_g = \dot{V} \times \frac{1ft^3}{7.4805Gal} \times \frac{62.43lb}{1ft^3} \times C_i \times \frac{1}{10^6} \times \frac{1ton}{2000lb} \quad \textbf{(Eq. 6)}$$

where,

B_g = Annual baseline generation in tons per year,
C_i = pollutant concentration in PPM (mass basis), and
$\dot{V}$ = volumetric flow rate of wastewater in gallons per year.

Attachments

Attachment A. Baseline Emissions Analysis for Process Vents

Attachment B. Analysis of Baseline Emissions from Residual HAP in Resin

Attachment C. Baseline Emissions Analysis for Storage Tanks

Attachment D. Baseline Emissions Analysis for Heat Exchange Systems

Attachment E. Baseline Emissions Analysis for Equipment Leaks

Attachment F. Baseline Emissions Analysis for Other Emission Sources

Attachment G. Baseline Emissions Analysis for Wastewater

Attachment A

Baseline Emissions Analysis for Process Vents

ATTACHMENT A: BASELINE EMISSIONS ANALYSIS FOR PROCESS VENTS

02/08/2012

Baselines, Reductions, Costs

1	2	3	4	5	6	7	8	9	10
Facility	**Classification**	**Outlet Conditions**							
		Outlet Max Flow Rate (DSCMM)	**Average O2 (%)**	**Avg. Temp (C)**	**Vinyl Chloride (ppmvd @ 3%O2)**	**Cl2 (ppmvd @ 3% O2)**	**HCl (ppmvd @ 3%O2)**	**CDD/CDF (ng/dscm @ 3%O2)**	**TotalHAP (ppmvd @ 3%O2)**
OVPA	PVC - Only	1.55E+01	7.46E+00	2.48E+01	9.71E-01	6.02E+00	3.60E+02	7.8E-03	1.8E+01
CTLC	Area Source	3.43E+01	1.69E+01	5.71E+01	5.24E+00	2.26E+02	1.04E+02	3.1E-02	73.70
SHTFP	PVC - Only	1.10E+01	2.43E+00	2.29E+01	5.00E-03	5.63E-02	1.20E-01	1.2E-02	2.2E-01
FPC DE	PVC - Only	1.57E+01	5.37E+00	6.17E+00	2.45E-01	1.29E-01	1.21E+02	2.7E-03	2.8E+00
GGA	PVC - Only	1.07E+01	7.83E+00	2.09E+01	2.00E+00	3.88E+01	1.57E+02	4.7E-03	6.9E+00
POH	PVC - Only	1.13E-01	1.53E+01	-6.37E+00	2.18E+00	3.38E-01	5.30E-01	Not Reported	9.7E+03
POP	PVC - Only	4.36E-02	1.87E+01	-3.63E-01	2.66E+00	3.88E+01	1.32E+00	Not Reported	2.5E+04
SHTA	PVC - Only	1.43E+01	7.59E+00	3.13E+01	2.43E-01	3.87E-02	8.47E-02	1.7E-02	1.2E+01
FPC BR	PVC - Combined	4.10E+02	9.15E+00	4.87E+01	1.28E-01	2.23E+00	9.23E+01	7.05E-02	2.02E+00
FPC TX	PVC - Combined	1.36E+02	9.10E+00	6.42E+01	4.40E-01	2.23E+00	9.23E+01	3.10E-01	2.02E+00
OVLADP	Area Source	1.05E+03	4.07E+00	5.50E+01	1.93E-01	2.23E+00	9.23E+01	1.53E-02	2.02E+00
GGP	PVC - Combined	3.36E+02	1.08E+01	2.01E+01	2.35E-03	2.23E+00	1.84E+02	4.69E-02	1.71E+00
SHTP	PVC - Combined	2.50E+02	6.72E+00	1.23E+02	1.28E-01	2.23E+00	9.23E+01	1.95E-02	2.02E+00
WLG	PVC - Combined	6.50E+02	1.13E+01	2.50E+01	7.31E-04	2.23E+00	4.06E-01	2.91E-02	4.02E+00
WLCC	PVC - Combined	4.10E+02	9.15E+00	4.87E+01	1.28E-01	2.23E+00	9.23E+01	7.05E-02	2.02E+00
DOWMI	PVC - Combined	3.44E+01	1.29E+01	4.16E+00	4.51E-03	2.23E+00	Not Reported	1.68E-03	3.36E-01

Color Code Key

🟧 Average of PVC Combined Facilities

🟨 Average of PVC Only Facilities

🟩 Based on Average Factor (Inlet Flow Rate/Outlet Flow Rate) of PVC Combined Facilities

🟪 Estimated by calculating average Reduction Effy for VC for All PVC facilties and applying to outlet concentration

🟥 Average of All Facilities

🟩 Calculated using Inlet flow, O_2, and VC Concentration estimates

🟦 Estimated by calculating average factor of TOHAP (TPY)/Outlet Flow Rate

Existing Source Limits

VC	PVC - Only	6.00	ppmvd @ 3% O2
VC	PVC - Combined	1.10	ppmvd @ 3% O2
HCl	PVC - Only	78	ppmvd @ 3% O2
HCl	PVC - Combined	380	ppmvd @ 3% O2
CDD/CDF	PVC - Only	0.038	ng/dscm @ 3% O2
CDD/CDF	PVC - Combined	0.051	ng/dscm @ 3% O2
TOHAP	PVC - Only	56	ppmvd @ 3% O2
TOHAP	PVC - Combined	9.80	ppmvd @ 3% O2

ATTACHMENT A: BASELINE EMISSIONS ANALYSIS FOR PROCESS VENTS

02/08/2012

11	12	13	14	15	16
Inlet Conditions					
Inlet Max Flow Rate (DSCMM)	**Average O2 (%)**	**Avg. Temp (C)**	**Vinyl Chloride (ppmvd @ 3%O2)**	**CE Redux Effy**	**Vinyl Chloride (lbs/hr)**
1.51E+01	4.94E+00	1.89E+01	1.88E+05	9.999948E+01	8.82E+02
5.65E+00	3.33E-02	6.47E+01	9.59E+04	9.999453E+01	2.20E+02
5.47E-01	6.67E-01	1.56E+01	2.84E+02	9.999824E+01	6.09E-02
5.26E-01	8.15E+00	7.40E-01	6.33E+05	9.999996E+01	8.25E+01
1.12E-01	2.13E+00	1.63E+01	4.85E+05	9.999959E+01	1.98E+01
1.13E-01	6.03E+00	1.65E+01	7.39E+05	9.999971E+01	2.40E+01
9.01E-02	2.64E+00	-3.63E-01	5.08E+05	9.999948E+01	1.62E+01
9.97E+00	2.10E-01	1.89E+01	1.57E-01	-5.510638E+01	6.27E-04
9.08E+00	2.43E+00	1.89E+01	1.28E+04	9.999900E+01	4.16E+01
3.00E+00	2.43E+00	1.89E+01	4.39E+04	9.999900E+01	4.73E+01
2.33E+01	2.43E+00	1.89E+01	1.93E+04	9.999900E+01	1.61E+02
1.42E+00	1.90E+00	1.89E+01	5.18E+05	1.000000E+02	2.71E+02
5.54E+00	2.43E+00	1.89E+01	1.28E+04	9.999900E+01	2.54E+01
2.61E+01	2.97E+00	1.89E+01	1.26E+05	1.000000E+02	1.14E+03
9.08E+00	2.43E+00	1.89E+01	1.28E+04	9.999900E+01	4.16E+01
7.62E-01	2.43E+00	1.89E+01	4.51E+02	9.999900E+01	1.23E-01

ATTACHMENT A: BASELINE EMISSIONS ANALYSIS FOR PROCESS VENTS

02/08/2012

17	18	19	20	21	22	23	24	25	26
Baseline Emissions Estimates									
VC Baseline (lbs/hr)	**CL2 Baseline (lbs/hr)**	**HCl** Baseline (lbs/hr)	**CDD/CDF** Baseline (lbs/hr)	**TOHAP** Baseline (lbs/hr)	**VC** Baseline (Tons/Yr)	**Cl2** Baseline (Tons/yr)	**HCl** Baseline (Tons/Yr)	**CDD/CDF (TEQ)** Baseline (Tons/Yr)	**TOHAP** Baseline (Tons/Yr)
3.92E-03	2.75E-02	8.46E-01	1.19E-11	6.72E-02	1.64E-02	1.16E-01	3.55E+00	5.00E-11	2.82E-01
1.39E-02	6.81E-01	1.61E-01	3.14E-11	2.55E-01	5.84E-02	2.86E+00	6.77E-01	1.32E-10	1.07E+00
1.98E-05	2.53E-04	2.77E-04	1.75E-11	8.96E-04	8.32E-05	1.06E-03	1.16E-03	7.34E-11	3.76E-03
1.16E-03	6.95E-04	3.36E-01	4.88E-12	1.19E-02	4.88E-03	2.92E-03	1.41E+00	2.05E-11	4.99E-02
5.41E-03	1.19E-01	2.47E-01	4.86E-12	1.81E-02	2.27E-02	5.00E-01	1.04E+00	2.04E-11	7.60E-02
2.66E-05	4.70E-06	3.79E-06	No Data	2.18E-01	1.12E-04	1.97E-05	1.59E-05	No Data	9.14E-01
4.89E-06	8.08E-05	1.41E-06	No Data	8.45E-02	2.05E-05	3.39E-04	5.94E-06	No Data	3.55E-01
8.98E-04	1.62E-04	1.83E-04	2.43E-11	6.23E-02	3.77E-03	6.81E-04	7.67E-04	1.02E-10	2.62E-01
1.20E-02	2.37E-01	5.04E+00	2.51E-09	1.13E-01	5.03E-02	9.93E-01	2.11E+01	1.05E-08	4.76E-01
1.37E-02	7.86E-02	1.67E+00	3.67E-09	3.75E-02	5.74E-02	3.30E-01	7.03E+00	1.54E-08	1.57E-01
6.64E-02	8.70E-01	1.85E+01	2.01E-09	2.91E-01	2.79E-01	3.65E+00	7.78E+01	8.42E-09	1.22E+00
1.55E-04	1.67E-01	7.09E+00	1.18E-09	6.54E-02	6.52E-04	7.01E-01	2.98E+01	4.95E-09	2.75E-01
8.83E-03	1.74E-01	3.71E+00	5.12E-10	6.92E-02	3.71E-02	7.32E-01	1.56E+01	2.15E-09	2.90E-01
8.82E-05	3.05E-01	2.86E-02	1.34E-09	3.86E-01	3.71E-04	1.28E+00	1.20E-01	5.62E-09	1.62E+00
1.20E-02	2.37E-01	5.04E+00	2.51E-09	1.13E-01	5.03E-02	9.93E-01	2.11E+01	1.05E-08	4.76E-01
2.41E-05	1.35E-02	No Data	3.42E-12	1.42E-03	1.01E-04	5.68E-02	No Data	1.44E-11	5.98E-03

ATTACHMENT A: BASELINE EMISSIONS ANALYSIS FOR PROCESS VENTS

02/08/2012

29	30	31	32	33	34	35	36	37	38
Percent Reductions Needed to Meet Floors				**Reductions (Tons/yr)**					**Total Reductions**
VC - % Redux to Meet Conc. Limit	**HCl** - % Redux to Meet Conc. Limit	**CDD/CDF** - % Redux to Meet	**TOHAP -** % Redux to Meet Conc. Limit	**VC**	**Cl2**	**HCl**	**CDD/CDF**	**TOHAP**	**Tons/yr**
	7.83E+01			1.29E-02	9.06E-02	2.78E+00	3.92E-11	2.21E-01	3.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	3.57E+01			1.74E-03	1.04E-03	5.04E-01	7.32E-12	1.78E-02	5.22E-01
	5.02E+01			1.14E-02	2.51E-01	5.22E-01	1.03E-11	3.82E-02	5.60E-01
			9.94E+01	1.11E-04	1.96E-05	1.58E-05	no data	9.09E-01	9.09E-01
			9.98E+01	2.05E-05	3.39E-04	5.93E-06	no data	3.54E-01	3.54E-01
				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		2.76E+01		1.39E-02	2.74E-01	5.84E+00	2.91E-09	1.31E-01	5.97E+00
		8.36E+01		4.80E-02	2.76E-01	5.87E+00	1.29E-08	1.32E-01	6.01E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
				0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		2.76E+01		1.39E-02	2.74E-01	5.84E+00	2.91E-09	1.31E-01	5.97E+00
				0.00E+00	0.00E+00	no data	0.00E+00	0.00E+00	0.00E+00

ATTACHMENT A: BASELINE EMISSIONS ANALYSIS FOR PROCESS VENTS

02/08/2012

39	40	41	42	43	44	45	46	47	48
Equipment Costing				Testing Costs				Total Testing and Monitoring Costs	Total Annual Costs
Condenser TCI ($)	Condenser Annualized Capital Cost ($/yr)	Condenser Annual Costs ($/yr)	Condenser Total Annualized Costs ($/yr)	Intital Testing Cost ($)	Annualized Initial Testing Cost ($/yr)	Annual Testing Cost ($/yr)	Total Testing TAC ($/YR)	TAC ($/YR)	($/Yr)
$ 777,040	$ 73,347	$ 281,841	$ 355,188	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 368,659.84
$ -	$ -	$ -	$ -	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 13,472.25
$ 54,595	$ 5,153	$ 101,501	$ 106,655	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 120,126.78
$ 48,450	$ 4,573	$ 100,026	$ 104,599	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 118,071.27
$ 59,229	$ 5,591	$ 100,068	$ 105,659	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 119,130.85
$ 47,498	$ 4,483	$ 99,437	$ 103,921	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 117,392.96
$ -	$ -	$ -	$ -	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 13,472.25
$ 584,150	$ 55,140	$ 209,045	$ 264,185	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 277,657.29
$ 435,451	$ 41,104	$ 156,028	$ 197,131	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 210,603.36
$ -	$ -	$ -	$ -	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 13,472.25
$ -	$ -	$ -	$ -	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 13,472.25
$ -	$ -	$ -	$ -	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 13,472.25
$ 584,150	$ 55,140	$ 209,045	$ 264,185	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 277,657.29
$ -	$ -	$ -	$ -	$ 51,198	$ 4,833	$ 8,640	$ 13,472	$ 13,472	$ 13,472.25

Attachment B

Analysis of Baseline Emissions from Residual HAP in Resin

ATTACHMENT B. ANALYSIS OF BASELINE EMISSIONS FROM RESIDUAL HAP IN RESIN
02/08/2012

Baseline Emissions and Emission Reductions

1	2	3	4	5	6	7	8	10	11	13	14	15	16	17
Company, Facility, and Resin Type	**Resin Type**	**Vinyl Chloride**	**Total Non-VC HAP**	**Can Meet Limit?**			**Est Resin Production or Capacity (lbs)**	**Percent Reduction Required to Meet Part 63 Limit**		**Part 63 Baseline Emissions, tons/yr**			**Part 63 Baseline Emissions Reduction, tons/yr**	
		ppmw	**ppmw**	**Vinyl Chloride**	**Total Non-VC HAP**	**Both**		**Vinyl Chloride**	**Total Non-VC HAP**	**Vinyl Chloride**	**Total Non-VC HAP**		**Vinyl Chloride**	**Total Organic HAP**
Certain Teed - Lake Charles	Bulk	7.10	160.20	Yes	Yes	Yes	447,348,640	NA	NA	1.6	35.8		0	0
PolyOne - Pedricktown	Dispersion	144.35	64.68	Yes	Yes	Yes	39,809,584	NA	NA	2.9	1.3		0	0
PolyOne - Henry	Dispersion	380.79	26.27	Yes	Yes	Yes	25,335,764	NA	NA	4.8	0.3		0	0
Formosa - Delaware City	Dispersion	533.50	29.01	Yes	Yes	Yes	71,650,150	NA	NA	19.1	1.0		0	0
Formosa - Baton Rouge	Suspension	0.54	39.80	Yes	Yes	Yes	917,121,920	NA	NA	0.2	18.2		0	0
OxyVinyls - Deer Park	Suspension	0.86	12.11	Yes	Yes	Yes	551,155,000	NA	NA	0.2	3.3		0	0
PolyOne - Henry	Suspension	0.88	151.98	Yes	Yes	Yes	25,335,764	NA	NA	0.0	1.9		0	0
Formosa - Point Comfort	Suspension	1.68	19.08	Yes	Yes	Yes	1,565,280,200	NA	NA	1.3	14.9		0	0
Shintech - Plaquemine	Suspension	3.38	67.97	Yes	Yes	Yes	1,300,725,800	NA	NA	2.2	44.2		0	0
Shintech - Freeport	Suspension	3.64	67.75	Yes	Yes	Yes	3,196,699,000	NA	NA	5.8	108.3		0	0
Georgia Gulf - Plaquemine	Suspension	3.67	235.49	Yes	Yes	Yes	1,199,313,280	NA	NA	2.2	141.2		0	0
OxyVinyls - Pasadena	Suspension	5.51	77.22	Yes	Yes	Yes	2,101,002,860	NA	NA	5.8	81.1		0	0
Shintech - Addis	Suspension	6.11	68.32	Yes	Yes	Yes	623,907,460	NA	NA	1.9	21.3		0	0
OxyVinyls - Pedricktown	Suspension	6.89	39.59	Yes	Yes	Yes	350,534,580	NA	NA	1.2	6.9		0	0
Westlake - Calvert City	Suspension	13.55	247.75	Yes	Yes	Yes	1,100,000,000	NA	NA	7.5	136.3		0	0
Georgia Gulf - Aberdeen	Suspension	18.57	225.93	Yes	Yes	Yes	1,000,897,480	NA	NA	9.3	113.1		0	0
Westlake - Geismar	Suspension	68.65	1.09	**No**	Yes	**No**	476,390,000	**46.3**	NA	16.4	0.3		8	0
Dow - Midland	Copolymer (VDCO-S)	0.37	1.86	Yes	Yes	Yes	21,600,000	NA	NA	0.0	0.0		0	0
Formosa - Delaware City	Copolymer (VACO-D)	361.44	892.77	Yes	Yes	Yes	71,650,150	NA	NA	12.9	32.0		0	0
PolyOne - Henry	Suspension Blending	15.66	64.16	Yes	Yes	Yes	25,335,764	NA	NA	0.2	0.8		0	0
										96	**762**		**8**	**0**

Attachment C

Baseline Emissions Analysis for Storage Tanks

ATTACHMENT C: BASELINE EMISSIONS ANALYSIS FOR STORAGE TANKS

02/08/2012

Baseline Emissions Analysis for Storage Tanks

Company	Facility	Process	Reported Emissions, lb/yr			Baseline Emissions, lb/yr			Baseline Emissions, tons/yr		
			Total VOC	Total Organic HAP	Vinyl Chloride	Total VOC	Total Organic HAP	Vinyl Chloride	Total VOC	Total Organic HAP	Vinyl Chloride
CertainTeed	Lake Charles	B	0.2	0.2		0.20	0.20	0.00		0.0001	0
Formosa	Delaware City	D	705.6	705.6		705.60	705.60	0.00		0.3528	0
PolyOne	Henry	D				705.60	705.60	0.00		0.3528	0
PolyOne	Pedricktown	D				705.60	705.60	0.00		0.3528	0
Dow	Midland	S	0	0	0	0.00	0.00	0.00		0	0
Dow (Union Carbide)	Texas City	SL	720	720		720.00	720.00	672.27		0.36	0.336133333
Formosa	Baton Rouge	S	2007.63	2435.99		2007.63	2435.99	672.27		1.217995	0.336133333
Formosa	Point Comfort - PVC	S	0	0	0	0.00	0.00	0.00		0	0
Georgia Gulf	Aberdeen	S				1016.92	984.84	672.27		0.492418333	0.336133333
Georgia Gulf	Plaquemine	S				1016.92	984.84	672.27		0.492418333	0.336133333
OxyVinyls	Deer Park	S				1016.92	984.84	672.27		0.492418333	0.336133333
OxyVinyls	Pasadena	S				1016.92	984.84	672.27		0.492418333	0.336133333
OxyVinyls	Pedricktown	S				1016.92	984.84	672.27		0.492418333	0.336133333
Shintech	Addis	S	2583	2123	1797	2583.00	2123.00	1797.00		1.0615	0.8985
Shintech	Freeport	S	1313.71	403.18		1313.71	403.18	672.27		0.20159	0.336133333
Shintech	Plaquemine	S	420.4	180.4	180.4	420.40	180.40	180.40		0.0902	0.0902
Westlake	Calvert City	S	0.096	0		0.10	0.00	672.27		0	0.336133333
Westlake	Geismar	S	73.59	46.45	39.4	73.59	46.45	39.40		0.023225	0.0197

Average of Reported Emissions >0 lb/yr

Bulk	0.2	0.2	0.0
Dispersion	705.6	705.6	0.0
All Other	1016.9	984.8	672.3

Totals in Tons per Year

Bulk	0.0001	0.0001	0.000000
Dispersion	1.06	1.06	0.000000
All Other	5.74	5.06	3.70
TOTAL	**6.80**	**6.12**	**3.70**

* PolyOne - Henry included in dispersion category.

** Average of reported emissions grater than zero for each category applied to facilities in that category that did not report emissions.

*** Certain Teed did not report a value for Vinyl Chloride - Since there are no other bulk facilities, a value of zero was assumed

Attachment D

Baseline Emissions Analysis for Heat Exchange Systems

ATTACHMENT D: BASELINE EMISSIONS ANALYSIS FOR HEAT EXCHANGE SYSTEMS
02/08/2012

Heat Exchange Systems - Summary of Clarification Data Submitted to EPA

Company	Facility	CT #	Flow Rate (gpm)	Pollutant Measured	Leak Action Level	Units	Monitoring Frequency	Monitoring Method	Note(s)
CertainTeed	Lake Charles	1	10,000	Vinyl chloride			Weekly	Water sampling - GC headspace	
		2	5,000	Vinyl chloride			Weekly	Water sampling - GC headspace	
Dow	Midland	1	16,500	Vinyl chloride	10000	ppbw	Quarterly	Method 415.1	
Formosa	Baton Rouge	1	48,000	Vinyl chloride	10	ppbw	Daily	Method 601	
Formosa	Delaware City	1	6,000						[no data]
		2	3,000						[no data]
Formosa	Point Comfort		158700						
Georgia Gulf	Aberdeen	1	13,500	Vinyl chloride	250	ppbw	Quarterly	Method 107	
		2	18,000	Vinyl chloride	250	ppbw	Quarterly	Method 107	
		3	18,000	Vinyl chloride	250	ppbw	Quarterly	Method 107	
Georgia Gulf	Plaquemine	1	40,000						[cw pressure > process pressure]
		2	22,300						[cw pressure > process pressure]
		3	1,181						[no heat exchangers]
		4	11,000						[utility system]
OxyVinyls	Deer Park	1	8,400	Vinyl chloride	5000	ppbw	Monthly	Method 107	
		2	1,200	Vinyl chloride	5000	ppbw	Monthly	Method 107	
OxyVinyls	Pasadena	1	9,000	Vinyl chloride	50	ppbw	Monthly	Method 107	
		2	11,600	Vinyl chloride	50	ppbw	Monthly	Method 107	
OxyVinyls	Pedricktown	1	13,333	Vinyl chloride	1000	ppbv	Continuous	Similar to M106 and M21	[continuous monitoring of air above cooling tower]
PolyOne	Henry		39000						
PolyOne	Pedricktown	1	1,900						
		2	1,850						
Shintech	Addis		449						
Shintech	Freeport		360						
Shintech	Plaquemine		433						
Westlake	Calvert City	1	23,000						[no data]
Westlake	Geismar	1	10,653	Vinyl chloride	50	ppbw	Yearly	Method 107	

Calculated Emissions, Reductions, and Costs

OVP Conc (ppbw)	5.93		
% of LAL	12%		
Avg LAL (ppbw)	1363	Based on M107 only	
Avg Conc (ppbw)	162		
LAL (ppbw)	50	Cost per Repair (	4300
DOR LAL (ppbw)	800		
DOR Period (days)	120		
Repairs per yr	1		

REPORTED EMISSIONS FROM	VC Conc	LAL	BASELINE EMISSIONS	EMISSION REDUCTIONS	REPAIR COSTS
VC (tpy)	(ppbw)	(ppbw)	VC (tpy)	VC (tpy)	($/yr)
	162	1363	3.54E+00	2.45E+00	4,300
	162	1363	1.77E+00	1.22E+00	4,300
	1186	10000	4.29E+01	4.11E+01	4,300
	1	10	1.25E-01	0.00E+00	4,300
	162	1363	2.13E+00	1.47E+00	4,300
	162	1363	1.06E+00	7.34E-01	4,300
	162	1363	5.62E+01	3.88E+01	4,300
	30	250	8.78E-01	0.00E+00	4,300
	30	250	1.17E+00	0.00E+00	4,300
	30	250	1.17E+00	0.00E+00	4,300
					4,300
					4,300
					4,300
					4,300
	593	5000	1.09E+01	1.00E+01	4,300
	593	5000	1.56E+00	1.43E+00	4,300
9.40E-02	6	50	9.40E-02	0.00E+00	4,300
1.81E-01	6	50	1.81E-01	0.00E+00	4,300
	119	1000	3.47E+00	2.01E+00	4,300
	162	1363	1.38E+01	9.54E+00	4,300
	162	1363	6.73E-01	4.65E-01	4,300
	162	1363	6.55E-01	4.53E-01	4,300
	162	1363	1.59E-01	1.10E-01	4,300
	162	1363	1.28E-01	8.81E-02	4,300
	162	1363	1.53E-01	1.06E-01	4,300
	162	1363	8.15E+00	5.63E+00	4,300
	6	50	1.39E-01	0.00E+00	4,300
			151.1	**115.6**	**116,100**

ATTACHMENT D: BASELINE EMISSIONS ANALYSIS FOR HEAT EXCHANGE SYSTEMS
02/08/2012

Calculated Emissions, Reductions, and Costs

			MACT Floor Costs								Baseline Emissions and MACT Floor Emissions Reductions							
			ACT Floor Capital Cost ($		MACT Floor - Annual Costs ($/yr)				tal Capital Co	tal Annual Co	Baseline Emissions (TPY)				MACT Floor Emissions Reductions (TPY)			
			Control Equi	T&M	Control Equip		T&M		$	$/yr	VCM	HCl	D/F	TOH	VCM	HCl	D/F	TOH
			Control	Testing and	Control	Control	Testing and	Testing and	Total Capital	Total	Baseline -	Baseline -	Baseline -	Baseline -	Reduction -	Reduction -	Reduction -	Reduction -
Certain Teed - Lake Charles	Area Source	Bulk								8,600	5.31E+00			5.31E+00	3.67E+00			3.67E+00
PolyOne - Henry	PVC - Only	Suspension, Dispersion, Suspension Blending								4,300	1.38E+01			1.38E+01	9.54E+00			9.54E+00
PolyOne - Pedricktown	PVC - Only	Dispersion								8,600	1.33E+00			1.33E+00	9.18E-01			9.18E-01
Formosa - Delaware City	PVC - Only	Dispersion, Copolymer (VACO-D)								8,600	3.19E+00			3.19E+00	2.20E+00			2.20E+00
Dow - Midland	PVC - Combined	Copolymer (VDCO-S)								4,300	4.29E+01			4.29E+01	4.11E+01			4.11E+01
Formosa - Baton Rouge	PVC - Combined	Suspension								4,300	1.25E-01			1.25E-01	0.00E+00			0.00E+00
Formosa - Point Comfort	PVC - Combined	Suspension								4,300	5.62E+01			5.62E+01	3.88E+01			3.88E+01
Georgia Gulf - Aberdeen	PVC - Only	Suspension								12,900	3.22E+00			3.22E+00	0.00E+00			0.00E+00
Georgia Gulf - Plaquemine	PVC - Combined	Suspension								17,200	0.00E+00			0.00E+00	0.00E+00			0.00E+00
OxyVinyls - Deer Park	PVC - Combined	Suspension								8,600	1.25E+01			1.25E+01	1.14E+01			1.14E+01
OxyVinyls - Pasadena	PVC - Only	Suspension								8,600	2.75E-01			2.75E-01	0.00E+00			0.00E+00
OxyVinyls - Pedricktown	PVC - Only	Suspension								4,300	3.47E+00			3.47E+00	2.01E+00			2.01E+00
Shintech - Addis	PVC - Only	Suspension								4,300	1.59E-01			1.59E-01	1.10E-01			1.10E-01
Shintech - Freeport	PVC - Only	Suspension								4,300	1.28E-01			1.28E-01	8.81E-02			8.81E-02
Shintech - Plaquemine	PVC - Combined	Suspension								4,300	1.53E-01			1.53E-01	1.06E-01			1.06E-01
Westlake - Calvert City	PVC - Combined	Suspension								4,300	8.15E+00			8.15E+00	5.63E+00			5.63E+00
Westlake - Geismar	PVC - Combined	Suspension								4,300	1.39E-01			1.39E-01	0.00E+00			0.00E+00

Attachment E

Baseline Emissions Analysis for Equipment Leaks

Equipment Leaks - MACT Floor Cost Analysis

Cost Summary for PRD Monitoring Systems

Source Type	PRD Monitoring Costs[1]	
	Capital Costs	Annual Costs
Major Sources	188,913	26,897

[1] - From South Coast Air Quality Management District "Proposed Amended Rule 1173 - Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum Facilities and Chemical Plants". May 15, 2007 Includes device parts, installation, maintenance, and data retrieval system.

Cost Summary for Equipment Leaks

Company	LDAR Program[1]	(A) PRV Monitoring System Capital Cost ($)	(B) Annualize Capital Cost of PRV Monitoring System ($)	Baseline Emission[2] (Tons/yr)	Part 61 Allowable Emissions (Tons/yr)	Estimated Emission Reductions (Tons/yr)
Formosa - Baton Rouge	40CFR61 V	188,913.00	26,897.00	14.64	14.64	
Formosa - Delaware City	40CFR63 UU	188,913.00	26,897.00	8.10	14.64	
Formosa - Point Comfort	40CFR61 V	188,913.00	26,897.00	14.64	14.64	
Georgia Gulf - Aberdeen	40CFR61 V	188,913.00	26,897.00	14.64	14.64	
Georgia Gulf - Plaquemine	40CFR63 UU	188,913.00	26,897.00	8.10	14.64	
OxyVinyls - Pasadena	40CFR61 V	188,913.00	26,897.00	14.64	14.64	
OxyVinyls - Pedricktown	40CFR61 V	188,913.00	26,897.00	14.64	14.64	
PolyOne - Henry	40CFR61 V	188,913.00	26,897.00	14.64	14.64	
PolyOne - Pedricktown	40CFR61 V	188,913.00	26,897.00	14.64	14.64	
Shintech - Addis	40CFR61 V	188,913.00	26,897.00	14.64	14.64	
Shintech - Freeport	40CFR61 V	188,913.00	26,897.00	14.64	14.64	
Shintech - Plaquemine	40CFR61 V	188,913.00	26,897.00	14.64	14.64	
Dow - Midland	40CFR61 V	188,913.00	26,897.00	14.64	14.64	
Westlake - Calvert City	40CFR61 V	188,913.00	26,897.00	14.64	14.64	
Westlake - Geismar	40CFR61 V	188,913.00	26,897.00	14.64	14.64	
Totals		2,833,695.00	403,455.00	207	220	-

[1] - LDAR program type reported by facility in August 12, 2009 information collection request.

[2] - VOC assumed to equal total HAP.

ATTACHMENT E. BASELINE EMISSION ANALYSIS FOR EQUIPMENT LEAKS

02/08/2012

Major Source Equipment Leaks Baseline and Emission Reduction Analysis[1]

		Type of Component	Number of Components[1]	SubpartV Emission Factor (kg/hr/equipment)	Subpart UU Emission Factor (kr/hr/equipment)	Subpart V Emissions (Tons/yr)	Subpart UU Emissions (Tons/yr)	Emission Reduction (Tons/yr)
Model 2		**Pump Seals**						
		* Light-liquid service	40	2.51E-03	6.95E-04	0.93	0.26	0.67
		* Heavy-liquid service	5					
		Valves						
		* Gas/vapor service	414	3.52E-04	2.03E-04	1.35	0.78	0.57
		* Light-liquid service	1,179	3.90E-04	2.32E-04	4.26	2.53	1.72
		* Heavy-liquid service	71					
		Connectors						
		* Flanges - gas/vapor	0	3.07E-04	3.07E-04	0.00	0.00	0.00
		* Flanges - light liquid	2,662	3.07E-04	1.62E-04	7.57	3.99	3.57
		* Flanges -heavy liquid	0					
		Agitators						
		* Light-liquid service	3	2.51E-03	2.51E-03	0.07	0.07	0.00
		* Heavy-liquid service	3					
		Pressure Relief Devices						
		* Disks	45	0.00E+00	0.00E+00	0.00	0.00	0.00
		* Disk holders, valves,etc.	45	NA	NA			
		Open-ended Valves	141	3.33E-05	3.33E-05	0.04	0.04	0.00
		Sampling Connections	35	0.00E+00	0.00E+00	0.00	0.00	0.00
		Compressor Vent	2	2.28E-02	2.28E-02	0.42	0.42	0.00
		Totals				**14.64**	**8.10**	**6.54**

[1] - Emissions estimated based on 8,400 operating hours per year

Attachment F

Baseline Emissions Analysis for Other Emission Sources

ATTACHMENT F. BASELINE EMISSIONS ANALYSIS FOR OTHER EMISSION SOURCES
02/08/2012

Company	Facility	Process	Equipment	Total 2008 Emissions (lbs)			Total 2008 Emissions (lbs)			
				Total VOC	Vinyl Chloride	Methanol	Total VOC	Vinyl Chloride	Methanol	Total Organic HAP
CertainTeed	Lake Charles	B	Reactor Openings		66.90		0.00	66.90	0.00	66.90
Dow	Midland	S					55.68	101.19	0.88	102.08
Dow (Union Carbide)	Texas City	SL	Filter Openings			0.88	55.68	101.19	0.88	102.08
Formosa	Baton Rouge	S	Filter Openings	102.63	102.63		102.63	102.63	0.88	103.51
Formosa	Baton Rouge	S	Reactor Openings	86.19	86.19		86.19	86.19	0.88	87.07
Formosa	Baton Rouge	S	Vessel Openings	102.63	102.63		102.63	102.63	0.88	103.51
Formosa	Deleware City	D	Reactor Openings				0.04	0.04	0.00	0.04
Formosa	Point Comfort - PVC Ur	S	Filter Openings	0.16	0.16		0.16	0.16	0.88	1.04
Formosa	Point Comfort - PVC Ur	S	Reactor Openings	213.00	213.00		213.00	213.00	0.88	213.88
Formosa	Point Comfort - PVC Ur	S	Stripping Column	1.90	1.90		1.90	1.90	0.88	2.78
Formosa	Point Comfort - PVC Ur	S	Vessel Openings	9.96	9.96		9.96	9.96	0.88	10.84
Georgia Gulf	Aberdeen	S	Vessel Openings				55.68	101.19	0.88	102.08
Georgia Gulf	Plaquemine	S	Reactor Openings				55.68	101.19	0.88	102.08
OxyVinyls	Deer Park	S	Filter Openings	0.01			0.01	101.19	0.88	102.08
OxyVinyls	Deer Park	S	Foam Trap	0.06			0.06	101.19	0.88	102.08
OxyVinyls	Deer Park	S	Reactor Openings	30.30			30.30	101.19	0.88	102.08
OxyVinyls	Deer Park	S	Stripping Column	0.30			0.30	101.19	0.88	102.08
OxyVinyls	Deer Park	S	Vessel Openings	1.01			1.01	101.19	0.88	102.08
OxyVinyls	Deer Park	S	Waste Water Strippe	0.00			0.00	101.19	0.88	102.08
OxyVinyls	Pasadena	S	Condensers	0.19			0.19	101.19	0.88	102.08
OxyVinyls	Pasadena	S	Filter Openings	0.05			0.05	101.19	0.88	102.08
OxyVinyls	Pasadena	S	Reactor Openings	8.23			8.23	101.19	0.88	102.08
OxyVinyls	Pasadena	S	Vessel Openings	26.14	0.01		26.14	0.01	0.88	0.89
OxyVinyls	Pasadena	S	Wash Columns	0.86			0.86	101.19	0.88	102.08
OxyVinyls	Pedricktown	S	Filter Openings				55.68	101.19	0.88	102.08
OxyVinyls	Pedricktown	S	Reactor Openings	4.89	4.89		4.89	4.89	0.88	5.77
OxyVinyls	Pedricktown	S	Recovery Separators				55.68	101.19	0.88	102.08
OxyVinyls	Pedricktown	S	Stripping Column	4.89	4.89		4.89	4.89	0.88	5.77
OxyVinyls	Pedricktown	S	Vessel Openings				55.68	101.19	0.88	102.08
PolyOne	Henry	S, D	Reactor Openings				55.68	101.19	0.88	102.08
PolyOne	Pedricktown	D	Reactor Openings	7694.28	549297.26		0.04	0.04	0.00	0.04
PolyOne	Pedricktown	D	Vessel Openings	0.04	0.04		0.04	0.04	0.00	0.04
Shintech	Addis	S	Reactor Openings	13.29	13.29		13.29	13.29	0.88	14.17
Shintech	Freeport	S	Reactor Openings		390.40		55.68	390.40	0.88	391.28
Shintech	Freeport	S	Storage Sphere		5.11		55.68	5.11	0.88	5.99
Shintech	Plaquemine	S	Reactor Openings	500.00	500.00		500.00	500.00	0.88	500.88
Westlake	Calvert City	S	Reactor Openings	177.50	177.50		177.50	177.50	0.88	178.38
Westlake	Calvert City	S	Stripping Column	2.72	2.72		2.72	2.72	0.88	3.60
Westlake	Calvert City	S	Vessel Openings	0.00	0.00		0.00	0.00	0.88	0.88
Westlake	Geismar	S	Reactor Openings	105.03	105.03		105.03	105.03	0.88	105.91

Company	Facility	Process	VC (tpy)	TOH (TPY)
CertainTeed	Lake Charles	B	0.0335	0.0335
Dow	Midland	S	0.0506	0.051
Dow (Union Carbid	Texas City	SL	0.0506	0.051
Formosa	Baton Rouge	S	0.0513	0.0518
Formosa	Baton Rouge	S	0.0431	0.0435
Formosa	Baton Rouge	S	0.0513	0.0518
Formosa	Deleware City	D	2E-05	2E-05
Formosa	Point Comfort - PVC Ur	S	8E-05	0.0005
Formosa	Point Comfort - PVC Ur	S	0.1065	0.1069
Formosa	Point Comfort - PVC Ur	S	0.001	0.0014
Formosa	Point Comfort - PVC Ur	S	0.005	0.0054
Georgia Gulf	Aberdeen	S	0.0506	0.051
Georgia Gulf	Plaquemine	S	0.0506	0.051
OxyVinyls	Deer Park	S	0.0506	0.051
OxyVinyls	Deer Park	S	0.0506	0.051
OxyVinyls	Deer Park	S	0.0506	0.051
OxyVinyls	Deer Park	S	0.0506	0.051
OxyVinyls	Deer Park	S	0.0506	0.051
OxyVinyls	Deer Park	S	0.0506	0.051
OxyVinyls	Pasadena	S	0.0506	0.051
OxyVinyls	Pasadena	S	0.0506	0.051
OxyVinyls	Pasadena	S	0.0506	0.051
OxyVinyls	Pasadena	S	5E-06	0.0004
OxyVinyls	Pasadena	S	0.0506	0.051
OxyVinyls	Pedricktown	S	0.0506	0.051
OxyVinyls	Pedricktown	S	0.0024	0.0029
OxyVinyls	Pedricktown	S	0.0506	0.051
OxyVinyls	Pedricktown	S	0.0024	0.0029
OxyVinyls	Pedricktown	S	0.0506	0.051
PolyOne	Henry	S, D	0.0506	0.051
PolyOne	Pedricktown	D	2E-05	2E-05
PolyOne	Pedricktown	D	2E-05	2E-05
Shintech	Addis	S	0.0066	0.0071
Shintech	Freeport	S	0.1952	0.1956
Shintech	Freeport	S	0.0026	0.003
Shintech	Plaquemine	S	0.25	0.2504
Westlake	Calvert City	S	0.0888	0.0892
Westlake	Calvert City	S	0.0014	0.0018
Westlake	Calvert City	S	2E-06	0.0004
Westlake	Geismar	S	0.0525	0.053

* Excluded: compressors, pumps, exchangers.

** PolyOne included with dispersion.

*** Dow - Midland added; no emissions reported from equipment openings.

Average of Reported Emissions >0 lb/yr

Bulk	0.0	66.9	0.0
Dispersion	0.04	0.04	0.0
All Other	55.7	101.2	0.88

Reported values from PolyOne - Pedricktown excluded.

Bulk	0.000	0.033	0.000	0.033
Dispersion	0.0279	0.0507	0.0004	0.0511
All Other	0.919	1.670	0.015	1.685
TOTAL	0.947	**1.754**	0.015	**1.769**

Average value applied to PolyOne - Pedricktown
0.9466

ATTACHMENT F: BASELINE EMISSIONS FOR EQUIPMENT LEAKS

02/08/2012

Gasholders - Baseline Emissions and BTF Analysis

Comment Data

15 gas holders at 7 locations[1]		
Total annual fugitive emissions[1]	A small gas holder's estimated fugitive emissions are approximately 0.88 tons per year VCM, while larger gas holder could emit 3.3. (Average = 2.09 TPY)	
Floating Object installed Cost[2]	$5,000	per gas holder
Estimated emission reduction from floating objects[2]	70%	
Westlake Geismar cost of mats (does not include installation)[2]	$3,000	

Table B.2 Total Capital Investment and Total Annualized Cost Estimate: Flow Indicator - Gas Phase

Component	Equation	Cost ($)
Capital and Other Initial Costs		
Total Capital Investment ($2011)	TCI	**5,000**
Annualized Costs		
Maintenance and repairs[3]	O&M=.07*TCI	350
Taxes, Insurance[3]	TI=0.04*TCI	200
Interest Rate[3]	i	0.07
Equipment Life[3] (years)	n	7
Capital Recovery Factor[4]	CRF=(i*(1+i)^n)/((1+i)^n-1)	0.19
Capital Recovery[4]	CR=CFR*TCI	928
Total Annualized Costs ($/yr) ($2011)	TAC=O&M+TI+CR	**1,478**

Component	Equation	Assumed emission Redux		
		LOW	HIGH	Averaeg
Total VCM Emission (ton/yr)	**(tons per gas holder)*(gas holders)**	**13.20**	**49.50**	**31.35**
Total VCM Removed (ton/yr)	(ton per gas holder) * (gas holders) * (% reduction)	**9.24**	**34.7**	**21.9**
Removal Effectiveness ($/ton VCM)	(Total VCM Removed) / ((Total Costs)* (gas holders))	**2,399**	**640**	**1,010**

References

1 - Comments Of The Vinyl Institute, Inc., PVC Mact Working Group. Docket ID No. EPA-HQ-OAR-2002-0037

2 - Krock, Richard P. Memorandum to Ms. Jodi Howard. "Vinyl Institute Response to EPA Request for Additional Information on Work Practices for Gasholders at PVC Resin Manufacturing Facilities." September 22, 2011

3 - Peters, Timmerhaus, and West. "Plant Design and Economics for Chemical Engineers." Fifth Edition. McGraw Hill. New York, NY. 2003. pg. 268

4 - U.S. EPA. "Air Pollution Control Cost Manual." Sixth Edition (EPA/452/B-02-001). January 2002 pg 2-21

Attachment G

Baseline Emissions Analysis for Wastewater

ATTACHMENT G: BASELINE EMISSIONS ANALYSIS FOR WASTEWATER
02/08/2012

Baseline Emissions Analysis for Maintenance and Process Wastewater

Wastewater Stripper Outlet Concentration Limits (Monthly Basis)		
Pollutant	Existing Source (ppmw)	New Source (ppmw)
VC	6.80	0.28
Total Non_VC HAP	110.00	0.018

CONTROLLED WW STREAMS - Stripper Outlet Data - VC concentrations replaced with VI data where supplied

			Average of Avg Conc (ppmw)						
Company & Facility	Originating Equipment	Total WW (GAL)	Acetaldehyde	EDC	MeOH	MIBK	VC	Total Non-VC HAP	VI Data Name Lookup
Certain Teed Lake Charles	Waste Water Stripper	3,600					0.4000		
Dow Midland									
Formosa Baton Rouge	Wastewater Stripping Colu	13,703,040		0.3			0.1400	0.3	
Formosa Delaware									
Formosa Point Comfort							1.6212		FPCTX
OxyVinyls Deer Park	Waste Water Stripper		0.018				0.3761	0.018	OXYDP
OxyVinyls Pasadena	Waste Water Preheater E	64,000,000					0.0245		OXYPA
OxyVinyls Pedricktown									
PolyOne Henry	Waste Water Stripper Col	4,953,600					1.4832		POH
PolyOne Pedricktown	Waste Water Stripping Co	247,101					1.8752		POP
Shintech Addis	Waste Water Stripper	14,839,200			40	0.26	0.0060	40.26	
Shintech Freeport	HEAT EXCHANGER	27,000,000			39	0.259	0.1186	39.259	SHTF
Shintech Plaquemine	Waste Water Stripper	3,801,600			40	0.3	0.0100	40.3	
Westlake Calvert City	Water Stripper Col Feed H	28,908,000			2.26		1.0146	2.26	WLCC
Westlake Geismar	PVC Plant Waste Water S	13,225,138					1.1870		WLG
Georgia Gulf Aberdeen	Waste Water strippers	10,584,000					0.8678		GGA
Georgia Gulf Plaquemine	Waste Water Stripper						1.0000		
						Avg Conc (PPMW)	0.72	20.40	
						VI Supplied Data			

Stripper Outlet Wastewater Baseline Estimation

Company & Facility	Resin Type	2008 lbs of Resin	2008 lb of Resin CBI?	2006 Capacity	2008 Stripper WW (Gal)	2008 Stripper Outlet (Gals)/Lb of Resin	2008 Stripper Outlet (Gals/YR)	VC Conc W/ Avg for Non-Report (PPMW)	% Reduction of VC Conc Needed to meet MACT floor limit	Total Non-VC HAP Conc W/ Avg for Non-Report (PMW)	% Reduction of Total Non-VC HAP Conc Needed to meet MACT floor limit	Baseline VC (Tons/YR)	Baseline Total Non-VCHAP (Tons/YR)		VC Reduction (Tons Per Year)	Total Non-VC HAP Reduction (Tons/yr)
Certain Teed Lake Charles	Bulk	447,348,640	No	480,607,160	3600.00	8.05E-06	3,600	0.40	-	20.40	-	6.01E-06	3.06E-04		0.00E+00	0.00E+00
Dow Midland	Other	21,600,000	No				677,273	0.72	-	20.40	-	2.04E-03	5.77E-02		0.00E+00	0.00E+00
Formosa Baton Rouge	Other		Yes	917,121,920	13703040.00		13,703,040	0.14	-	0.30	-	8.01E-03	1.72E-02		0.00E+00	0.00E+00
Formosa Delaware	Dispersion		Yes	143,300,300			4,493,214	0.72	-	20.40	-	1.36E-02	3.82E-01		0.00E+00	0.00E+00
Formosa Point Comfort	Other		Yes	1,565,280,200			49,079,723	1.62	-	20.40	-	3.32E-01	4.18E+00		0.00E+00	0.00E+00
OxyVinyls Deer Park	Other		Yes	551,155,000			17,281,593	0.38	-	0.02	-	2.71E-02	1.30E-03		0.00E+00	0.00E+00
OxyVinyls Pasadena	Other		Yes	2,101,002,860	64000000.00		64,000,000	0.02	-	20.40	-	6.53E-03	5.45E+00		0.00E+00	0.00E+00
OxyVinyls Pedricktown	Other			350,534,580			10,991,093	0.72	-	20.40	-	3.32E-02	9.36E-01		0.00E+00	0.00E+00
PolyOne Henry	Other/Dispersion	76,007,292	No	125,663,340	4953600.00	6.52E-02	4,953,600	1.48	-	20.40	-	3.07E-02	4.22E-01		0.00E+00	0.00E+00
PolyOne Pedricktown	Dispersion	39,809,584	No	130,072,580	247101.00	6.21E-03	247,101	1.88	-	20.40	-	1.93E-03	2.10E-02		0.00E+00	0.00E+00
Shintech Addis	Other		Yes	623,907,460	14839200.00		14,839,200	0.01	-	40.26	-	3.72E-04	2.49E+00		0.00E+00	0.00E+00
Shintech Freeport	Other		Yes	3,196,699,000	27000000.00		27,000,000	0.12	-	39.26	-	1.34E-02	4.42E+00		0.00E+00	0.00E+00
Shintech Plaquemine	Other		Yes	1,300,725,800	3801600.00		3,801,600	0.01	-	40.30	-	1.59E-04	6.39E-01		0.00E+00	0.00E+00
Westlake Calvert City	Other	1,100,000,000	No	800,277,060	28908000.00	2.63E-02	28,908,000	1.01	-	2.26	-	1.22E-01	2.73E-01		0.00E+00	0.00E+00
Westlake Geismar	Other	476,390,000	No	573,201,200	13225138.43	2.78E-02	13,225,138	1.19	-	20.40	-	6.55E-02	1.13E+00		0.00E+00	0.00E+00
Georgia Gulf Aberdeen	Other			1,000,897,480	10584000.00		10,584,000	0.87	-	20.40	-	3.83E-02	9.01E-01		0.00E+00	0.00E+00
Georgia Gulf Plaquemine	Other			1,199,313,280			37,604,746	1.00	-	20.40	-	1.57E-01	3.20E+00		0.00E+00	0.00E+00
					Average*	3.14E-02				Totals		8.52E-01	2.45E+01		0.00E+00	0.00E+00

*Average does not include CTLC due to absence of H20 in Bulk process

UNCONTROLLED WASTEWATER STREAMS

ATTACHMENT G: BASELINE EMISSIONS ANALYSIS FOR WASTEWATER
02/08/2012

Wastewater Stripper Outlet Concentration Limits (Monthly Basis)		
Pollutant	Existing Source (ppmw)	New Source (ppmw)
VC	6.80	0.28

UnControlled Data

	Data		
FacilityName	Sum of Total WW (GAL)	Sum of VC2	Sum of Total Non-VC HAP2
Formosa Plastics Corporation Baton Rouge	342048960	0.14273188	
Georgia Gulf Chemicals Aberdeen Facility	27720000	0	
Lake Charles Polymer Plant	59616000	0.000621921	
OxyVinyls Deer Park		0	
OxyVinyls Pasadena	462061144.2	0	1.439935448
PolyOne Henry	41253800	0.34429179	
Shintech Addis	51112800	0.007939744	2.492969532
Shintech Freeport	27000000	0.000676002	4.423191163
Shintech Plaquemine	10022400	0.002797745	0.61992652
Westlake Calvert City	64648800	0	0.609679537
Westlake Geismar	110527230.7	0.006666394	

Company & Facility	Total WW (GAL)	Tons VC	Tons Total Non-VC HAP	VC Conc (PPMW)	Total Non-VC HAP Conc (PPMW)
Formosa Baton Rouge	342048960	0.14273188		0.1	
Georgia Gulf Aberdeen	27720000	0		0	
Certain Teed Lake Charles	59616000	0.000621921		0.0025	
OxyVinyls Deer Park		0			
OxyVinyls Pasadena	462061144.2	0	1.439935448	0	0.746811268
PolyOne Henry	41253800	0.34429179		2	
Shintech Addis	51112800	0.007939744	2.492969532	0.037225806	11.6883871
Shintech Freeport	27000000	0.000676002	4.423191163	0.006	39.259
Shintech Plaquemine	10022400	0.002797745	0.61992652	0.066896552	14.82298851
Westlake Calvert City	64648800	0	0.609679537	0	2.26
Westlake Geismar	110527230.7	0.006666394		0.01445403	
			Average	0.22	13.76

(see "BTF Costing" sheet) BTF Costing

Company & Facility	Resin Type	2008 lbs of Resin	2008 lb of Resin CBI?	2006 Capacity	2008 Uncontrolled WW (Gal)	2008 Uncontrolled Flow (Gals/Lb of Resin	2008 Uncontrolled Flow (Gals/YR)	VC Conc W/ Avg for Non-Report (PPMW)	Total Non-VC HAP Conc W/ Avg for Non-Report (PMW)	Baseline VC (Tons/YR)	Baseline Total Non-VC HAP (Tons/YR)	TCI ($)	TAC ($/yr)	CR ($/yr)	% Reduction of HAP	VC Reductions (tpy)	% Reduction of Non-VC HAP	Non-VC HAP Reductions (tpy)
Certain Teed Lake Charles	Bulk	447,348,640	No	480,607,160	59616000.00	1.33E-01	59,616,000	0.0025	13.75543737	6.22E-04	3.42E+00	$ 4,312,495.51	$ 195,687.80	$ 407,063.77	99	0.000615702	2.10688E-05	7.20959E-07
Dow Midland	Other	21,600,000	No				6,001,507	0.222707639	13.75543737	5.58E-03	3.44E-01	$ 1,170,206.76	$ 263,169.23	$ 110,458.54	99	0.00552158	1.90209E-05	6.55237E-08
Formosa Baton Rouge	Other		Yes	917,121,920	342048960.00		342,048,960	0.1	13.75543737	1.43E-01	1.96E+01	$ 12,497,714.15	$ 27,555,245.71	$ 1,179,678.11	99	0.141304561	0.027742882	0.005446869
Formosa Delaware	Dispersion		Yes	143,300,300			39,815,639	0.222707639	13.75543737	3.70E-02	2.29E+00	$ 3,607,537.41	$ 4,760,376.15	$ 340,522.10	99	0.03663167	0.000837177	1.91328E-05
Formosa Point Comfort	Other		Yes	1,565,280,200			434,909,290	0.222707639	13.75543737	4.04E-01	2.50E+01	$ 15,004,502.40	$ 68,716,040.93	$ 1,416,298.20	99	0.400130544	0.099886663	0.024935226
OxyVinyls Deer Park	Other		Yes	551,155,000			153,137,074	0.222707639	13.75543737	1.42E-01	8.79E+00	$ 8,050,612.18	$ 30,134,452.20	$ 759,910.49	99	0.140891037	0.012384282	0.001088575
OxyVinyls Pasadena	Other		Yes	2,101,002,860	462061144.24		462,061,144	0	0.746811268	0.00E+00	1.44E+00	$ 15,765,447.36	$ 108,791,861.15	$ 1,488,125.20	99	0	0	0
OxyVinyls Pedricktown	Other			350,534,580			97,395,179	0.222707639	13.75543737	9.05E-02	5.59E+00	$ 6,147,011.88	$ 26,713,314.84	$ 580,226.88	99	0.089606699	0.005009392	0.000280046
PolyOne Henry	Other/Dispersion	76,007,292	No	125,663,340	41253800.00	5.43E-01	41,253,800	2	13.75543737	3.44E-01	2.37E+00	$ 3,698,428.98	$ 12,919,660.71	$ 349,101.51	99	0.340848872	0.008071104	0.000191119
PolyOne Pedricktown	Dispersion	39,809,584	No	130,072,580			11,060,996	0.222707639	13.75543737	1.03E-02	6.35E-01	$ 1,603,065.92	$ 3,901,367.75	$ 151,316.76	99	0.010176472	6.46098E-05	4.10204E-07
Shintech Addis	Other		Yes	623,907,460	51112800.00		51,112,800	0.037225806	11.6883871	7.94E-03	2.49E+00	$ 4,561,891.33	$ 19,963,003.73	$ 430,605.54	99	0.007860347	0.000195956	4.88512E-06
Shintech Freeport	Other		Yes	3,196,699,000	27000000.00		27,000,000	0.006	39.259	6.76E-04	4.42E+00	$ 4,025,728.22	$ 11,596,709.31	$ 379,997.39	99	0.000669242	2.96018E-05	1.30935E-06
Shintech Plaquemine	Other		Yes	1,300,725,800	10022400.00		10,022,400	0.066896552	14.82298851	2.80E-03	6.20E-01	$ 1,796,626.93	$ 4,700,549.55	$ 169,587.67	99	0.002769768	1.71705E-05	1.06445E-07
Westlake Calvert City	Other	1,100,000,000	No	800,277,060	64648800.00	5.88E-02	64,648,800	0	2.26	0.00E+00	6.10E-01	$ 5,610,422.62	$ 32,757,050.10	$ 529,578.58	99	0	0	0
Westlake Geismar	Other	476,390,000	No	573,201,200	110527230.71	2.32E-01	110,527,231	0.01445403	13.75543737	6.67E-03	6.34E+00	$ 6,651,912.71	$ 60,274,694.99	$ 627,885.24	99	0.00659973	0.0004187	2.65631E-05
Georgia Gulf Aberdeen	Other			1,000,897,480	27720000.00		27,720,000	0	13.75543737	0.00E+00	1.59E+00	$ 3,296,630.76	$ 16,199,462.93	$ 311,175.68	99	0	0	0
Georgia Gulf Plaquemine	Other			1,199,313,280			333,226,273	0.222707639	13.75543737	3.10E-01	1.91E+01	$ 12,800,118.20	$ 207,503,809.01	$ 1,208,223.21	99	0.306578896	0.058639277	0.011215921
					Average*	2.78E-01				1.51	104.68	**$ 110,600,353.33**	**$ 636,946,456.09**	**$ 10,439,754.89**		**1.490205119**	**0.213336905**	**0.04321095**
															CE ($/ton)	**370,622,647**		
										Totals W/O CTLC or OVDP		$ 98,237,245.63	$ 606,616,316.10	$ 9,272,780.63		1.35	0.21	0.04

*Average does not include CTLC due to absence of H20 in Bulk process

ATTACHMENT G: BASELINE EMISSIONS ANALYSIS FOR WASTEWATER

02/08/2012

Wastewater Stripper Outlet Concentration Limits (Monthly Basis)		
Pollutant	Existing Source (ppmw)	New Source (ppmw)
VC	6.80	0.28

MAINTENANCE WW STREAMS

Company & Facility	Total WW (GAL)	VC Conc (PPMW)	Total Non-VC HAP Conc (PPMW)
PolyOne Henry	22,243,957.00	2	
Shintech Freeport	430,000.00		0.077
Westlake Calvert City	1,206,000.00		
Westlake Geismar	852,000.00	2.25	
		2.1250	0.077

Company & Facility	Resin Type	2008 lbs of Resin	2008 lb of Resin CBI?	2006 Capacity	2008 Main WW (Gal)	2008 Maint Flow (Gals/Lb of Resin	2008 Maint Flow (Gals/YR)	VC Conc W/ Avg for Non-Report (PPMW)	TOHAP Conc W/ Avg for Non-Report (PMW)	Baseline VC (Tons/YR)	Baseline TOHAP (Tons/YR)
Certain Teed Lake Charles	Bulk	447,348,640	No	480,607,160			44,069,862	2.13	0.077	3.91E-01	1.42E-02
Dow Midland	Other	21,600,000	No				2,127,891	2.13	0.077	1.89E-02	6.84E-04
Formosa Baton Rouge	Other		Yes	917,121,920			90,348,854	2.13	0.077	8.01E-01	2.90E-02
Formosa Delaware	Dispersion		Yes	143,300,300			14,117,008	2.13	0.077	1.25E-01	4.54E-03
Formosa Point Comfort	Other		Yes	1,565,280,200			154,201,168	2.13	0.077	1.37E+00	4.95E-02
OxyVinyls Deer Park	Other		Yes	551,155,000			54,296,186	2.13	0.077	4.81E-01	1.74E-02
OxyVinyls Pasadena	Other		Yes	2,101,002,860			206,977,061	2.13	0.077	1.84E+00	6.65E-02
OxyVinyls Pedricktown	Other			350,534,580			34,532,374	2.13	0.077	3.06E-01	1.11E-02
PolyOne Henry	Other/Dispersion	76,007,292	No	125,663,340	22,243,957.00	2.93E-01	22,243,957	2.00	0.077	1.86E-01	7.15E-03
PolyOne Pedricktown	Dispersion	39,809,584	No	130,072,580			3,921,780	2.13	0.077	3.48E-02	1.26E-03
Shintech Addis	Other		Yes	623,907,460			61,463,283	2.13	0.077	5.45E-01	1.97E-02
Shintech Freeport	Other		Yes	3,196,699,000	430,000.00		430,000	2.13	0.077	3.81E-03	1.38E-04
Shintech Plaquemine	Other		Yes	1,300,725,800			128,138,999	2.13	0.077	1.14E+00	4.12E-02
Westlake Calvert City	Other	1,100,000,000	No	800,277,060	1,206,000.00	1.10E-03	1,206,000	2.13	0.077	1.07E-02	3.87E-04
Westlake Geismar	Other	476,390,000	No	573,201,200	852,000.00	1.79E-03	852,000	2.25	0.077	8.00E-03	2.74E-04
Georgia Gulf Aberdeen	Other			1,000,897,480			98,601,874	2.13	0.077	8.74E-01	3.17E-02
Georgia Gulf Plaquemine	Other			1,199,313,280			118,148,501	2.13	0.077	1.05E+00	3.80E-02
					Average*	9.85E-02				9.17E+00	3.33E-01

*Average does not include CTLC due to absence of H20 in Bulk process

Stripper Outlet, Uncontrolled, and Maint. Wastewater Combined

Company & Facility	Resin Type	Baseline VC (Tons/YR)	Baseline Total Non-VC HAP (Tons/YR)	VC Reduction (Tons Per Year)	Total Non-VC HAP Reduction (Tons Per Year)
Certain Teed - Lake Charles	Bulk	3.91E-01	3.44	0.00E+00	0.00E+00
Dow - Midland	Other	2.65E-02	4.03E-01	0.00E+00	0.00E+00
Formosa - Baton Rouge	Other	9.52E-01	19.7	0.00E+00	0.00E+00
Formosa - Delaware City	Dispersion	1.76E-01	2.67	0.00E+00	0.00E+00
Formosa - Point Comfort	Other	2.10	29.2	0.00E+00	0.00E+00
OxyVinyls - Deer Park	Other	6.51E-01	8.81	0.00E+00	0.00E+00
OxyVinyls - Pasadena	Other	1.84	6.95	0.00E+00	0.00E+00
OxyVinyls - Pedricktown	Other	4.30E-01	6.54	0.00E+00	0.00E+00
PolyOne - Henry	Other/Dispersion	5.61E-01	2.80	0.00E+00	0.00E+00
PolyOne - Pedricktown	Dispersion	4.70E-02	6.57E-01	0.00E+00	0.00E+00
Shintech - Addis	Other	5.53E-01	5.01	0.00E+00	0.00E+00
Shintech - Freeport	Other	1.79E-02	8.85	0.00E+00	0.00E+00
Shintech - Plaquemine	Other	1.14	1.30	0.00E+00	0.00E+00
Westlake - Calvert City	Other	1.33E-01	8.83E-01	0.00E+00	0.00E+00
Westlake - Geismar	Other	8.02E-02	7.47	0.00E+00	0.00E+00
Georgia Gulf - Aberdeen	Other	9.13E-01	2.52	0.00E+00	0.00E+00
Georgia Gulf - Plaquemine	Other	1.51	22.4	0.00E+00	0.00E+00
Total		**11.5**	**130**	**0.00**	**0.00**
	Totals w/o area sources	10.49	117.29		