A Study of the Cost Implications of EPA's Proposed Chemical Manufacturing Area Source NESHAP

PRESENTED TO: SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION

DECEMBER 11, 2008

DIXON ENVIRONMENTAL

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Executive Summary

EPA published a proposed rule to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Chemical Manufacturing Area Sources (40 Part 63 Subpart VVVVVV) on October 6, 2008 in the Federal Register. The Synthetic Organic Chemical Manufacturers Association (SOCMA) requested that Dixon Environmental conduct a study to estimate the potential cost impact of the proposed NESHAP rule for Chemical Manufacturing Area Sources on SOCMA members. Dixon Environmental worked closely with SOCMA staff and their member companies to develop a survey to administer to companies. Dixon Environmental conducted phone interviews with five (5) SOCMA member companies. We have not identified the individual companies in order to maintain confidentiality and to encourage a free and open dialogue with the surveyed members.

The study plants were typical of SOCMA membership in that they were predominantly batch operations, with between 45 and 215 employees, and employ control of air emissions by condensers, scrubbers and work practices. All plants were area sources and 3 of the 5 had installed controls within the last 6 years to limit their potential to emit below major HAP source thresholds. The highlights of the major findings of the study are as follows:

1. Only one of the plants had significant quantities of Urban Air Toxics (UAT) emitted. The total UAT batch process vent emissions from the other 4 plants was less than 700 lb/yr UAT on an uncontrolled basis.
2. Acetaldehyde was the UAT with the highest emissions but was found at only one plant. Methylene chloride was the predominant UAT at the 4 other plants.
3. There are 2 plants which exceed EPA's proposed threshold of 19,000 lb/yr uncontrolled organic HAP emissions, thus would require plant-wide control of batch process vents. The incremental cost per ton of Hazardous Air Pollutant (HAP) removed calculated for these plants is over \$125,000 and is well beyond EPA's cost threshold for Generally Available Control Technology of \$3,000/ton HAP removed. Application of these controls renders the proposal more stringent than the Miscellaneous Organic NESHAP (MON) rule which specifies the use of Maximum Available Control Technology (MACT) levels.
4. Initial costs for the 3 plants that require no control, and thus will have no reduction in either UAT or HAP, will be between \$23,000 and \$500,000. These plants will incur annual costs of between \$11,000 and \$114,000, without any environmental benefit.

From this study, the following cost implications have been identified as affecting SOCMA membership:

1. Controls are generally not in place to obtain a plant-wide 90% reduction in uncontrolled organic HAP emission from batch process vents.
2. The EPA database understated, perhaps significantly, the number of facilities affected by the batch process vent standard.
3. The costs to determine uncontrolled emissions and for making wastewater characterizations that will be required as a result of the proposed rule were not accounted for by EPA.
4. The cumulative cost burdens, even if no control is required, are disproportionate to the UAT reductions, if any.

Section 1: Background

INTRODUCTION

EPA published a proposed rule to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Chemical Manufacturing Area Sources (40 Part 63 Subpart VVVVVV) on October 6, 2008 in the Federal Register[1].

This study was prepared at the request of the Synthetic Organic Chemical Manufacturers Association (SOCMA) in order to estimate the potential cost impact of the proposed NESHAP rule for Chemical Manufacturing Area Sources on SOCMA members. SOCMA believes that the proposal will impose significant financial and administrative costs on its members, many of whom are small and medium-sized businesses.

SCOPE OF WORK

Since the schedule did not allow for an exhaustive study, Dixon Environmental conducted a focused evaluation as described below.

Identification of Potential Impacts with the Focus on Cost Implications

Dixon Environmental worked closely with SOCMA staff and their member companies who were working on this effort. Several phone calls were conducted to walk through the proposed rule and solicit input from members. Based on the SOCMA input on significant potential cost implications, a detailed checklist was prepared. Concurrently, Dixon Environmental obtained EPA's docket information, focusing on the basis and financial aspects. SOCMA, meanwhile, canvassed their membership to identify plants that were willing to participate in the survey.

Compile Data on Cost Implications

Dixon Environmental conducted phone interviews with six (6) SOCMA member companies utilizing the checklists described above. One of the companies was unable to provide complete information within the timeframe and, therefore, the scope was reduced to 5 plants. Dixon Environmental completed the surveys with each of the 5 plants via phone interviews/web meetings as well as subsequent follow-up via phone and email to clarify certain aspects. We have not identified the individual companies in this study report in order to maintain confidentiality and to encourage a free and open dialogue with the surveyed members.

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[1] 58352 Federal Register / Vol. 73, No. 194 / Monday, October 6, 2008 / 40 CFR Part 63
[EPA–HQ–OAR–2008–0334; FRL–8720–8] RIN 2060–AM19
National Emission Standards for Hazardous Air Pollutants for Chemical Manufacturing Area Sources
AGENCY: Environmental Protection Agency (EPA).
ACTION: Proposed rule.

Evaluate the Cost Implications

Dixon Environmental reduced the survey checklist information into a useable format as presented herein. Dixon Environmental prepared a cost analysis for each of the 5 plants which was utilized to assess the impacts to the SOCMA members in general.

EPA GACT APPROACH

Dixon Environmental reviewed the EPA docket and, in particular, the cost analysis conducted by EPA's contractor, RTI, International (RTI). The EPA docket was reviewed with emphasis on the elements which EPA relied on to support the application of Generally Available Control Technology[2] (GACT) for this source category. Based on our review of the available documentation, the following table summarizes EPA's determination of GACT in dollars per ton of HAP reduced:

Table 1 *EPA GACT Levels ($/ton HAP reduced)*

Batch Process Vents[i]	$2,300
Continuous Process Vents[ii]	$3,000
Metal HAP[iii] @ 400 lb/yr threshold	$3,000
Storage Tanks[iv]	$2,800
Cooling Towers[v]	$1,100
Wastewater[vi]	$1,600
Transfer Operations[vii]	$1,600

The GACT value that EPA is using is approximately $3,000 per ton of HAP removed. EPA did not establish a value for Equipment Leaks because they stated that the costs are considered to be nominal.

In reviewing the RTI data sort, it became clear that there are several inaccuracies that would lead EPA to incorrect conclusions regarding both what is GACT and the potential impact on plants; particularly small-sized facilities typical of SOCMA's membership. Dixon Environmental identified these major flaws as follows:

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[2] Federal Register / Vol. 73, No. 194 / Monday, October 6, 2008 page 58354: *Under CAA section 112(d)(5), we may elect to promulgate standards or requirements for area sources "which provide for the use of generally available control technologies or management practices by such sources to reduce emissions of hazardous air pollutants." Additional information on generally available control technologies or management practices (GACT) is found in the Senate report on the legislation (Senate report Number 101– 228, December 20, 1989), which describes GACT as:*

"methods, practices and techniques which are commercially available and appropriate for application by the sources in the category considering economic impacts and the technical capabilities of the firms to operate and maintain the emissions control systems."

Consistent with the legislative history, we can consider costs and economic impacts in determining GACT, which is particularly important when developing regulations for source categories, like this one, that have many small businesses.

Determining what constitutes GACT involves considering the control technologies and management practices that are generally available to the area sources in the source category. We also consider the standards applicable to major sources in the same industrial sector to determine if the control technologies and management practices are transferable and generally available to area sources. In appropriate circumstances, we may also consider technologies and practices at area and major sources in similar categories to determine whether such technologies and practices could be considered generally available for the area source category at issue. Finally, as we have already noted, in determining GACT for a particular area source category, we consider the costs and economic impacts of available control technologies and management practices on that category.

1) **Uncontrolled emissions are understated for individual plants and for the industry as a whole** – First, the National Emissions Inventory[3] (NEI) database is incomplete in terms of identifying which data is on a controlled versus uncontrolled basis. Generally, RTI assumed that the NEI emissions were uncontrolled. In some cases the NEI database stipulated that the emissions were controlled and in those cases RTI properly reported uncontrolled emissions.

   Second, the NEI database relies heavily on the TRI database[4] which only report the listed HAP if the total amounts of that chemical manufactured exceed 25,000 lb/yr at a given facility. Therefore, if the plant had values below 25,000 lb/yr, RTI was unable to have information to include the associated emissions in their analysis. This greatly underestimates the uncontrolled emissions. Further, the TRI emissions are after controls and there is no reliable method for determining the uncontrolled emissions as noted above.

   This study will more closely discuss these points as they relate to the SOCMA surveyed plants. Likely as a result of these flaws, EPA's database indicates only four facilities with uncontrolled HAP emissions from process vents exceeding 19,000 lb/yr. Since two of the five sample SOCMA plants meet that threshold, the correct total number must be substantially greater.

2) **The RTI impacts analysis excluded those plants with only metal UAT[5] as HAPs, but EPA is regulating batch process vents for all OHAP with any UAT emitted at the plant** – First, the database was parsed by RTI as follows:

Table 2 *EPA's Database Reduction*

Total number of plants	5,000
Less the number of major sources	1,700
Less the number with no UAT	452
For process vents, less the plants with only metals as UAT	263
For batch process vents, at plants with >19,000 lb HAP/yr	4

This excludes many facilities from the impact analysis and understates the potential cost ramifications of the proposed rule.

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[3] EPA's Emission Inventory and Analysis Group (EPA/OAR/OAQPS/AQAD/EIAG) prepares a national database of air emissions information with input from numerous State and local air agencies, from tribes, and from industry. This database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs). The database includes estimates of annual emissions, by source, of air pollutants in each area of the country, on an annual basis.

[4] Per the preamble to the proposed rule and information in the docket, EPA also utilized the Toxic Release Inventory (TRI) database as well as other supplemental information. EPCRA Section 313 requires EPA and the States to annually collect data on releases and transfers of certain toxic chemicals from industrial facilities, and make the data available to the public in the TRI.

[5] 1,3-butadiene
methylene chloride
1,3-dichloropropene
hexachlorobenzene
acetaldehyde
hydrazine
chloroform
quinoline
ethylene dichloride
HAP metals: compounds of arsenic, cadmium, chromium, lead, manganese, and nickel

The following table summarizes how each of the 5 SOCMA surveyed plants were represented in the RTI database review:

Table 3 *SOCMA Surveyed Plants*

Plant	NEI Database (part of 5,000)	Area or Synthetic Minor (part of 1,700)	UAT (part of 452)	UAT organic (part of 263)
1	X	X	X (organic)	X
2	X	X	X (metal)	
3	X	X		
4	X	X		
5	X	X		

A further review of the top 6 facilities in the EPA database that RTI indicated would be subject to the process vent standards was conducted as summarized in Table 4 below:

Table 4 *RTI Listing of the Top 6 Process Vent Emitting Plants*

Plant Name	Zip Code	NEI No.	Database designation	RTI description	Search of EPA's ECHO database
Clariant, now Elgin	29045	41376	Major HAP	No explanation why RTI re-designated as an area source.	Title V, NESHAP & MACT are listed applicable rules, so likely a major source.
ITW TACC	11520	1079	Area	None	Minor
King Pharmaceutical	37620	4925	Major HAP	Assumed to be Synthetic Minor and not subject to Subpart GGG.	Synthetic Minor and must comply with MACT. It is not explained in ECHO, but may only be subject to LDAR under Subpart I.
Eli Lilly	00680	46546	Area	Assumed area.	Major source subject to MACT.
Merck, now Cherokee	17686	17868	Major HAP	Assumed minor, not subject to GGG	Title V and MACT, so likely a major source.
Marine T Terminal	77590	6958	Major HAP	None	Nothing found on this facility. This is probably not actually a chemical or pharmaceutical manufacturer but instead just a terminal of some sort as the name suggests.

As noted at three, and possibly four, of the six plants are in fact major sources complying with MACT. One is probably not even a chemical or pharmaceutical manufacturer. They should not be included in EPA's estimate of national impacts. This further demonstrates the flaws in the RTI database.

3) **The analysis of control options from batch process vents improperly assumes that vent condensers will meet the reduction requirements** – Due to the wide variety of operations, chemical characteristics and the likelihood of high volume, low concentration streams at some plants, specialty chemical manufacturers cannot universally achieve the 90% reduction with condensers. While condensers could be

one part of a compliance strategy, our information indicates that multiple process units would require control to meet the proposed 90% plant-wide reduction. If multiple locations must be controlled, then larger flowrates would be required to collect and convey to a centralized location. This was the basis for our cost analysis. Were we to use condensers it is believed that the costs would be even higher. For these reasons, EPA cannot use RTI's "Option 1," but instead must use RTI's "Option 2," which uses the thermal oxidizer costs to estimate costs and to select GACT. RTI estimates that Option 2 will cost in the range of $25,000 - 30,000 per ton of HAP removed. Also, the RTI memorandum incorrectly assumes that the thermal oxidizers can be estimated without the need for halogen reduction. At the plants in this study potentially requiring control, halogens gases will be a concern. Dixon Environmental conducted a detail costing evaluation in 2005 as part of MON compliance evaluation for a specialty chemical manufacturer. The costs from this study were used as the more appropriately addressed the unique aspects of SOCMA members as follows:

- **The multipurpose nature and the batch operations present significant challenges that must be overcome.**
- **Either multiple units (condensers or oxidizers) need to be installed for a plant-wide solution or a larger centralized oxidizer must be installed with significant cost for piping.**
- **Many situations are high flow, low concentration, thus making condensers impractical and driving up the costs for oxidizers.**
- **Safety issues require additional costs to ensure that manifolded units do not create operating problems.**

As a result of this, Dixon Environmental prepared the following cost estimates:

Table 5 *Oxidizer Costs at Specialty Chemical Manufacturing Plants*

Control Option Description	*Initial Capital Cost*	*Annual Operating Cost*	*Annualized Cost (10 years)*
1,000 CFM	$2,373,723	$321,586	$707,899
2,000 CFM	$2,553,360	$360,611	$776,158
4,000 CFM	$2,898,008	$419,029	$890,666

It is assumed that refrigerated condensers would need to be very large or there would need to be several at each source. Our analysis concludes that thermal oxidation is the only technology that is generally available.

An alternative method in determining the batch vent threshold can be derived from EPA's $3,000/ton HAP removed as GACT. The thermal oxidizer option could arguably achieve 98% reduction which will be used here to be conservative. (Using 90%, the uncontrolled organic HAP emission threshold would be even higher.) EPA estimates $128,100/yr for a large thermal oxidizer. Back-calculating that ($128,000/yr * 2,000 lb/ton)/($3,000/ton HAP removed * 0.98 lb removed per lb fed) equates to a threshold of 87,000 lb/yr. Estimates provided further in this analysis will show that the thermal oxidizer costs are greater than $500,000/yr which equates to 340,000 lb/yr threshold.

Therefore, the threshold for GACT based on the uncontrolled batch process vent emission should be at least 87,000 lb organic HAP/yr and quite possibly much more.

Section 2: Survey Results

This section describes the findings of the survey and Dixon Environmental's analysis of the data. Each plant surveyed is discussed separately but it is helpful to provide an initial summary to put into perspective.

This table provides a summary of the responses the survey.

Table 6 *Survey Results*

	Plant 1	Plant 2	Plant 3	Plant 4	Plant 5
EPA Region	5	7	4	5	4
Number of Employees	45	215	135	83	60
Full time Environmental Staff	0	1.5	1	0.5	0
Included in EPA Database	Yes	Yes	Yes	Yes	Yes
Included in EPA Economic Analysis	Yes	Yes	No	No	No
Included in EPA Batch Process Vent Analysis	Yes	No	No	No	No
Primary business	Pharma	Pharma	Spec. Chem	Pharma	Spec. Chem
Urban Air Toxics Organic	1	1	2	3	1
Urban Air Toxics Metals	0	1	0	2	0
Other HAPs (at least)	3	4	6	6	10
Uncontrolled UAT (lb/yr)	500	70	3	52	24,000
Uncontrolled OHAP not including UAT (lb/yr)	2,500	34,770	11,500	10,000	18,500
Total Uncontrolled OHAP including UAT (lb/yr)	3,000	34,840	11,503	10,052	42,500
Batch vent control efficiency	83%	88%	0%	0%	64%
Estimated number of CPUs	3	150	60	90	10
Estimated number of CPUs with UATs	2	1	1	6	2
Approximate number of different products per year	10	50	100	70	18
Approximate number of discrete batch steps per product	30	60	70	70	60
Batch calculations per Pharma MACT equations	No	Yes	No	Yes	No
Possible number of wastewater PODs	10	75	250	90	16
Cooling Towers - None over 8,000 gpm recirculation rate	0	2	3	3	2
Currently have an LDAR program	No	No	No	Partial	No

These plants appear to be a typical cross-section of the SOCMA membership. The predominant batch nature of the operation, the multitude of products made, primarily in non-dedicated equipment and the small size of each plant makes the data set representative. Member plants with less than 100 employees typically do not have full time environmental professionals on-site and even at mid-size plants, the environmental responsibilities may be shared among plant staff.

Dixon Environmental developed a costing model based upon the survey, SOCMA consensus and our experience with other HAP standards. Specific focus was on the following areas:

1) Cost to control batch process vents;
2) Cost to determine uncontrolled batch process vent emissions;
3) Cost to make the wastewater characterizations;
4) Cost to develop and implant a fugitive emissions program; and
5) Overall administrative costs for compliance.

For plants with the potential for emission reduction, Dixon Environmental calculated the cost for controls and associated HAP emission reductions. The plants that would be required to meet the proposed 90% facility-wide organic HAP reduction already employ source control measures. Therefore the incremental cost per ton of HAP reduction was calculated in addition to the gross overall tpy of HAP reduction. The following table provides the summary of the analysis.

Table 7 *Survey Analysis*

	Plant 1	Plant 2	Plant 3	Plant 4	Plant 5
Initial					
Uncontrolled OHAP Emissions Estimation	$9,133	$ -	$156,432	$ -	$26,633
Sample & analysis of PODs	$12,683	$95,123	$317,075	$114,147	$20,293
Control batch vents	$ -	$2,373,723	$ -	$ -	$2,898,008
Monitoring, Recordkeeping & Reporting	$1,500	$75,000	$30,000	$45,000	$5,000
Total	$23,316	$2,543,845	$503,507	$159,147	$2,949,934

Annual					
Uncontrolled OHAP Emissions Estimation	$3,653	$ -	$23,465	$ -	$3,995
Sample & analysis of PODs	$5,073	$14,268	$47,561	$17,122	$3,044
Control batch vents	$ -	$707,899	$ -	$ -	$890,666
Monitoring, Recordkeeping & Reporting	$2,145	$107,250	$42,900	$64,350	$7,150
Total	$10,871	$829,417	$113,926	$81,472	$904,855

Estimated OHAP Reduction (TPY)	0.0	15.8	0.0	0.0	18.9
Incremental OHAP Reduction (TPY)	0.0	1.7	0.0	0.0	7.2
Overall Cost-effectiveness ($/ton OHAP removed)	NA	$52,495	NA	NA	$47,876

Table 7 *Survey Analysis (Continued)*

	Plant 1	Plant 2	Plant 3	Plant 4	Plant 5
Incremental Cost-effectiveness ($/ton OHAP removed)	NA	$487,892	NA	NA	$125,674
For comparison, calculated using EPA methods - annual cost	$1,190	$129,290	NA	NA	$129,290
EPA Approach using overall reduction ($/ton OHAP removed)	NA	$8,209	NA	NA	$6,841
Notes:	Based on recent TRI data and assumed control efficiencies	Based on 2007 actual and ceasing operations involving a metal HAP	Based on 2007 actual operations	Based on recent TRI data and need to limit PTE	Based on permitted, not actual levels

The remainder of this section examines the survey results and cost implications for each of the five plants.

PLANT 1

This plant is located in EPA Region 5 and can best be classified as a Pharmaceutical Intermediates manufacturer. The 30,000 sq. ft. facility houses eight chemical drug development and production laboratories, three full-scale production areas, as well as three analytical laboratories for quality control. Projects at this facility typically involve:

- Process development;
- Material manufacture for toxicology studies;
- cGMP manufacture of clinical trial materials; and
- Post-approval commercial production of drug product.

Major production equipment include glass-lined batch vessels (up to 500 gallons), hydrogenation and other pressure vessels, centrifugal, Nutsche and contained filter-dryer equipment and vacuum and convection tray drying ovens. The plant has 45 employees and no full time environmental professional is on staff. The results of the survey as well as a break-down of potential cost implications for Plant 1 are provided in Attachment 1.

UAT & OHAP emissions – Based upon recent TRI reports, the plant emits only 1 UAT, which is methylene chloride. It is used as a solvent in several products and can be utilized in 2 out of the 3 reactor systems, as well as the laboratory scale equipment.
Uncontrolled UAT emissions from batch process vents are estimated to be less than 500 lb/yr. Uncontrolled non-UAT organic HAPs from batch process vents are estimated to be less than 3,000 lb/yr.

Potential emission reductions – The plant already controls the methylene chloride and other OHAPs with condensers and scrubbers so that controlled emissions are expected to be less than 500 lb/yr from batch process vents. Since the uncontrolled OHAP emissions are below the proposed threshold no controls would be required for the batch process vents. **No reductions in UAT nor of HAPs are expected from the proposed rule.**

Other cost implications – The plant does not currently calculate uncontrolled UAT nor OHAP emissions. There would be initial and on-going costs for calculating uncontrolled emissions to demonstrate the emissions are below the 19,000 lb/yr threshold for the batch process vents. There would be additional costs for wastewater characterizations, leak detection and miscellaneous monitoring, recordkeeping and reporting.
These initial compliance costs are estimated to be approximately $23,000 with an annual cost burden of approximately $11,000 per year. (EPA's estimate for this plant is only $1,230 initial and $1,190 annually, but apparently only accounts for the leak detection burdens.)

Alternatives to minimize the regulatory burden – There will be no reduction in UAT or HAP emissions as a result of the proposed rule as applied to this plant. However, there are significant administrative requirements as well as presenting the potential for a paperwork non-compliance should something be overlooked by operations personnel.
Allowing a negative declaration based on some lower controlled or uncontrolled UAT threshold could minimize the unnecessary burden of compliance for this plant.

PLANT 2

This plant is located in EPA Region 7 and can best be classified as a Pharmaceutical Intermediates manufacturer. This plant employs batch chemical manufacturing in 4 major manufacturing buildings. The size of the batch reactors ranges from kilo scale & R&D, large scale for Pharma (500 gallon to 4,000 gallon reactors), organic chemistry (Chem. 2) 750-1000 gallon reactors) and, finally the oldest part (Chem. 1) 750 gallon reactor aqueous based chemistry. The plant has 215 employees and one (1) full time environmental professional is on staff as well as another professional for about half time. The results of the survey as well as a break-down of potential cost implications for Plant 2 are provided in Attachment 2.

UAT & OHAP emissions – Based upon 2007 uncontrolled emission estimates, the plant has only 1 UAT, which is methylene chloride. It is used as a solvent in the pilot scale equipment. The plant has emissions of arsenic compounds but plans to exit that business, so these emissions were excluded from this study. Emissions for 2007 are summarized as follows in lb/yr:

Controlled stack organic HAP emissions	4,145
Uncontrolled stack organic HAP emissions	34,770

Uncontrolled stack emissions of methylene chloride are only 70 lbs/yr.

Potential emission reductions – The plant already controls the OHAPs with condensers and scrubbers with an overall annual average control efficiency, plant-wide of approximately 88% from batch process vents. This would vary from year to year depending on product mix as well as wide variation occurring daily. However, the incremental reduction would amount to only about 2% of uncontrolled emissions under the proposed rule.
No reductions in UAT emissions are expected from the proposed rule. However, the installation of controls for batch process vents would require approximately $2,500,000 initially and $800,000 annually.

Other cost implications – There would be additional costs for wastewater characterizations, leak detection and miscellaneous monitoring, recordkeeping and reporting.
The initial compliance costs are estimated to be approximately $170,000 with an annual cost burden of approximately $120,000 per year.

Alternatives to minimize the regulatory burden – There will be no reduction in UAT emissions as a result of this rule as applied to this plant. However, there are significant administrative requirements as well as presenting the potential for a paperwork non-

compliance should something be overlooked by operations personnel. In addition, if the rule were to be a chemical process unit basis, similar to Subpart FFFF, many if not all of the process units would be below the 10,000 lb/yr batch process threshold in the MON rule.
As proposed, this rule would have an incremental cost-effectiveness of over $300,000 per ton of HAP reduced. Allowing a negative declaration based on some lower controlled or uncontrolled UAT threshold could minimize the unnecessary burden of compliance for this plant.

PLANT 3

This plant is located in EPA Region 4 and can best be classified as a Specialty Chemical manufacturer focusing on silicon chemistry; mostly batch operations. Products are made in small lots of kilo size and some in drums and tank trucks. Reactor systems (about 18) in sizes from 50 gal to 2,000 gal. There are about 10 dedicated distillation systems; half continuous and half batch stills. There are some bench scale, some pilot size and up to the full scale 2,000 gal production. The plant has 135 employees and one (1) full time environmental professional is on staff. The results of the survey as well as a break-down of potential cost implications for Plant 3 are provided in Attachment 3.

UAT & OHAP emissions – Based upon 2007 uncontrolled emission estimates, the plant has only 1 UAT, which is methylene chloride that has air emissions. The plant also generates hexachlorobenzene, but has no air emissions of this UAT. Methylene chloride is used as a solvent in various production operations. Emissions for 2007 are summarized as follows in lb/yr:

Cumene	350
Ethyl chloride	6,254
Ethylene glycol	5
Hexane	2,766
Ethyl benzene	193
Methanol	343
Methyl chloride	104
Methyl ethyl ketone	223
Methylene chloride	3
Toluene	342
Xylene	953

Uncontrolled stack emissions of UAT were only 3 lbs/yr in 2007. Uncontrolled OHAP emissions from batch process vents are estimated to be approximately 10,500 lb/yr, therefore no additional controls would be required.

Potential emission reductions – The plant already controls the OHAPs with scrubbers and a flare in one part of the plant.
There will be no reductions in UAT emissions from the proposed rule.

Other cost implications – The plant does not currently calculate uncontrolled UAT or OHAP emissions based on EPA's MACT equations[6]. There would be initial and on-going costs for calculating uncontrolled emissions to demonstrate the emissions are below the

[6] The proposed rule allows for several calculation approaches, however, given that the calculations will likely need to revisited, we have assumed that the preferred method will be the methodology situated in § 63.1257(d)(2)(i) and (ii) of subpart GGG and § 63.2460(b)(1) through (5) of subpart FFFF.

19,000 lb/yr threshold for the batch process vents. There would be additional costs for wastewater characterizations, leak detection and miscellaneous monitoring, recordkeeping and reporting.
The initial compliance costs are estimated to be approximately $504,000 with an annual cost burden of approximately $114,000 per year.

Alternatives to minimize the regulatory burden – There will be no reduction in UAT nor OHAP emissions as a result of this rule as applied to this plant. However, there are significant administrative requirements as well as presenting the potential for a paperwork non-compliance should something be overlooked by operations personnel.
Allowing a negative declaration based on some lower controlled or uncontrolled UAT threshold could minimize the unnecessary burden of compliance for this plant.

PLANT 4

This plant is located in EPA Region 5 and can best be classified as a Pharmaceutical Intermediates manufacturer, all batch operations. The plant has R&D scale to process engineering to production scale operations. The plant has 83 employees and one (1) full time environmental, health & safety professional that devotes about half his time to environmental matters. The results of the survey as well as a break-down of potential cost implications for Plant 4 are provided in Attachment 4.

UAT & OHAP emissions – The plant has several UATs, however based upon 2007 uncontrolled emission estimates, methylene chloride has the highest air emissions. The total UAT is estimated at approximately 52 lbs for 2007. Methylene chloride is used as a solvent in various production operations. Emissions of total OHAP are expected to be less than 10,000 lb/yr, however, no reliable emission estimate was available at this time.
Uncontrolled stack emissions of UAT were only 52 lbs/yr in 2007. Uncontrolled OHAP emissions from batch process vents are estimated to be approximately 10,000 lb/yr, therefore no additional controls would be required.

Potential emission reductions – The plant already controls the OHAPs with scrubbers.
There will be no reductions in UAT nor HAP emissions from the proposed rule.

Other cost implications – There would be additional costs for wastewater characterizations, leak detection and miscellaneous monitoring, recordkeeping and reporting.
The initial compliance costs are estimated to be approximately $159,000 with an annual cost burden of approximately $81,000 per year.

Alternatives to minimize the regulatory burden – There will be no reduction in UAT nor HAP emissions as a result of this rule as applied to this plant. However, there are significant administrative requirements as well as presenting the potential for a paperwork non-compliance should something be overlooked by operations personnel.
Allowing a negative declaration based on some lower controlled or uncontrolled UAT threshold could minimize the unnecessary burden of compliance for this plant.

PLANT 5

This plant is located in EPA Region 4 and can best be classified as a Specialty Chemical manufacturer; all batch operations. There are 11 reactors in the air permit and separated into the following areas: 1)Polymers manufactured by reacting polyester-type monomers, this produces acetaldehyde, ethylene glycol and 1-4 dioxane - only 1 reactor; 2)Amphoteric surfactants fatty acid & amine via reaction and followed up with distillation - (2 reactors of 11 used)and 1 process generates methanol as unwanted byproduct; and 3)Amphoteric reactions to make final products using 4 of the 11 reactors via rhe reaction of intermediate using mono chloroacetic acid & epichlorohydrin. The plant has 60 employees and no full time environmental professional is on staff. The results of the survey as well as a break-down of potential cost implications for Plant 5 are provided in Attachment 5.

UAT & OHAP emissions – The plant has only 1 UAT, which is acetaldehyde. It is generated as an unwanted by-product. Based upon permitted values, pre-control emissions from batch vents are summarized as follows in lb/yr:

1,4-Dioxane	8,901
Acetaldehyde	23,581
Acrylic Acid	29
Chloroacetic Acid	14
Diethanolamine	5
Epichlorohydrin	106
Ethylene Glycol	76
Methanol	9,402
MIBK	4

Actual emissions are lower than permitted, but are believed to be greater than 19,000 lb/yr OHAP from batch process vents.

Potential emission reductions – The plant already controls the OHAPs utilizing scrubbers with an overall annual average control efficiency, plant-wide of approximately 64% from batch process vents. This would vary from year to year depending on product mix as well as wide variations occurring daily. However, the incremental reduction would amount to only about 26% of uncontrolled emissions under the proposed rule.

Reductions in UAT emissions are expected to occur from the proposed rule. And overall OHAP emissions would be reduced by approximately 6.8 tons per year. However, the installation of controls for batch process vents would require approximately $3,000,000 initially and $900,000 annually.

Other cost implications – The plant does not currently calculate uncontrolled UAT or OHAP emissions by EPA's MACT equations. Therefore, there would be initial and on-going costs for calculating uncontrolled emissions to demonstrate that the emission reduction of 90% is achieved for the batch process vents. There would be additional costs for wastewater characterizations, leak detection and miscellaneous monitoring, recordkeeping and reporting.

The initial compliance costs are estimated to be approximately $52,000 with an annual cost burden of approximately $14,000 per year.

Alternatives to minimize the regulatory burden – While there will be reductions in UAT and OHAP emissions, the impacts are greater than if the facility were required to comply with the MON rule. For example, if the rule were to be a chemical process unit basis, similar to Subpart FFFF, many if not all of the process units would be below the 10,000 lb/yr batch process threshold in the MON rule.

As proposed, this rule would have an incremental cost-effectiveness of over $125,000 per ton of HAP reduced.

Section 3: Findings

CONCLUSIONS

This survey of 5 SOCMA plants indicates that the cost burden for the proposed rule is not appropriate as follows:

1. EPA did not appropriately account for the significant initial and on-going costs at plants which do not exceed the threshold for requiring controls. At the same time, these plants will have no reduction in UAT or HAP emissions, thus providing no environmental benefit.
2. For plants that exceed the OHAP threshold of 19,000 lb/yr for batch process vents, the costs to reduce emissions across the plant site were not accounted for by EPA and exceed EPA's GACT threshold of $3,000/ton HAP removed by an order of magnitude.
3. The application of controls across the plant for batch process vents renders the proposed rule more stringent than the MON rule and thus goes well beyond GACT.
4. The use of very small amounts of UAT, results in subjecting plants to stringent OHAP controls with little to no reduction of UAT emissions.
5. The administrative burden on small batch chemical manufacturers is disproportionate to their impact on UAT emissions.

RECOMMENDATIONS

To remedy some of the deficiencies noted in this report, Dixon Environmental offers the following suggestions:

1. The EPA should exclude activities of insignificance by establishing sufficient thresholds for equipment subject to work practice standards such as closed vessels and tanks.
2. The rule should establish a threshold for emissions of UAT. While EPA has set some *de minimis* for the listed HAP, once subject to the rule, all HAPs must be considered regardless of their concentrations within the process or their contribution to emissions.
3. The batch process emissions threshold of 19,000 lb/yr of uncontrolled organic HAP emissions is significantly more stringent than MACTs, most notably the MON rule, as it would require controls of all process units with batch process emissions at an area source. Either the threshold should be raised or a threshold should be established that is applicable only to a given process unit, not the entire site.
4. The definition of batch process vent should include some of the necessary thresholds and exemptions in the MON rule definition. Most notably, the MON rule excludes individual batch process vents that are less than 200 lb/yr OHAP.
5. The monitoring, recordkeeping & reporting requirements need to be limited to significant UAT emission sources at the plant. Experience with compliance with the MON rule, even at facilities that required little or no control, have significant administrative burdens for no measurable environmental benefit. Just determining uncontrolled emissions from batch process vents can take hundreds of hours per process in labor for these efforts and would indicate that annual cost would be orders of magnitude higher than those estimated by EPA.

References

[i] Memorandum from D. Randall, RTI to R. McDonald, EPA/SPPD. August 25, 2008. Control Options and Impacts Analysis for Batch Process Vents Chemical Manufacturing Area Sources NESHAP.

[ii] Memorandum from D. Randall, RTI to R. McDonald, EPA/SPPD. August 26, 2008. Control Options and Impacts Analysis for Continuous Process Vents, Chemical Manufacturing Area Sources NESHAP.

[iii] Memorandum from D. Randall, RTI to R. McDonald, EPA/SPPD. August 25, 2008. Control Options and Impacts Analysis for Metal Process Vents, Chemical Manufacturing Area Sources NESHAP.

[iv] Memorandum from M. Icenhour and D. Randall, RTI to R. McDonald, EPA/SPPD. July 7, 2008. Control Options and Impacts for the Application of Storage Tank Control Measures, Chemical Manufacturing Area Sources NESHAP.

[v] Memorandum from K. Schaffner and D. Randall, RTI to R. McDonald, EPA/SPPD. September 5, 2008. Control Options and Impacts for Cooling Tower Control Measures, Chemical Manufacturing Area Sources NESHAP.

[vi] Memorandum from D. Randall, RTI to R. McDonald, EPA/SPPD. September 17, 2008. Control Options and Impacts for Wastewater Systems, Chemical Manufacturing Area Sources NESHAP.

[vii] Memorandum from K. Schaffner and D. Randall, RTI to R. McDonald, EPA/SPPD. August 29, 2008. Control Options and Impacts for Transfer Operation Control Measures, Chemical Manufacturing Area Sources NESHAP.

Attachment 1: *Plant 1 Survey & Analysis*

General Information		EPA Database		HAPs		Chemical Process Units		Level of Process Vent Control		Water, LDAR & Other	
Question	Answer	Question	Answer	Question	Answer	Question	Answer	Question	Answer	Question	Answer
Name		Is the plant included in EPA's database for the rule?	Yes, and the facility is listed in the continuous vent, batch vent, LDAR, ww and economic analysis.	Does the facility use, produce or otherwise generate one or more of the listed urban air toxics? If so, please list them.	Methylene chloride	What is the total number of CPUs at the site?	3 rooms with different scale equipment. Will use 2-3 reactors per product. Methylene chloride is used in 2 out of the 3 rooms	Are the continuous process vents controlled for organic HAP and to what level? If controlled what type of control device is used?	No	How many process wastewater Points of Determination (POD) are there?	Process water is drummed and sent off-site. A 7,500 gallon tank is used to store non-hazardous water is shipped offsite. Non-contact water goes to the sanitary sewer.
Location (State and EPA Region)	EPA Regions 5	Is the information correct? If not, please identify discrepancies.		Does the facility use, produce or otherwise generate one or more of the other listed HAPs? If so, please list them. If too numerous, please indicate the top 3 HAPs by emissions.	Methanol, toluene and MTBE (use less than 100 lb/yr if other than methanol) Have one process that would currently use about 250 lbHCl/yr.	What is the total number of products manufactured at the site?	10 per year but most would be in the lab area. 3-4 in the production ea.	Are the batch process vents controlled for organic HAP and to what level? If controlled what type of control device is used?	Vent condenser. Circulating packed column water scrubber.	Do you have any organic HAP concentration and flowrate (or mass rate) data for each POD?	None
Contact Name and Phone Number as well as email address		Have there been any significant changes in operations since 2002 (they base year for the EPA data)? If so, please describe.	There is a new process that is different frOm the 2002 time period. Probably will be a new mix each year.	At what relative magnitude of concentrations relative to the total raw material usage are the listed urban air toxics present.	15% for the largest current process. Overall maybe 5-10%.	How many continuous processes are there? How many different continuous vents are there?	None	When were controls installed? Were controls required to meet a regulatory standard; if so, which one?	Construction 2003.	How many cooling towers do you have and what is the recirculation rate in gpm for each one?	None
Number of Employees? Do you have a full time environmental professional on site?	45 employees, no full time EHS staff but Iproduction foreman spends about 1/4 of his time on these matters.			Do you have any of the HAP metals? If so, what are the emission rates in lb/yr? Are the emissions currently controlled?	Could be adding nickel catalyst.	What is the typical number of discrete batch processing steps for each product made?		What was the capital cost of the controls? Are there any special materials of construction issues that we should be aware of (i.e. exotic metals required)?	NA	Does the plant have truck or rail loading containing orgainc HAP? If so, do you use submerged fill? How much organic HAP is in the liquids being loaded?	None
Description of Operations	The 30,000 sq. ft. facility houses eight chemical drug development and production laboratories, three full-scale production areas, as well as three analytical laboratories for quality control. Projects at this facility typically involve: * Process development * Material manufacture for toxicology studies * cGMP manufacture of clinical trial materials * Post-approval commercial production of drug product			What are your uncontrolled organic HAP emissions from process vents? If known, can you break down by process unit?	Have a final condenser, but not as a control device that they monitor. The emissions in the TRI database would be after this condenser, so the pre-control emissions would be greater.	Are there any open-top vessels (not closed) reactors or vessels used? If so how many and do they contain HAP and at what concentration?	None	Are the organic HAP emissions at the inlet of the control device greater than 20,000 lb/yr?	No	Are you currently subject to LDAR requirements? If so, what % of your components are covered by an inspection program? What are the total number of components potentially subject to LDAR?	None
Are there any particular concerns that you have about the rule that you would like to discuss with us?	Should fall below process vent threshold but additional MRR is of concern.	Information from EPA's TRI Database	See worksheet tab.	If you do not know your uncontrolled organic HAP emissions from process vents, can we estimate from controlled (or permitted) rates and an assumed control efficiency?	Don't know the control efficiency.	For batch operations, have you calculated uncontrolled HAP emissions utilizing EPA's MACT equations.	They use mass balance, no MACT equations.	Do you have any information on the HAP concentration of uncontrolled emissions? If so, do you know the % that are low (around 1,000 ppm HAP) and high (up to 80,000 ppm)?	Probably considered high concentration, low flow.	If readily available, please provide a list of storage tanks, capacity & HAP content or HAP partial pressure.	Drums only.
Comments		Comments		Comments		Comments		Comments Dixon to assume approximately a 50% reduction for methylene chloride in the condensers and 90% control of methanol in the scrubber.	Assuming this and the TRI values we get: MeCl 250 lb/yr from stack and therefore 500 lb/yr uncontrolled. For MeOH there was 250 lb/yr from the stack so that would be 2,500 lb/yr uncontrolled. Total uncontrolled OHAP is approximately 3,000 lb/yr.	Comments	

BATCH PROCESS VENT DETERMINATION OF UNCONTROLLED ORGANIC HAP EMISSIONS

DESCRIPTION		DIXON ESTIMATE				EPA ESTIMATE
		Rate ($/hr)	$ 125	Number of Stops	Number of Products	None indicated in the docket
Uncontrolled OHAP Emissions Estimation	Number of batch steps/product	Hrs	Cost for sampling	30	10	
	20	6	$ 750			
	60	10	$ 1,250			
	100	18	$ 2,250			
Calculated Initial Cos			Calculated from cost curve	$ 913	$ 9,133	
Annual changes or new product	40%	of the initial products		$ 365	$ 3,653	

WASTEWATER CHARACTERIZATION AND POTENTIAL CONTROL

DESCRIPTION		DIXON ESTIMATE			
		Sampling Time	Analysis	Total for triplicate analysis	Total
		Rate ($/hr)	$ 173	$ 865	
Sample & analysis of PODs	Number of PODs	Hrs	Cost per product		
	10	40	$ 5,000	$ 8,850	$ 13,850
	20	60	$ 8,125	17700	$ 25,825
	10	150	$ 18,750	44250	$ 63,000
					Number of PODs
					10
Calculated Initial Cos				Calculated from cost curve	$ 12,683
Annual changes or new product	40%	of the initial products			$ 5,072

EPA ESTIMATE

None indicated in the docket

Notes: Contractor concluded that no controls would be required and costs would be incurred.

Alternative would be to install decanter:

Model Plant	HAP	Concentration (ppmw)	HAP Load (lb/yr)	Capital Cost	Total Annual Cost
9	Toluene	15,000	700	$ 5,970	$ 940
10	Toluene	15,000	9,000	$ 17,300	$ 5,600
11	Toluene	45,000	2,100	$ 5,970	$ 1,600
12	Toluene	45,000	22,000	$ 16,500	$ 15,500
13	Toluene	300,000	3,500	$ 5,970	$ 5,970
14	Toluene	300,000	25,000	$ 5,970	$ 5,970

BATCH PROCESS CONTROL OPTIONS

DESCRIPTION		DIXON ESTIMATE			
	For reference:				
	TO with Scrubber:	Control Option Description	Initial Capital Cost	Annual Operating Cost	Annualized Cost (10 years)
Thermal oxidizer		Option 1 - 1,000 CFM TO	$ 2,373,723	$ 321,587	$ 707,899
		Option 2 - 2,000 CFM TO	$ 2,553,360	$ 360,611	$ 776,158
		Option 3 - 4,000 CFM TO	$ 2,898,008	$ 419,029	$ 890,666
	RTO without Scrubber:	Control Option Description	Initial Capital Cost	Annual Operating Cost	Annualized Cost (10 years)
		Option 1 - 1,000 CFM TO	$ 1,867,240	$ 271,347	$ 575,232
		Option 2 - 2,000 CFM TO	$ 1,895,330	$ 325,016	$ 633,472
		Option 3 - 4,000 CFM TO	$ 1,866,266	$ 342,340	$ 646,069
		Complete the following on a case-by-case basis:			
		Estimated Costs		Initial	0
		Basis:	No control required	Annualized	0

EPA ESTIMATE

Model Plant	Device	Concentration (ppmw)	HAP Load (lb/yr)	Capital Cost	Total Annual Cost
1	TO	80,000	27,000	$ 349,500	$ 128,100
2	TO	80,000	22,500	$ 334,200	$ 119,500
3	TO	80,000	13,000	$ 127,600	$ 61,264
4	TO	1,000	13,000	$ 292,300	$ 98,824
5	TO	80,000	3,000	$ 127,000	$ 57,747
6	TO	1,000	3,000	$ 130,900	$ 69,636

Complete the following on a case-by-case basis:

Estimated Costs		Initial	0
Basis:	No control required	Annualized	0

EPA did not include any of the surveyed plants as being controlled. The estimates provided use the contractor's factors

MONITORING, RECORDKEEPING & REPORTING

DESCRIPTION		DIXON ESTIMATE				EPA ESTIMATE	
	hrs	Rate ($/hr)	$ 125				
Notification of Compliance Status Report		Cost			Total	None indicated in the docket	
Negative declaration	40	$ 5,000			$ 5,000		
Requires control	200	$ 25,000					
Periodic Reporting		Cost per year				None indicated in the docket other than with specific areas such as LDAR.	
Approximately 16 hrs/qt if they require contr	64	$ 8,000					
				Number of Process Units	3		
LDAR	Hrs/process unit for sensory check	Rate ($/hr)	$ 65			Initial/facility	$ 1,230
	1.5	$/process unit/yr	$ 390		$ 1,170	Annual/facility	$ 1,190
Management System	Hrs/process unit for sensory check	Rate ($/hr)	$ 125			None indicated in the docket other than with specific areas such as LDAR.	
Initial development	4	$/process unit	$ 500		$ 1,500		
Periodic inspection	1.25	$/process unit/yr	$ 325		$ 975		

TOTAL

DESCRIPTION	DIXON ESTIMATE	USING EPA'S COSTING METHODOLOGY
Initial		
Uncontrolled OHAP Emissions Estimation	$ 9,135	$ -
Sample & analysis of PODs	$ 12,683	$ -
Control batch vents	$ -	$ -
MRR	$ 1,500	$ 1,230
Total	$ 23,316	$ 1,230
Annual		
Uncontrolled OHAP Emissions Estimation	$ 3,653	$ -
Sample & analysis of PODs	$ 5,073	$ -
Control batch vents	$ -	$ -
MRR	$ 2,145	$ 1,190
Total	$ 10,871	$ 1,190

Plant 1 TRI Data

Year	Chemical	CAS	Federal (F)	Form Type	Industry	Fugitive Ai	Stack Air	Total Air
2000	DICHLOROMETHANE	'00007509	C	R	325 Chemi	250	250	500
2001	DICHLOROMETHANE	'00007509	C	R	325 Chemi	129	5	134
2002	DICHLOROMETHANE	'00007509	C	R	325 Chemi	236	0	236
2003	METHANOL	'00006756	C	R	325 Chemi	0	250	250
2004	DICHLOROMETHANE	'00007509	C	R	325 Chemi	250	250	500
2005	DICHLOROMETHANE	'00007509	C	R	325 Chemi	250	250	500
2005	METHANOL	'00006756	C	R	325 Chemi	250	250	500
2006	DICHLOROMETHANE	'00007509	C	R	325 Chemi	250	250	500
2006	METHANOL	'00006756	C	R	325 Chemi	250	250	500

Attachment 2: *Plant 2 Survey & Analysis*

General Information		EPA Database		HAPs		Chemical Process Units		Level of Process Vent Control		Water, LDAR & Other	
Question	Answer	Question	Answer	Question	Answer	Question	Answer	Question	Answer	Question	Answer
Name		Is the plant included in EPA's database for the rule?	Yes and also in the EPA economic analysis.	Does the facility use, produce or otherwise generate one or more of the listed urban air toxics? If so, please list them.	Methylene chloride. Arsenic compounds but they not planning to have in the future.	What is the total number of CPUs at the site?	Guess there would be up to 150 CPUs	Are the continuous process vents controlled for organic HAP and to what level? If controlled what type of control device is used?	NA	How many process wastewater Points of Determination (POD) are there?	If only methylene chloride, about 15 PODs. If all streams containing listed partially soluble HAP, it would be 50 to 100 PODs.
Location (State and EPA Region)	EPA Region 7	Is the information correct? If not, please identify discrepancies.		Does the facility use, produce or otherwise generate one or more of the other listed HAPs? If so, please list them. If too numerous, please indicate the top 3 HAPs by emissions.	Methanol, HCl, toluene, 1,1,2 tricxhloroethane, etc.	What is the total number of products manufactured at the site?	40 to 50 active finished goods	Are the batch process vents controlled for organic HAP and to what level? If controlled what type of control device is used?	Water scrubbers for soluble HAPs like methanol. Have some chilled condensers. Would be challenged to meet the 90% control; based on 2007 estimates the overall efficiency is approximately 88%.	Do you have any organic HAP concentration and flowrate (or mass rate) data for each POD?	Have on-site wastewater treatment (activated sludge). Some ww would go off-site depending on how much the treatment plant can handle.
Contact Name and Phone Number as well as email address		Have there been any significant changes in operations since 2002 (they base year for the EPA data)? If so, please describe.	Product mix constantly changes. Were synthetic minor with additional scrubbers and condensers, etc.	At what relative magnitude of concentrations relative to the total raw material usage are the listed urban air toxics present.	Can be a fair amount of UAT relative to production because it is a solvent. Also used in Pharma 1 as solvent.	How many continuous processes are there? How many different continuous vents are there?	None	When were controls installed? Were controls required to meet a regulatory standard; if so, which one?	There were several pre-existing controls in place, but additional controls were installed in 2002 to become synthetic minor (to avoid Pharma MACT).	How many cooling towers do you have and what is the recirculation rate in gpm for each one?	2 cooling towers, with recirculation rates of 3000 gpm and 4500 gpm.
Number of Employees? Do you have a full time environmental professional on site?	215 Full time; 1 1/2 environmental professionals			Do you have any of the HAP metals? If so, what are the emission rates in lb/yr? Are the emissions currently controlled?	Arsenic compounds but they not planning to have in the future.	What is the typical number of discrete batch processing steps for each product made?	15 to 100	What was the capital cost of the controls? Are there any special materials of construction issues that we should be aware of (i.e. exotic metals required)?	If they had to have the reduction they needed in 3 out of 4 areas. And they were over $2 million for entire plant. This would be using liquid nitrogen condenser for entire plant. This cost assumes that they have no redundancy.	Does the plant have truck or rail loading containing organic HAP? If so, do you use submerged fill? How much organic HAP is in the liquids being loaded?	Waste only; have a loading arm that sits about a foot off the bottom off the tanker.
Description of Operations	Batch chemical manufacturing; primarily pharmaceutical. 4 major manufacturing buildings, kilo scale & R&D, large scale for Pharma (500 gallon to 4,000 gallon reactors), organic chemistry (Chem. 2) 750-1000 gallon reactors) most products go out as solids, finally the oldest part (Chem. 1) 750 gallon reactor aqueous based chemistry.			What are your uncontrolled organic HAP emissions from process vents? If known, can you break down by process unit?	Don't have a breakdown but believe is it >20,000 lbs/yr overall.	Are there any open-top vessels (not closed) reactors or vessels used? If so how many and do they contain HAP and at what concentration?	No, some in Chem1 (old plant area) but none with HAP	Are the organic HAP emissions at the inlet of the control device greater than 20,000 lb/yr?	Yes, if they were to put in one centralized control.	Are you currently subject to LDAR requirements? If so, what % of your components are covered by an inspection program? What are the total number of components potentially subject to LDAR?	No current requirements.
Are there any particular concerns that you have about the rule that you would like to discuss with us?	Applicability limited to UAT, but then the entire facility is covered for all HAPs. Methylene chloride on a small scale on a pilot operation.	Information from EPA's TRI Database	See worksheet tab.	If you do not know your uncontrolled organic HAP emissions from process vents, can we estimate from controlled (or permitted) rates and an assumed control efficiency?	Yes, would be over 15,600 lb/yr OHAP. About 4 TPY controlled emissions of OHAP for the last 12 months. See comments below:	For batch operations, have you calculated uncontrolled HAP emissions utilizing EPA's MACT equations.	Yes, use Aspen Batch Plus	Do you have any information on the HAP concentration of uncontrolled emissions? If so, do you know the % that are low (around 1,000 ppm HAP) and high (up to 80,000 ppm)?	Common vent header and would generally have high flow low concentration.	If readily available, please provide a list of storage tanks, capacity & HAP content or HAP partial pressure.	Methanol - 3 tanks; 13,000 gallon for virgin, 5,000 gallon for recovered, and 5,360 gallon for recovered. Phenol - 1 tank; 11,500 gallon, Toluene - 1 tank; 11,000 gallon, Waste tanks - 3 tanks; 20,400 gallon, 8,800 gallon and 6,300 gallon
Comments		Comments		Comments	2007: Controlled organic HAP emissions (site-wide; includes wastewater, storage, fugitive) = 3,080 lbs/yr Controlled metal HAP emissions (site-wide) = 430 lbs/yr Controlled stack organic HAP emissions = 4,145 lbs/yr Uncontrolled stack organic HAP emissions = 34,770 lbs/yr Controlled stack metal HAP emissions = 430 lbs/yr Uncontrolled stack metal HAP emissions = 43,000 lbs/yr Uncontrolled stack emissions of methylene chloride totaled 70 lbs/yr.	Comments		Comments		Comments	

BATCH PROCESS VENT DETERMINATION OF UNCONTROLLED ORGANIC HAP EMISSIONS

DESCRIPTION		DIXON ESTIMATE				EPA ESTIMATE
		Rate ($/hr)	$ 125	Number of Steps	Number of Products	None indicated in the docket
Uncontrolled OHAP Emissions Estimation	Number of batch steps/product	Hrs	Cost for sampling	0	0	
	20	6	$ 750			
	50	10	$ 1,250			
	100	18	$ 2,250			
Calculated Initial Cost			Calculated from cost curve	$ 347	$ -	
Annual changes or new product		15% of the initial products		$ 52	$ -	
			Since plant uses Pharma MACT equations no additional costs are expected for this effort.			

WASTEWATER CHARACTERIZATION AND POTENTIAL CONTROL

DESCRIPTION		DIXON ESTIMATE	Analysis	Total for triplicate analysis	Total
		Sampling Time			
		Rate ($/hr)	$ [illegible]	$ [illegible]	
Sample & analysis of PODs	Number of PODs	Hrs	Cost per product		
	75	[illegible]	$ [illegible]	[illegible]	$ 13,850
	225	[illegible]	$ [illegible]	[illegible]	$ 25,825
	550	[illegible]	$ [illegible]	[illegible]	$ 63,000
				Number of PODs	75
Calculated Initial Cost				Calculated from cost curve	$ 95,123
Annual changes or new product		15% of the initial products			$ 14,268

EPA ESTIMATE

None indicated in the docket

Notes:

Alternative would be to install decanter

Model Plant	HAP	Concentration (ppmv)	HAP Load (lb/yr)	Capital Cost	Total Annual Cost
8	Toluene	15,000	700	$ 5,970	$ 940
10	Toluene	15,000	9,000	$ 17,300	$ 5,600
11	Toluene	45,000	2,100	$ 5,970	$ 1,600
12	Toluene	45,000	22,000	$ 16,500	$ 15,500
13	Toluene	300,000	3,500	$ 5,970	$ 5,970
14	Toluene	300,000	25,000	$ 5,970	$ 5,970

BATCH PROCESS CONTROL OPTIONS

DESCRIPTION		DIXON ESTIMATE			
	For reference: TO with Scrubber:	Control Option Description	Initial Capital Cost	Annual Operating Cost	Annualized Cost (10 years)
Thermal oxidizer		Option 1 - 1,000 CFM TO	$ 2,373,723	$ 321,587	$ 707,899
		Option 2 - 2,000 CFM TO	$ 2,552,360	$ 360,611	$ 776,156
		Option 3 - 4,000 CFM TO	$ 2,808,008	$ 416,029	$ 880,606
	RTO without Scrubber:	Control Option Description	Initial Capital Cost	Annual Operating Cost	Annualized Cost (10 years)
		Option 1 - 1,000 CFM TO	$ 1,867,240	$ 271,347	$ 575,232
		Option 2 - 2,000 CFM TO	$ 1,895,320	$ 325,016	$ 633,472
		Option 3 - 4,000 CFM TO	$ 1,866,268	$ 342,340	$ 646,089
		Complete the following on a case-by-case basis:			
		Estimated Costs	Halogenated	Initial	$ 2,373,723
		Basis:	High flow, low concentration	Annualized @15%	$ 707,899

Plant evaluation using nitrogen condenser system @ $2 million in capital.
This compares favorably to the reference case above for a TO.

EPA ESTIMATE

Model Plant	Device	Concentration (ppmv)	HAP Load (lb/yr)	Capital Cost	Total Annual Cost
1	TO	60,000	27,000	$ 348,500	$ 128,100
2	TO	80,000	22,500	$ 334,200	$ 119,500
3	TO	80,000	13,000	$ 127,000	$ 81,264
4	TO	1,000	13,000	$ 292,300	$ 99,824
5	TO	80,000	3,000	$ 127,000	$ 87,747
6	TO	1,000	3,000	$ 130,900	$ 89,638

Complete the following on a case-by-case basis:

Estimated Costs		Initial	$ 349,500
Basis:	Highest HAP load	Annualized	$ 128,100

EPA did not include any of the surveyed plants as being controlled. The estimates provided use the contractor's factors

MONITORING, RECORDKEEPING & REPORTING

DESCRIPTION		DIXON ESTIMATE			
	hrs	Rate ($/hr)	$ 125		
Notification of Compliance Status Report		Cost			Total
Negative declaration	40	$ 5,000			
Requires control	200	$ 25,000			$ 25,000
Periodic Reporting		Cost per year			
Approximately 16 hrs/qt if they require control	64	$ 8,000			$ 8,000
				Number of Process Units	150
LDAR	Hrs/process unit for sensory check	Rate ($/hr)	$ 65		
	1.5	$/process unit/yr	$ 390		$ 58,500
Management Systems	Hrs/process unit for sensory check	Rate ($/hr)	$ 125		
Initial development	4	$/process unit	$ 500		$ 75,000
Periodic Inspection	1.25	$/process unit/yr	$ 325		$ 48,750

EPA ESTIMATE

None indicated in the docket

None indicated in the docket other than with specific areas such as LDAR.

Initial/facility	$ 1,230
Annual/facility	$ 1,190

None indicated in the docket other than with specific areas such as LDAR.

TOTAL

DESCRIPTION	DIXON ESTIMATE	USING EPA'S COSTING METHODOLOGY
Initial		
Uncontrolled OHAP Emissions Estimation	$ -	$ -
Sample & analysis of PODs	$ 95,123	$ -
Control batch vents	$ 2,373,723	$ 349,500
MRR	$ 78,000	$ 1,230
Total	$ 2,546,846	$ 350,730
Annual		
Uncontrolled OHAP Emissions Estimation	$ -	$ -
Sample & analysis of PODs	$ 14,268	$ -
Control batch vents	$ 707,899	$ 128,100
MRR	$ 107,250	$ 1,190
Total	$ 829,417	$ 129,290

Year	Chemical	CAS	Federal (F	Form Typ	Industry	Fugitive A	Stack Air	Total Air
2002	1,1,2-TRICHLOROETHANE	'00007900	C	R	325 Chemi	1300	6800	8100
2002	ACETONITRILE	'00007505	C	R	325 Chemi	170	140	310
2002	ALLYLAMINE	'00010711	C	R	325 Chemi	80	510	590
2002	AMMONIA	'00766441	C	R	325 Chemi	810	74000	74810
2002	ARSENIC COMPOUNDS	'N020'	C	R	325 Chemi	0	40	40
2002	DICHLOROMETHANE	'00007509	C	R	325 Chemi	5800	9700	15500
2002	ETHYLENE GLYCOL	'00010721	C	R	325 Chemi	0	0	0
2002	HYDROCHLORIC ACID (1995 AND AFT	'00764701	C	R	325 Chemi	1200	29000	30200
2002	METHANOL	'00006756	C	R	325 Chemi	12000	16000	28000
2002	METHYL TERT-BUTYL ETHER	'00163404	C	R	325 Chemi	430	20	450
2002	NITRATE COMPOUNDS	'N511'	C	R	325 Chemi	0	0	0
2002	NITRIC ACID	'00769737	C	R	325 Chemi	0	0	0
2002	PHENOL	'00010895	C	R	325 Chemi	360	90	450
2002	SODIUM NITRITE	'00763200	C	R	325 Chemi	0	0	0
2002	TOLUENE	'00010888	C	R	325 Chemi	20	200	220
2003	1,1,2-TRICHLOROETHANE	'00007900	C	R	325 Chemi	1100	200	1300
2003	ACETONITRILE	'00007505	C	R	325 Chemi	210	940	1150
2003	ALLYLAMINE	'00010711	C	R	325 Chemi	3300	70	3370
2003	AMMONIA	'00766441	C	R	325 Chemi	970	115000	115970
2003	ARSENIC COMPOUNDS	'N020'	C	R	325 Chemi	1300	160	1460
2003	DICHLOROMETHANE	'00007509	C	R	325 Chemi	630	770	1400
2003	ETHYLENE GLYCOL	'00010721	C	R	325 Chemi	0	0	0
2003	HYDROCHLORIC ACID (1995 AND AFT	'00764701	C	R	325 Chemi	1000	3800	4800
2003	MERCURY COMPOUNDS	'N458'	C	R	325 Chemi	0	0	0
2003	METHANOL	'00006756	C	R	325 Chemi	5700	2300	8000
2003	N-BUTYL ALCOHOL	'00007136	C	R	325 Chemi	70	50	120
2003	NITRATE COMPOUNDS	'N511'	C	R	325 Chemi	0	0	0
2003	NITRIC ACID	'00769737	C	R	325 Chemi	0	0	0
2003	PHENOL	'00010895	C	R	325 Chemi	370	90	460
2003	SODIUM NITRITE	'00763200	C	R	325 Chemi	0	0	0
2003	TOLUENE	'00010888	C	R	325 Chemi	1000	940	1940
2004	1,1,2-TRICHLOROETHANE	'00007900	C	R	325 Chemi	1000	200	1200
2004	ACETONITRILE	'00007505	C	R	325 Chemi	3	60	63
2004	ALLYLAMINE	'00010711	C	R	325 Chemi	2100	50	2150
2004	AMMONIA	'00766441	C	R	325 Chemi	1300	100000	101300
2004	ARSENIC COMPOUNDS	'N020'	C	R	325 Chemi	0	150	150
2004	ETHYLENE GLYCOL	'00010721	C	R	325 Chemi	0	0	0
2004	HYDROCHLORIC ACID (1995 AND AFT	'00764701	C	R	325 Chemi	900	4600	5500
2004	MERCURY COMPOUNDS	'N458'	C	R	325 Chemi	0	0	0
2004	METHANOL	'00006756	C	R	325 Chemi	8600	4300	12900
2004	METHYL TERT-BUTYL ETHER	'00163404	C	R	325 Chemi	110	80	190
2004	N-BUTYL ALCOHOL	'00007136	C	R	325 Chemi	20	70	90
2004	NITRATE COMPOUNDS	'N511'	C	R	325 Chemi	0	0	0
2004	NITRIC ACID	'00769737	C	R	325 Chemi	0	0	0
2004	PHENOL	'00010895	C	R	325 Chemi	410	90	500
2004	SODIUM NITRITE	'00763200	C	R	325 Chemi	0	0	0
2004	TOLUENE	'00010888	C	R	325 Chemi	230	380	610
2005	1,1,2-TRICHLOROETHANE	'00007900	C	R	325 Chemi	1100	210	1310
2005	ACETONITRILE	'00007505	C	R	325 Chemi	40	250	290
2005	ALLYLAMINE	'00010711	C	R	325 Chemi	2200	50	2250
2005	AMMONIA	'00766441	C	R	325 Chemi	3	120000	120003
2005	ARSENIC COMPOUNDS	'N020'	C	R	325 Chemi	0	170	170
2005	ETHYLENE GLYCOL	'00010721	C	R	325 Chemi	0	0	0
2005	HYDROCHLORIC ACID (1995 AND AFT	'00764701	C	R	325 Chemi	1600	4800	6400
2005	MERCURY COMPOUNDS	'N458'	C	R	325 Chemi	0	0	0
2005	METHANOL	'00006756	C	R	325 Chemi	9300	4000	13300
2005	METHYL TERT-BUTYL ETHER	'00163404	C	R	325 Chemi	130	500	630
2005	N-BUTYL ALCOHOL	'00007136	C	R	325 Chemi	190	10	200
2005	NITRATE COMPOUNDS	'N511'	C	R	325 Chemi	0	0	0
2005	NITRIC ACID	'00769737	C	R	325 Chemi	0	0	0
2005	PHENOL	'00010895	C	R	325 Chemi	240	62	302
2005	SODIUM NITRITE	'00763200	C	R	325 Chemi	0	0	0
2005	TOLUENE	'00010888	C	R	325 Chemi	260	810	1070
2006	1,1,2-TRICHLOROETHANE	'00007900	C	R	325 Chemi	910	170	1080
2006	ACETONITRILE	'00007505	C	R	325 Chemi	51	24	75
2006	ALLYLAMINE	'00010711	C	R	325 Chemi	1800	43	1843
2006	AMMONIA	'00766441	C	R	325 Chemi	150	96000	96150
2006	ARSENIC COMPOUNDS	'N020'	C	R	325 Chemi	0	140	140
2006	ETHYLENE GLYCOL	'00010721	C	R	325 Chemi	0	0	0
2006	HYDROCHLORIC ACID (1995 AND AFT	'00764701	C	R	325 Chemi	760	4200	4960
2006	MERCURY COMPOUNDS	'N458'	C	R	325 Chemi	0	0	0
2006	METHANOL	'00006756	C	R	325 Chemi	10000	4000	14000
2006	METHYL TERT-BUTYL ETHER	'00163404	C	R	325 Chemi	90	60	150
2006	N-BUTYL ALCOHOL	'00007136	C	R	325 Chemi	990	280	1270
2006	NITRATE COMPOUNDS	'N511'	C	R	325 Chemi	0	0	0
2006	NITRIC ACID	'00769737	C	R	325 Chemi	0	0	0
2006	PHENOL	'00010895	C	R	325 Chemi	300	58	358
2006	SODIUM NITRITE	'00763200	C	R	325 Chemi	0	0	0
2006	TOLUENE	'00010888	C	R	325 Chemi	330	1500	1830

Attachment 3: *Plant 3 Survey & Analysis*

General Information		EPA Database		HAPs		Chemical Process Units		Level of Process Vent Control		Water, LDAR & Other	
Question	Answer	Question	Answer	Question	Answer	Question	Answer	Question	Answer	Question	Answer
Name		Is the plant included in EPA's database for the rule?	Yes, see worksheet tab. Although, the plant is not included in the continuous vent, batch vent, LDAR, WW or economic analysis databases.	Does the facility use, produce or otherwise generate one or more of the listed urban air toxics? If so, please list them.	Yes, about 6 different ones: 1-3 butadiene, acetaldehyde, methylene chloride, chloroform and 2 metal complexes.	What is the total number of CPUs at the site?	10-20 with urban HAPs; 50-60 with any HAPs, and 90 total	Are the continuous process vents controlled for organic HAP and to what level? If controlled what type of control device is used?	NA	How many process wastewater Points of Determination (POD) are there?	Some are collected in tanks put into tanks truck and sent off site. Others are floor drains, etc that go to ww treatment plant. Activated Sludge treatment on site.
Location (State and EPA Region)	EPA Region 5	Is the information correct? If not, please identify discrepancies.		Does the facility use, produce or otherwise generate one or more of the other listed HAPs? If so, please list them. If too numerous, please indicate the top 3 HAPs by emissions.	Yes, see TRI report plus there are a number of HAPs below the TRI thresholds	What is the total number of products manufactured at the site?	Approximately 70 products or isolated intermediates per year.	Are the batch process vents controlled for organic HAP and to what level? If controlled what type of control device is used?	If any control, the condenser system. There are a few (<10) products that an HCl Scrubber (caustic) is used.	Do you have any organic HAP concentration and flowrate (or mass rate) data for each POD?	It would seem that there could be a lot of streams that have greater than 10,000 ppm at the POD. It would be problematic to install decanters at all these location. SO conceivable there could be one on each reactor (12). But there could be many more maybe up to 25 locations.
Contact Name and Phone Number as well as email address		Have there been any significant changes in operations since 2002 (they base year for the EPA data)? If so, please describe.	Product mix changes. Also, currently in the process of installing a new centrifuge.	At what relative magnitude of concentrations relative to the total raw material usage are the listed urban air toxics present.	See the "HAPS used at site" worksheet tab.	How many continuous processes are there? How many different continuous vents are there?	None	When were controls installed? Were controls required to meet a regulatory standard; If so, which one?	1990's	How many cooling towers do you have and what is the recirculation rate in gpm for each one?	3 cooling towers; all < 8,600 ppm.
Number of employees? Do you have a full-time environmental professional on-site?	83 Yes (but they wear two hats and the environmental is only about half time)			Do you have any of the HAP metals? If so, what are the emission rates in lb/yr? Are the emissions currently controlled?	Yes, see notes.	What is the typical number of discrete batch processing steps for each product made?	Approximately 40 to 100	What was the capital cost of the controls? Are there any special materials of construction issues that we should be aware of (i.e. exotic metals required)?	Probably would need to look at Hastalloy or some other materials for corrosive service.	Does the plant have truck or rail loading containing organic HAP? If so, do you use submerged fill? How much organic HAP is in the liquids being loaded?	All trucks and all bottom or submerged fill.
Description of Operations	R&D scale to process engineering to production. Fully integrated facility with on-site staff for maintenance, QA/QC, Env Health & Safety. Synthesis of Pharmaceutical and other Intermediates.			What are your uncontrolled organic HAP emissions from process vents? If known, can you break down by process unit?	Emissions are basically uncontrolled for OHAP.	Are there any open-top vessels (not closed) reactors or vessels used? If so how many and do they contain HAP and at what concentration?	No	Are the organic HAP emissions at the inlet of the control device greater than 20,000 lb/yr?	No	Are you currently subject to LDAR requirements? If so, what % of your components are covered by an inspection program? What are the total number of components potentially subject to LDAR?	Yes, 6 large reactors. About 2,620 components under LDAR. Probably quadruple for every component if required.
Are there any particular concerns that you have about the rule that you would like to discuss with us?	About 6 products made in past that have UAT and so far made two this year. Emissions of UAT are about 10 lbs from one chemical and another is chromium octoate so zero emissions of that.	Information from EPA's TRI Database	See additional worksheet tab.	If you do not know your uncontrolled organic HAP emissions from process vents, can we estimate from controlled (or permitted) rates and an assumed control efficiency?		For batch operations, have you calculated uncontrolled HAP emissions utilizing EPA's MACT equations.	Yes and they are in the process of updating all of the current products. Modeling estimates controlled emissions.	Do you have any information on the HAP concentration of uncontrolled emissions? If so, do you know the % that are low (around 1,000 ppm HAP) and high (up to 80,000 ppm)?	Variable flowrate as you pull vacuum down but would generally be a fairly low flow and possible high HAP.	If readily available, please provide a list of storage tanks, capacity & HAP content or HAP partial pressure.	14,500 gallon storage tanks which store hexane, acetonitrile, or methanol.
Comments		Comments		Comments		Comments		Comments		Comments	

Attachment 4: *Plant 4 Survey & Analysis*

Year	Chemical	CAS	Federal (F)	Form Type	Industry	Fugitive Ai	Stack Air	Total Air
2000	AMMONIA	'00766441	C	R	325 Chemi	250	12800	13050
2000	CHLOROETHANE	'00007500	C	R	325 Chemi	0	4486	4486
2000	CUMENE	'00009882	C	R	325 Chemi	250	831	1081
2000	DIBROMOTETRAFLUOROETHA	'00012473	C	R	325 Chemi	0	0	0
2000	HEXACHLOROBENZENE	'00011874	C	R	325 Chemi	0	0	0
2000	METHANOL	'00006756	C	R	325 Chemi	250	797	1047
2000	N-HEXANE	'00011054	C	R	325 Chemi	0	4533	4533
2000	TOLUENE	'00010888	C	R	325 Chemi	250	299	549
2000	XYLENE (MIXED ISOMERS)	'00133020	C	R	325 Chemi	250	10	260
2001	AMMONIA	'00766441	C	R	325 Chemi	5	11590	11595
2001	CUMENE	'00009882	C	R	325 Chemi	5	713	718
2001	DIBROMOTETRAFLUOROETHA	'00012473	C	R	325 Chemi	0	615	615
2001	HEXACHLOROBENZENE	'00011874	C	R	325 Chemi	0	0	0
2001	METHANOL	'00006756	C	R	325 Chemi	5	469	474
2001	N-HEXANE	'00011054	C	R	325 Chemi	5	3463	3468
2001	TOLUENE	'00010888	C	R	325 Chemi	5	379	384
2001	XYLENE (MIXED ISOMERS)	'00133020	C	R	325 Chemi	0	12	12
2002	ALLYLAMINE	'00010711	C	R	325 Chemi	0	0	0
2002	AMMONIA	'00766441	C	R	325 Chemi	5	14110	14115
2002	CUMENE	'00009882	C	R	325 Chemi	5	874	879
2002	DIBROMOTETRAFLUOROETHA	'00012473	C	R	325 Chemi	0	0	0
2002	DICYCLOPENTADIENE	'00007773	C	R	325 Chemi	5	5	10
2002	HEXACHLOROBENZENE	'00011874	C	R	325 Chemi	0	0	0
2002	METHANOL	'00006756	C	R	325 Chemi	5	499	504
2002	N-HEXANE	'00011054	C	R	325 Chemi	5	4308	4313
2002	TOLUENE	'00010888	C	R	325 Chemi	5	291	296
2002	XYLENE (MIXED ISOMERS)	'00133020	C	R	325 Chemi	5	35	40
2003	AMMONIA	'00766441	C	R	325 Chemi	5	9190	9195
2003	CUMENE	'00009882	C	R	325 Chemi	5	513	518
2003	DIBROMOTETRAFLUOROETHA	'00012473	C	R	325 Chemi	0	0	0
2003	HEXACHLOROBENZENE	'00011874	C	R	325 Chemi	0	0	0
2003	METHANOL	'00006756	C	R	325 Chemi	5	320	325
2003	N-HEXANE	'00011054	C	R	325 Chemi	5	3160	3165
2003	XYLENE (MIXED ISOMERS)	'00133020	C	R	325 Chemi	5	21	26
2004	AMMONIA	'00766441	C	R	325 Chemi	5	10790	10795
2004	CUMENE	'00009882	C	R	325 Chemi	5	410	415
2004	DIBROMOTETRAFLUOROETHA	'00012473	C	R	325 Chemi	0	0	0
2004	HEXACHLOROBENZENE	'00011874	C	R	325 Chemi	0	0	0
2004	METHANOL	'00006756	C	R	325 Chemi	5	394	399
2004	N-HEXANE	'00011054	C	R	325 Chemi	5	3502	3507
2004	XYLENE (MIXED ISOMERS)	'00133020	C	R	325 Chemi	5	36	41
2005	AMMONIA	'00766441	C	R	325 Chemi	5	9995	10000
2005	CUMENE	'00009882	C	R	325 Chemi	5	291	296
2005	DIBROMOTETRAFLUOROETHA	'00012473	C	R	325 Chemi	0	0	0
2005	HEXACHLOROBENZENE	'00011874	C	R	325 Chemi	0	0	0
2005	METHANOL	'00006756	C	R	325 Chemi	5	443	448
2005	N-HEXANE	'00011054	C	R	325 Chemi	5	2916	2921
2005	TOLUENE	'00010888	C	R	325 Chemi	5	319	324
2005	XYLENE (MIXED ISOMERS)	'00133020	C	R	325 Chemi	5	485	490
2006	AMMONIA	'00766441	C	R	325 Chemi	5	8190	8195
2006	CUMENE	'00009882	C	R	325 Chemi	5	576	581
2006	DICYCLOPENTADIENE	'00007773	C	R	325 Chemi	0	0	0
2006	HEXACHLOROBENZENE	'00011874	C	R	325 Chemi	0	0	0
2006	METHANOL	'00006756	C	R	325 Chemi	5	318	323
2006	N-HEXANE	'00011054	C	R	325 Chemi	5	3240	3245
2006	TOLUENE	'00010888	C	R	325 Chemi	5	256	261
2006	XYLENE (MIXED ISOMERS)	'00133020	C	R	325 Chemi	5	343	348

Report for: 2007

	EMISSIONS (TONS)	**12 MONTH**	**LIMIT**
	TOTAL AMMONIA	4.9	<100
	TOTAL HAPS	6.4209	<25
	HIGHEST SINGLE HAP	3.1269	<10
	TOTAL VOC	56.5354	<100
	COMPOUND	**12 MONTH EMISSION (TONS)**	**LIMIT/ HAP <10 TONS**
	1,2,4-TRICHLOROBENZENE		
	CHLORINE		
	CUMENE	0.1754	
	ETHYL CHLORIDE	3.1269	
	ETHYLENE GLYCOL	0.0024	
	HEXANE	1.3829	
	HYDROGEN CHLORIDE (GAS)	0.653	
	ETHYL BENZENE	0.0965	
	METHANOL	0.1709	
	METHYL CHLORIDE	0.0521	
	METHYLETHYLKETONE	0.1116	
	METHYLENE CHLORIDE	0.0015	
	MISC(assume METHANOL)	0.0006	
	TOLUENE	0.1708	
	XYLENE	0.4763	
	Total HAPS FOR 2007 =	6.4209	tons
		12,842	pounds

Dixon Cost - Plant 3

BATCH PROCESS VENT DETERMINATION OF UNCONTROLLED ORGANIC HAP EMISSIONS

DESCRIPTION		DIXON ESTIMATE					EPA ESTIMATE
		Rate ($/hr)	$ 125	Number of Steps	Number of Products		
Uncontrolled OHAP Emissions Estimation	Number of batch steps/product	Hrs	Cost for sampling	100	70		None indicated in the docket
	20	6	$ 750				
	50	10	$ 1,250				
	100	18	$ 2,250				
Calculated Initial Cos			Calculated from cost curve	$ 2,235	$ 156,432		
Annual changes or new product		15% of the initial products		$ 335	$ 23,465		

WASTEWATER CHARACTERIZATION AND POTENTIAL CONTROL

DESCRIPTION		DIXON ESTIMATE					EPA ESTIMATE
		Sampling Time	Analysis	Total for triplicate analysis	Total		
		Rate ($/hr)	$ 125	$ 885			
Sample & analysis of PODs	Number of PODs	Hrs	Cost per product				None indicated in the docket
	10	40	$ 5,000	$ 8,850	$ 13,850		Notes:
	20	65	$ 8,125	17700	$ 25,825		
	50	150	$ 18,750	44250	$ 63,000		Alternative would be to install decanter:
					Number of PODs		
					250		
Calculated Initial Cos				Calculated from cost curve	$ 317,075		
Annual changes or new product		15% of the initial products			$ 47,561		

EPA ESTIMATE — Alternative would be to install decanter:

Model Plant	HAP	Concentration (ppmw)	HAP Load (lb/yr)	Capital Cost	Total Annual Cost
9	Toluene	15,000	700	$ 5,970	$ 940
10	Toluene	15,000	9,000	$ 17,300	$ 5,600
11	Toluene	45,000	2,100	$ 5,970	$ 1,600
12	Toluene	45,000	22,000	$ 15,500	$ 15,500
13	Toluene	300,000	3,500	$ 5,970	$ 5,970
14	Toluene	300,000	25,000	$ 5,970	$ 5,970

BATCH PROCESS CONTROL OPTIONS

DESCRIPTION		DIXON ESTIMATE			
	For reference:				
	TO with Scrubber:	Control Option Description	Initial Capital Cost	Annual Operating Cost	Annualized Cost (10 years)
Thermal oxidizer		Option 1 - 1,000 CFM TO	$ 2,373,723	$ 321,587	$ 707,899
		Option 2 - 2,000 CFM TO	$ 2,553,360	$ 360,611	$ 776,158
		Option 3 - 4,000 CFM TO	$ 2,898,008	$ 419,029	$ 890,666
	RTO without Scrubber:	Control Option Description	Initial Capital Cost	Annual Operating Cost	Annualized Cost (10 years)
		Option 1 - 1,000 CFM TO	$ 1,867,240	$ 271,347	$ 575,232
		Option 2 - 2,000 CFM TO	$ 1,895,330	$ 325,016	$ 633,472
		Option 3 - 4,000 CFM TO	$ 1,868,286	$ 342,340	$ 646,069
		Complete the following on a case-by-case basis:			
		Estimated Costs		Initial	$ -
		Basis:	No control required	Annualized	$0

EPA ESTIMATE

Model Plant	Device	Concentration (ppmw)	HAP Load (lb/yr)	Capital Cost	Total Annual Cost
1	TO	80,000	27,000	$ 349,500	$ 128,100
2	TO	80,000	22,500	$ 334,200	$ 119,500
3	TO	80,000	13,000	$ 127,800	$ 61,264
4	TO	1,000	13,000	$ 292,300	$ 99,824
5	TO	80,000	3,000	$ 127,000	$ 57,747
6	TO	1,000	3,000	$ 130,900	$ 69,636

Complete the following on a case-by-case basis:
Estimated Costs — Initial: $ -
Basis: No control re — Annualized: $ -
EPA did not include any of the surveyed plants as being controlled. The estimates provided use the contractor's factors

MONITORING, RECORDKEEPING & REPORTING

DESCRIPTION		DIXON ESTIMATE				EPA ESTIMATE	
	hrs	Rate ($/hr)	$ 125				
Notification of Compliance Status Report		Cost			Total	None indicated in the docket	
Negative declaration	40	$ 5,000			$ 5,000		
Requires control	200	$ 25,000					
Periodic Reporting		Cost per year				None indicated in the docket other than with specific areas such as LDAR.	
Approximately 16 hrs/qt if they require controls	64	$ 8,000					
				Number of Process Units	60		
LDAR	Hrs/process unit for sensory check	Rate ($/hr)	$ 65			Initial/facility	$ 1,230
	1.5	$/process unit/yr	$ 390		$ 23,400	Annual/facility	$ 1,190
Management Systems	Hrs/process unit for sensory check	Rate ($/hr)	$ 125			None indicated in the docket other than with specific areas such as LDAR.	
Initial development	4	$/process unit	$ 500		$ 30,000		
Periodic inspection	1.25	$/process unit/yr	$ 325		$ 19,500		

TOTAL

DESCRIPTION	DIXON ESTIMATE	USING EPA'S COSTING METHODOLOGY
Initial		
Uncontrolled OHAP Emissions Estimation	$ 156,432	$ -
Sample & analysis of PODs	$ 317,075	$ -
Control batch vents	$ -	$ -
MRR	$ 30,000	$ 1,230
Total	$ 503,507	$ 1,230
Annual		
Uncontrolled OHAP Emissions Estimation	$ 23,465	$ -
Sample & analysis of PODs	$ 47,561	$ -
Control batch vents	$ -	$ -
MRR	$ 42,900	$ 1,190
Total	$ 113,926	$ 1,190

General Information		EPA Database		HAPs		Chemical Process Units		Level of Process Vent Control		Water, LDAR & Other	
Question	Answer	Question	Answer	Question	Answer	Question	Answer	Question	Answer	Question	Answer
Name		Is the plant included in EPA's database for the rule?	Yes, but does not show up in the continuous vent, batch vent, LDAR, WW or economic analysis.	Does the facility use, produce or otherwise generate one or more of the listed urban air toxics? If so, please list them.	Methylene chloride and hexachlorobenzene (HCB)	What is the total number of CPUs at the site?	Difficult to assess because the reactor systems are general purpose. Dixon would estimate between 20 and 100 CPUs.	Are the continuous process vents controlled for organic HAP and to what level? If controlled what type of control device is used?	Most vents go through a caustic or water scrubber to remove HCL (This is after they go through a process condenser). One of the areas has no scrubbers, but is directed to a flare.	How many process wastewater Points of Determination (POD) are there?	Treatment via open tank for pH control then two air strippers. Afterwards there is a final open-top tank for pH adjustment and then into an open basin. Treated effluent goes to the POTW with an average flow of about 50 gpm.
Location (State and EPA Region)	EPA Region 4	Is the information correct? If not, please identify discrepancies.		Does the facility use, produce or otherwise generate one or more of the other listed HAPs? If so, please list them. If too numerous, please indicate the top 3 HAPs by emissions.	See the TRI report in the next tab, plus a small quantities of methylene chloride	What is the total number of products manufactured at the site?	Sell about 100 products but the mix changes from year to year.	Are the batch process vents controlled for organic HAP and to what level? If controlled what type of control device is used?	Various controls with different efficiencies depending on the HAP make-up. HCl is well controlled.	Do you have any organic HAP concentration and flowrate (or mass rate) data for each POD?	Several PODs for each product (probably 200-300 PODs in total). Some could have over 10,000 ppm OHAP. As an example, the plant stripped 1,426 lbs HAPs (of ones they test for) in last 12 months.
Contact Name and Phone Number as well as email address		Have there been any significant changes in operations since 2002 (they base year for the EPA data)? If so, please describe.	Methylene chloride is in fairly consistent use. Otherwise product mix constantly changing.	At what relative magnitude of concentrations relative to the total raw material usage are the listed urban air toxics present.	Might use a fair amount of solvent but there is a small amount of production. Used as a wash; not as a reactant.	How many continuous processes are there? How many different continuous vents are there?	About 2 continuous reactor systems with about 5 continuous distillation systems. They would have HAP.	When were controls installed? Were controls required to meet a regulatory standard; If so, which one?	Installed at various times. Note that the methylene chloride emissions are not controlled.	How many cooling towers do you have and what is the recirculation rate in gpm for each one?	3 cooling towers; the largest of which has a recirculation rate of only 1,000 gpm.
Number of Employees? Do you have a full time environmental professional on site?	135; Yes			Do you have any of the HAP metals? If so, what are the emission rates in lb/yr? Are the emissions currently controlled?	No	What is the typical number of discrete batch processing steps for each product made?	Generally 20 to 60 steps.	What was the capital cost of the controls? Are there any special materials of construction issues that we should be aware of (i.e. exotic metals required)?	Flare installed in 1995. Not aware of any exotic materials of construction required.	Does the plant have truck or rail loading containing organic HAP? If so, do you use submerged fill? How much organic HAP is in the liquids being loaded?	Generally yes, bottom fill.
Description of Operations	Specialty chemical manufacturing focusing on silicon chemistry, mostly batch. Products are made in small lots like kilos and some in drums and tank trucks. Reactor systems (about 18) in sizes from 50 gal to 2,000 gal. There are about 10 dedicated distillation systems;, half continuous and half batch stills. Mostly sell outside of company but some goes to internal sales. There are some bench scale, some pilot size and up to the full scale 2,000 gal production.			What are your uncontrolled organic HAP emissions from process vents? If known, can you break down by process unit?	There is no easy way to calculate the uncontrolled emissions. Generally it seems that the organic HAP is not controlled. The HCl is scrubbed.	Are there any open-top vessels (not closed) reactors or vessels used? If so how many and do they contain HAP and at what concentration?	No	Are the organic HAP emissions at the inlet of the control device greater than 20,000 lb/yr?	No	Are you currently subject to LDAR requirements? If so, what % of your components are covered by an inspection program? What are the total number of components potentially subject to LDAR?	No requirements. Number of components is unknown.
Are there any particular concerns that you have about the rule that you would like to discuss with us?	Methylene chloride is only used in lab glassware. Will this affect the entire facility or just the only area where it is made. Need a deminimus level and the problem with needing to control all HAPs. HCB is a by product of a process and removed, not in the final product.	Information from EPA's TRI Database	See worksheet tab.	If you do not know your uncontrolled organic HAP emissions from process vents, can we estimate from controlled (or permitted) rates and an assumed control efficiency?	As noted above this would be a difficult and time-consuming task.	For batch operations, have you calculated uncontrolled HAP emissions utilizing EPA's MACT equations.	Not sure that they really use exactly the MACT equations, but they calculate via Raoult's law, etc. for displacement, etc.	Do you have any information on the HAP concentration of uncontrolled emissions? If so, do you know the % that are low (around 1,000 ppm HAP) and high (up to 80,000 ppm)?	Because of local ventilation, they have induced air that makes the HCl streams to have low concentration and high flowrate. As the vapors leave reactors and process equipment, they would be expected to have high OHAP concentration and low flow.	If readily available, please provide a list of storage tanks, capacity & HAP content or HAP partial pressure.	None
Comments: Have a FESOP in order to be a minor source.		Comments	See worksheet in next tab for TRI data.	Comments		Comments		Comments		Comments	

BATCH PROCESS VENT DETERMINATION OF UNCONTROLLED ORGANIC HAP EMISSIONS

DESCRIPTION		DIXON ESTIMATE			
		Rate ($/hr)	$ 125	Number of Steps	Number of Products
Uncontrolled OHAP Emissions Estimation	Number of batch steps/product	Hrs	Cost for sampling	0	0
	20	6	$ 750		
	50	10	$ 1,250		
	100	18	$ 2,250		
Calculated Initial Cos			Calculated from cost curve	$ 347	$ -
Annual changes or new product	15%	of the initial products		$ 52	$ -
			Since plant uses Pharma MACT equations no additional costs are expected for this effc		

EPA ESTIMATE
None indicated in the docket

WASTEWATER CHARACTERIZATION AND POTENTIAL CONTROL

DESCRIPTION		DIXON ESTIMATE			
		Sampling Time	Analysis	Total for triplicate analysis	Total
		Rate ($/hr)	$ 125	$ 885	
Sample & analysis of PODs	Number of PODs	Hrs	Cost per product		
	10	40	$ 5,000	$ 8,850	$ 13,850
	20	65	$ 8,125	17700	$ 25,825
	50	150	$ 18,750	44250	$ 63,000
					Number of PODs
					90
Calculated Initial Cos				Calculated from cost curve	$ 114,147
Annual changes or new product	15%	of the initial products			$ 17,122

EPA ESTIMATE

None indicated in the docket

Notes:

Alternative would be to install decanter:

Model Plant	HAP	Concentration (ppmw)	HAP Load (lb/yr)	Capital Cost	Total Annual Cost
9	Toluene	15,000	700	$ 5,970	$ 940
10	Toluene	15,000	9,000	$ 17,300	$ 5,600
11	Toluene	45,000	2,100	$ 5,970	$ 1,600
12	Toluene	45,000	22,000	$ 15,500	$ 15,500
13	Toluene	300,000	3,500	$ 5,970	$ 5,970
14	Toluene	300,000	25,000	$ 5,970	$ 5,970

BATCH PROCESS CONTROL OPTIONS

DESCRIPTION		DIXON ESTIMATE			
	For reference:				
	TO with Scrubber:	Control Option Description	Initial Capital Cost	Annual Operating Cost	Annualized Cost (10 years)
Thermal oxidizer		Option 1 - 1,000 CFM TO	$ 2,373,723	$ 321,587	$ 707,899
		Option 2 - 2,000 CFM TO	$ 2,553,360	$ 360,611	$ 776,158
		Option 3 - 4,000 CFM TO	$ 2,898,008	$ 419,029	$ 890,686
	RTO without Scrubber:	Control Option Description	Initial Capital Cost	Annual Operating Cost	Annualized Cost (10 years)
		Option 1 - 1,000 CFM TO	$ 1,867,240	$ 271,347	$ 575,232
		Option 2 - 2,000 CFM TO	$ 1,898,330	$ 325,016	$ 633,472
		Option 3 - 4,000 CFM TO	$ 1,866,286	$ 342,340	$ 646,069
		Complete the following on a case-by-case basis:			
		Estimated Costs		Initial	$ -
		Basis:	No control required	Annualized	$ -

EPA ESTIMATE

Model Plant	Device	Concentration (ppmw)	HAP Load (lb/yr)	Capital Cost	Total Annual Cost
1	TO	80,000	27,000	$ 349,500	$ 128,100
2	TO	80,000	22,500	$ 334,200	$ 119,500
3	TO	80,000	13,000	$ 127,600	$ 61,264
4	TO	1,000	13,000	$ 292,300	$ 99,824
5	TO	80,000	3,000	$ 127,000	$ 57,747
6	TO	1,000	3,000	$ 130,900	$ 69,636

Complete the following on a case-by-case basis:

Estimated Costs		Initial	$ -
Basis:	No control re	Annualized	$ -

EPA did not include any of the surveyed plants as being controlled. The estimates provided use the contractor's factors

MONITORING, RECORDKEEPING & REPORTING

DESCRIPTION		DIXON ESTIMATE			
	hrs	Rate ($/hr)	$ 125		
Notification of Compliance Status Report		Cost			Total
Negative declaration	40	$ 5,000			$ 5,000
Requires control	200	$ 25,000			
Periodic Reporting		Cost per year			
Approximately 16 hrs/qt if they require controls	64	$ 8,000			$ -
				Number of Process Units	90
LDAR	Hrs/process unit for sensory check	Rate ($/hr)	$ 65		
	1.5	$/process unit/yr	$ 390		$ 35,100
Management Systems	Hrs/process unit for sensory check	Rate ($/hr)	$ 125		
Initial development	4	$/process unit	$ 500		$ 45,000
Periodic inspection	1.25	$/process unit/yr	$ 325		$ 29,250

EPA ESTIMATE

None indicated in the docket

None indicated in the docket other than with specific areas such as LDAR.

Initial/facility	$ 1,230
Annual/facility	$ 1,190

None indicated in the docket other than with specific areas such as LDAR.

TOTAL

DESCRIPTION	DIXON ESTIMATE	USING EPA'S COSTING METHODOLOGY
Initial		
Uncontrolled OHAP Emissions Estimation	$ -	$ -
Sample & analysis of PODs	$ 114,147	$ -
Control batch vents	$ -	$ -
MRR	$ 45,000	$ 1,230
Total	$ 159,147	$ 1,230
Annual		
Uncontrolled OHAP Emissions Estimation	$ -	$ -
Sample & analysis of PODs	$ 17,122	$ -
Control batch vents	$ -	$ -
MRR	$ 64,350	$ 1,190
Total	$ 81,472	$ 1,190

Plant 4 UAT Emissions

2007 Manufacturing				
Urban HAP	2007 batches produced	Total Urban HAP Used in Production	Urban HAP Emissions per Batch, lbs.	Total Annual Emissions. Lbs.
1,3-butadiene	0	0.0	0.2	0
1,3-dichloropropene		0.0		0
acetaldehyde	1	0.0		0
chloroform	2	4,343.9	2.6	5.2
ethylene dichloride		0.0		0
methylene chloride	1	3,901.5	46.5	46.5
hexachlorobenzene		0.0		0
hydrazine		0.0		0
quinoline		0.0		0
chromium	0	0.0	0	0
	2	344.4	0	0
nickel	0	0.0	0	0
		8,589.8	**Total Urban HAP Emissions, lbs.**	**51.7**

2008 Manufacturing				
Urban HAP	2008 batches produced	Total Urban HAP Used in Production	Urban HAP Emissions per Batch, lbs.	Total Annual Emissions. Lbs.
1,3-butadiene	0	0.0	0.2	0
1,3-dichloropropene		0.0		0
acetaldehyde	0	0.0		0
chloroform	4	8,687.8	2.6	10.4
ethylene dichloride		0.0		0
methylene chloride		0.0	46.5	0
hexachlorobenzene		0.0		0
hydrazine		0.0		0
quinoline		0.0		0
chromium	0	0.0	0	0
	2	344.4	0	0
nickel	0	0.0	0	0
		9,032.3	**Total Urban HAP Emissions, lbs.**	**10.4**

Plant 4 TRI Data

Year	Chemical	CAS	Federal (F)	Form Type	Industry	Fugitive Ai	Stack Air	Total Air
2000	ACETONITRILE	'00007505	C	R	325 Chemi	1366	333	1699
2000	BENZOYL CHLORIDE	'00009888	C	R	325 Chemi	9	0	9
2000	METHANOL	'00006756	C	R	325 Chemi	669	1049	1718
2000	N,N-DIMETHYLFORMAMIDE	'00006812	C	R	325 Chemi	35	6	41
2000	N-BUTYL ALCOHOL	'00007136	C	R	325 Chemi	49	2	51
2000	N-HEXANE	'00011054	C	R	325 Chemi	153	1623	1776
2000	SEC-BUTYL ALCOHOL	'00007892	C	R	325 Chemi	49	2	51
2000	TOLUENE	'00010888	C	R	325 Chemi	94	251	345
2000	TRIETHYLAMINE	'00012144	C	R	325 Chemi	5	8	13
2000	XYLENE (MIXED ISOMERS)	'00133020	C	R	325 Chemi	35	8	43
2001	ACETONITRILE	'00007505	C	R	325 Chemi	2594	633	3227
2001	BENZOYL CHLORIDE	'00009888	C	R	325 Chemi	9	0	9
2001	METHANOL	'00006756	C	R	325 Chemi	140	680	820
2001	N-BUTYL ALCOHOL	'00007136	C	R	325 Chemi	68	2	70
2001	N-HEXANE	'00011054	C	R	325 Chemi	169	2404	2573
2001	SEC-BUTYL ALCOHOL	'00007892	C	R	325 Chemi	68	2	70
2001	TOLUENE	'00010888	C	R	325 Chemi	27	146	173
2001	XYLENE (MIXED ISOMERS)	'00133020	C	R	325 Chemi	26	6	32
2002	ACETONITRILE	'00007505	C	R	325 Chemi	184	931	1115
2002	BENZOYL CHLORIDE	'00009888	C	R	325 Chemi	7	0	7
2002	METHANOL	'00006756	C	R	325 Chemi	429	614	1043
2002	N-BUTYL ALCOHOL	'00007136	C	R	325 Chemi	64	3	67
2002	N-HEXANE	'00011054	C	R	325 Chemi	127	4489	4616
2002	SEC-BUTYL ALCOHOL	'00007892	C	R	325 Chemi	63	3	66
2002	TOLUENE	'00010888	C	R	325 Chemi	29	19	48
2002	TRIETHYLAMINE	'00012144	C	R	325 Chemi	18	14	32
2002	VINYL ACETATE	'00010805	C	R	325 Chemi	44	41	85
2003	ACETONITRILE	'00007505	C	R	325 Chemi	109	163	272
2003	BENZOYL CHLORIDE	'00009888	C	R	325 Chemi	6	0	6
2003	DICHLOROMETHANE	'00007509	C	R	325 Chemi	46	217	263
2003	METHANOL	'00006756	C	R	325 Chemi	674	4590	5264
2003	N-BUTYL ALCOHOL	'00007136	C	R	325 Chemi	64	3	67
2003	N-HEXANE	'00011054	C	R	325 Chemi	124	2017	2141
2003	SEC-BUTYL ALCOHOL	'00007892	C	R	325 Chemi	53	2	55
2003	TOLUENE	'00010888	C	R	325 Chemi	24	278	302
2003	VINYL ACETATE	'00010805	C	R	325 Chemi	44	105	149
2004	ACETONITRILE	'00007505	C	R	325 Chemi	73	121	194
2004	BENZOYL CHLORIDE	'00009888	C	R	325 Chemi	9	0	9
2004	DICHLOROMETHANE	'00007509	C	R	325 Chemi	78	482	560
2004	METHANOL	'00006756	C	R	325 Chemi	766	6054	6820
2004	N-BUTYL ALCOHOL	'00007136	C	R	325 Chemi	65	2	67
2004	N-HEXANE	'00011054	C	R	325 Chemi	125	1458	1583
2004	N-METHYL-2-PYRROLIDONE	'00087250	C	R	325 Chemi	56	35	91
2004	SEC-BUTYL ALCOHOL	'00007892	C	R	325 Chemi	63	3	66
2004	TOLUENE	'00010888	C	R	325 Chemi	55	520	575
2004	VINYL ACETATE	'00010805	C	R	325 Chemi	66	72	138
2004	XYLENE (MIXED ISOMERS)	'00133020	C	R	325 Chemi	16	3	19
2005	ACETONITRILE	'00007505	C	R	325 Chemi	34	101	135
2005	BENZOYL CHLORIDE	'00009888	C	R	325 Chemi	6	0	6
2005	METHANOL	'00006756	C	R	325 Chemi	528	2407	2935
2005	N,N-DIMETHYLFORMAMIDE	'00006812	C	R	325 Chemi	8	0	8
2005	N-BUTYL ALCOHOL	'00007136	C	R	325 Chemi	86	2	88
2005	N-HEXANE	'00011054	C	R	325 Chemi	187	4161	4348
2005	SEC-BUTYL ALCOHOL	'00007892	C	R	325 Chemi	83	4	87
2005	VINYL ACETATE	'00010805	C	R	325 Chemi	192	673	865
2006	ACETONITRILE	'00007505	C	R	325 Chemi	33	1171	1204
2006	BENZOYL CHLORIDE	'00009888	C	R	325 Chemi	8	0	8
2006	ETHYLENE GLYCOL	'00010721	C	R	325 Chemi	0	0	0
2006	METHANOL	'00006756	C	R	325 Chemi	491	2050	2541
2006	METHYL TERT-BUTYL ETHER	'00163404	C	R	325 Chemi	49	82	131
2006	N,N-DIMETHYLFORMAMIDE	'00006812	C	R	325 Chemi	25	6	31
2006	N-BUTYL ALCOHOL	'00007136	C	R	325 Chemi	41	1	42
2006	N-HEXANE	'00011054	C	R	325 Chemi	172	5891	6063
2006	SEC-BUTYL ALCOHOL	'00007892	C	R	325 Chemi	39	2	41
2006	TRIETHYLAMINE	'00012144	C	R	325 Chemi	635	15	650
2006	VINYL ACETATE	'00010805	C	R	325 Chemi	106	370	476

Attachment 5: *Plant 5 Survey & Analysis*

General Information		EPA Database		HAPs		Chemical Process Units		Level of Process Vent Control		Water, LDAR & Other	
Question	Answer	Question	Answer	Question	Answer	Question	Answer	Question	Answer	Question	Answer
Name		Is the plant included in EPA's database for the rule?	No information found in any of the data that the contractor cites. Was no acetaldehyde reported for this plant so that may be why it was not in the subsequent contractor studies. They do not trip threshold for acetaldehyde for TRI purpose for 2002.	Does the facility use, produce or otherwise generate one or more of the listed urban air toxics? If so, please list them.	acetaldehyde produced as unwanted byproduct, disposed as waste	What is the total number of CPUs at the site?	There would be at least 3 different CPUs probably many more. See groups of families below.	Are the continuous process vents controlled for organic HAP and to what level? If controlled what type of control device is used?	One continuous process with dedicated scrubber; no HAP	How many process wastewater Points of Determination (POD) are there?	each of the 11 reactors generates its own steam boil and wastewater stream; each of the 4 scrubbers has a wastewater discharge, + add'l streams such as vacuum jets
Location (State and EPA Region)	EPA Region 4	Is the information correct? If not, please identify discrepancies.	See worksheet "Emissions" for comparison.	Does the facility use, produce or otherwise generate one or more of the other listed HAPs? If so, please list them. If too numerous, please indicate the top 3 HAPs by emissions.	methanol MIBK 1,4-dioxane see worksheet "Emissions".	What is the total number of products manufactured at the site?	10 active product families (18 are in the permit even though they don't currently manufacture)	Are the batch process vents controlled for organic HAP and to what level? If controlled what type of control device is used?	yes, 4 scrubbers total, efficiency ranges from 0 to 99% depending on scrubber and HAP being scrubbed..1) alkaline 2) acidic 3) neutral and 4) for the continuous process (no HAP). Flowrate and delta P, and per shift the acid or alkalinity as appropriate.	Do you have any organic HAP concentration and flowrate (or mass rate) data for each POD?	Acetaldehyde and epichlorohydrin are the only partially soluble HAPs present. Concentration is well below 10,000 ppm in streams that discharge to open systems. Jet has 40 lb/1000 lb which is 40,000 ppm; this is currently hard-piped to treatment. Due to high Pvap of acetaldehyde, decanting this stream could actually increase emissions. Activated sludge ww treatment and discharge to city.
Contact Name and Phone Number as well as email address		Have there been any significant changes in operations since 2002 (they have year for the EPA data)? If so, please describe.	There were likely some changes in product lines and added a reactor. Basically they have better data because they needed for Synthetic Minor.	At what relative magnitude of concentrations relative to the total raw material usage are the listed urban air toxics present.	0.03 lbs of acetaldehyde produced for every lb of polymer produced (0.03%). In terms of total production, percentage is even less.	How many continuous processes are there? How many different continuous vents are there?	One vent no HAP.	When were controls installed? Were controls required to meet a regulatory standard; If so, which one?	One was original for EO emissions form the 50s otherwise the Title V said they were installed or reconstructed between 1993-1998 not installed to meet a standard. Minor Hap source status was the goal to avoid MON. No testing conducted	How many cooling towers do you have and what is the recirculation rate in gpm for each one?	2 towers, <8000 gpm each
Number of Employees? Do you have a full time environmental professional on site?	50 employees no full-time env professional			Do you have any of the HAP metals? If so, what are the emission rates in lb/yr? Are the emissions currently controlled?	no	What is the typical number of discrete batch processing steps for each product made?	There are approximately 30 subfamilies. Typical process would have 10 discrete additions and 4 different levels of temperature and 3 different levels of pressure and could have a purge. Generally at least 2 different reactions that you want to accomplish; one to make product and the other to destroy impurities.	What was the capital cost of the controls? Are there any special materials of construction issues that we should be aware of (i.e. exotic metals required)?	Part of the original cost for the plant. No exotic materials of construction needed.	Does the plant have truck or rail loading containing organic HAP? If so, do you use submerged fill? How much organic HAP is in the liquids being loaded?	yes, all are bottom filled
Description of Operations	Manufacture surfactants and specialty chemicals, all batch produced. 11 reactors in their air permit. 1)Polymers manufactured by reacting polyester-type monomers, this produces acetaldehyde, ethylene glycol and 1-4 dioxane - only 1 reactor (R2 used). 2)Amphoteric surfactants fatty acid & amine Reaction and followed up with distillation -(2 reactors of 11 used) One process generates methanol as unwanted byproduct 3)Amphoteric reactions to make final products using 4 of the 11 reactors. Rx of intermediate using monochloroacetic acid & epichlorohydrin. One process generates HCl. All processes use aqueous HCl for pH adjustment.			What are your uncontrolled organic HAP emissions from process vents? If known, can you break down by process unit?	42,000 lb/yr permitted 23,000 lb/yr actual (after vacuum jet but before control device) see worksheet "Emissions"	Are there any open-top vessels (not closed) reactors or vessels used? If so how many and do they contain HAP and at what concentration?	all vessels have roofs, but some may vent to atm for certain operations	Are the organic HAP emissions at the inlet of the control device greater than 20,000 lb/yr?	Potentially. Total permitted pre-controlled emissions are 42,000 lb/yr split among 3 scrubbers. See worksheet "Emissions".	Are you currently subject to LDAR requirements? If so, what % of your components are covered by an inspection program? What are the total number of components potentially subject to LDAR?	not currently subject; 1530 components in organic HAP service; 2370 components in non-HAP VOC service
Are there any particular concerns that you have about the rule that you would like to discuss with us?	Requires more control of HAPs than just acetaldehyde. Their current permit allows them to discharge to the atmosphere. Some products or families may stipulate whether control is required or not.	Information from EPA's TRI Database		If you do not know your uncontrolled organic HAP emissions from process vents, can we estimate from controlled (or permitted) rates and an assumed control efficiency?		For batch operations, have you calculated uncontrolled HAP emissions utilizing EPA's MACT equations.	no	Do you have any information on the HAP concentration of uncontrolled emissions? If so, do you know the % that are low (around 1,000 ppm HAP) and high (up to 80,000 ppm)?	Only 1 of the 3 scrubbers that controls HAPs has potential for scrubber inlet >20,000 lb/yr HAPs. This also happens to be the only scrubber that controls an urban HAP.	If readily available, please provide a list of storage tanks, capacity & HAP content or HAP partial pressure.	Tank 20 is 29,400 gals and contains epichlorohydrin, but organic Pvap is <0.51 psia. Tank 59 is 21,200 gals and contains 5wt% methanol, but organic Pvap is <0.51 psia. All other tanks are either <19,800 gals and/or do not contain HAP.
Comments		Comments		Comments		Comments		Comments		Comments	Have done WATER9 modeling/sampling for PODs.
											Calc fugitive emissions (2003) using correlation factors and assuming screening values.

BATCH PROCESS VENT DETERMINATION OF UNCONTROLLED ORGANIC HAP EMISSIONS

DESCRIPTION		DIXON ESTIMATE				EPA ESTIMATE
		Rate ($/hr)	$ 125	Number of Steps	Number of Products	None indicated in the docket
Uncontrolled OHAP Emissions Estimation	Number of batch steps/product	Hrs	Cost for sampling	60	10	
	20	6	$ 750			
	50	10	$ 1,250			
	100	18	$ 2,250			
Calculated Initial Cost			Calculated from cost curve	$ 1,480	$ 26,833	
Annual changes or new product	15%	of the initial products		$ 222	$ [illegible]	

WASTEWATER CHARACTERIZATION AND POTENTIAL CONTROL

DESCRIPTION		DIXON ESTIMATE				EPA ESTIMATE
		Sampling Time	Analysis	Total for triplicate analysis	Total	
		Rate ($/hr)	$ 125	$ [illegible]		
Sample & analysis of PODs	Number of PODs	Hrs	Cost per analysis			None indicated in the docket
	10	[illegible]	$ [illegible]	$ [illegible]	$ [illegible]	Notes:
	20	[illegible]	$ [illegible]	[illegible]	$ [illegible]	
	50	[illegible]	$ [illegible]	[illegible]	$ [illegible]	Alternative would be to install decanter:
					Number of PODs	
					16	
Calculated Initial Cost				Calculated from cost curve	$ 29,293	
Annual changes or new product	15%	of the initial products			$ 3,044	

Model Plant	HAP	Concentration (ppmw)	HAP Load (lb/yr)	Capital Cost	Total Annual Cost
9	Toluene	15,000	700	$ 5,970	$ 940
10	Toluene	15,000	9,000	$ 17,300	$ 5,600
11	Toluene	45,000	2,100	$ 5,970	$ 1,600
12	Toluene	45,000	22,000	$ 15,500	$ 15,500
13	Toluene	300,000	3,500	$ 5,970	$ 5,970
14	Toluene	300,000	25,000	$ 5,970	$ 5,970

BATCH PROCESS CONTROL OPTIONS

DESCRIPTION		DIXON ESTIMATE			
	For reference:				
	TO with Scrubber:	Control Option Description	Initial Capital Cost	Annual Operating Cost	Annualized Cost (10 years)
Thermal oxidizer		Option 1 - 1,000 CFM TO	$ 2,373,723	$ 321,887	$ 707,899
		Option 2 - 2,000 CFM TO	$ 2,553,360	$ 360,611	$ 776,158
		Option 3 - 4,000 CFM TO	$ 2,896,009	$ 419,029	$ 860,066
	RTO without Scrubber:	Control Option Description	Initial Capital Cost	Annual Operating Cost	Annualized Cost (10 years)
		Option 1 - 1,000 CFM TO	$ 1,887,240	$ 271,347	$ 575,232
		Option 2 - 2,000 CFM TO	$ 1,895,330	$ 325,016	$ 633,472
		Option 3 - 4,000 CFM TO	$ 1,866,266	$ 342,340	$ 646,069
		Complete the following on a case-by-case basis:			
		Estimated Costs	Halogenated	Initial	$ 2,898,009
		Basis:	One large TO	Annualized	$890,686

EPA ESTIMATE

Model Plant	Device	Concentration (ppmw)	HAP Load (lb/yr)	Capital Cost	Total Annual Cost
1	TO	80,000	27,000	$ 349,500	$ 128,100
2	TO	80,000	22,500	$ 334,200	$ 119,500
3	TO	80,000	13,000	$ 127,600	$ 61,264
4	TO	1,000	13,000	$ 292,300	$ 90,824
5	TO	80,000	3,000	$ 127,000	$ 57,747
6	TO	1,000	3,000	$ 130,900	$ 69,636

Complete the following on a case-by-case basis:

Estimated Costs		Initial	$ 349,500
Basis:	One large TO	Annualized	$ 128,100

EPA did not include any of the surveyed plants as being controlled. The estimates provided use the contractor's factors.

MONITORING, RECORDKEEPING & REPORTING

DESCRIPTION		DIXON ESTIMATE				EPA ESTIMATE
	hrs	Rate ($/hr)	$ 125			
Notification of Compliance Status Report		Cost			Total	None indicated in the docket
Negative declaration	40	$ 5,000				
Requires control	200	$ 25,000			$ 25,000	
Periodic Reporting		Cost per year				None indicated in the docket other than with specific areas such as LDAR.
Approximately 16 hrs/qtr if they require control	64	$ 8,000			$ 8,000	
				Number of Process Units	10	
LDAR	Hrs/process unit for sensory check	Rate ($/hr)	$ 65			Initial/facility $ 1,230
	1.5	$/process unit/yr	$ 390		$ 3,900	Annual/facility $ 1,190
Management Systems	Hrs/process unit for sensory check	Rate ($/hr)	$ 125			None indicated in the docket other than with specific areas such as LDAR.
Initial development	4	$/process unit	$ 500		$ 5,000	
Periodic inspection	1.25	$/process unit/yr	$ 325		$ 3,250	

TOTAL

DESCRIPTION	DIXON ESTIMATE	USING EPA'S COSTING METHODOLOGY
Initial		
Uncontrolled OHAP Emissions Estimation	$ 26,833	$ -
Sample & analysis of PODs	$ 29,293	$ -
Control batch vents	$ 2,898,009	$ 349,500
MRR	$ 5,000	$ 1,230
Total	$ [illegible]	$ 350,730
Annual		
Uncontrolled OHAP Emissions Estimation	$ 3,985	$ -
Sample & analysis of PODs	$ 3,044	$ -
Control batch vents	$ 890,686	$ 128,100
MRR	$ 7,150	$ 1,190
Total	$ 904,865	$ 129,290

Plant 5 Emissions

All emissions in lbs/yr										
	EPA Database	Batch Vents								
	(NEI 2002)	permitted								
		pre-control	precontrolled/uncontrolled by product family							post-control
			polymers	amides	amphoterics	MeOH dist	esterification	ether sulfates	blends	
1,4-Dioxane	2169	8901	8,258				455	188		623
Acetaldehyde	0	23581	20,319				3,262			4716
Acrylic Acid	0	29			29					29
Chloroacetic Acid	9	14			14					14
Diethanolamine	2	5		5						5
Epichlorohydrin	171	106			106					106
Ethylene Glycol	6	76	76							76
Glycol Ethers	171	0								0
Formaldehyde	0	0								0
Hydrochloric Acid	195	7			7					7
Methanol	3827	9402	3,860	4,846	326	370				9402
MIBK	0	4							4	4
Total	6550	42125	32,513	4851	482	370	3717	188	4	14982

*Conservatively chose a period of high emissions (Mar 2007 to Feb 2008)

Year	Chemical	CAS	Federal (F	Form Type	Industry	Fugitive Ai	Stack Air	Total Air
2002	1,4-DIOXANE	'00012391	C	R	325 Chemi	0	2169	2169
2002	CERTAIN GLYCOL ETHERS	'N230'	C	R	325 Chemi	0	171	171
2002	CHLOROACETIC ACID	'00007911	C	R	325 Chemi	0	9	9
2002	DIETHANOLAMINE	'00011142	C	R	325 Chemi	0	2	2
2002	DIMETHYLAMINE	'00012440	C	R	325 Chemi	2	8	10
2002	EPICHLOROHYDRIN	'00010689	C	R	325 Chemi	114	57	171
2002	ETHYLENE GLYCOL	'00010721	C	R	325 Chemi	0	6	6
2002	HYDROCHLORIC ACID (1995 AND A	'00764701	C	R	325 Chemi	76	119	195
2002	METHANOL	'00006756	C	R	325 Chemi	239	3588	3827
2002	METHYL ACRYLATE	'00009633	C	R	325 Chemi	1410	121	1531
2002	SULFURIC ACID (1994 AND AFTER '	'00766493	C	R	325 Chemi	0	0	0
2003	CERTAIN GLYCOL ETHERS	'N230'	C	R	325 Chemi	0	171	171
2003	CHLOROACETIC ACID	'00007911	C	R	325 Chemi	0	6	6
2003	DIETHANOLAMINE	'00011142	C	R	325 Chemi	0	1	1
2003	DIMETHYLAMINE	'00012440	C	R	325 Chemi	2	8	10
2003	EPICHLOROHYDRIN	'00010689	C	R	325 Chemi	114	50	164
2003	ETHYLENE GLYCOL	'00010721	C	R	325 Chemi	0	6	6
2003	METHANOL	'00006756	C	R	325 Chemi	142	2902	3044
2003	METHYL ACRYLATE	'00009633	C	R	325 Chemi	1410	113	1523
2003	SULFURIC ACID (1994 AND AFTER '	'00766493	C	R	325 Chemi	0	0	0
2004	CERTAIN GLYCOL ETHERS	'N230'	C	R	325 Chemi	320	122	442
2004	CHLOROACETIC ACID	'00007911	C	R	325 Chemi	640	5.1	645.1
2004	DIETHANOLAMINE	'00011142	C	R	325 Chemi	20	5	25
2004	DIMETHYLAMINE	'00012440	C	R	325 Chemi	2	9	11
2004	EPICHLOROHYDRIN	'00010689	C	R	325 Chemi	1500	122	1622
2004	ETHYLENE GLYCOL	'00010721	C	R	325 Chemi	960	34	994
2004	METHANOL	'00006756	C	R	325 Chemi	1860	7166	9026
2004	METHYL ACRYLATE	'00009633	C	R	325 Chemi	1182	95	1277
2005	CERTAIN GLYCOL ETHERS	'N230'	C	R	325 Chemi	320	110	430
2005	CHLOROACETIC ACID	'00007911	C	R	325 Chemi	640	4	644
2005	DIETHANOLAMINE	'00011142	C	R	325 Chemi	20	3	23
2005	DIMETHYLAMINE	'00012440	C	R	325 Chemi	2	10	12
2005	EPICHLOROHYDRIN	'00010689	C	R	325 Chemi	1500	84	1584
2005	ETHYLENE GLYCOL	'00010721	C	R	325 Chemi	960	511	1471
2005	METHANOL	'00006756	C	R	325 Chemi	1860	6053	7913
2005	METHYL ACRYLATE	'00009633	C	R	325 Chemi	1400	105	1505
2006	CERTAIN GLYCOL ETHERS	'N230'	C	R	325 Chemi	320	96	416
2006	CHLOROACETIC ACID	'00007911	C	R	325 Chemi	640	4	644
2006	DIETHANOLAMINE	'00011142	C	R	325 Chemi	20	2	22
2006	DIMETHYLAMINE	'00012440	C	R	325 Chemi	2	10	12
2006	EPICHLOROHYDRIN	'00010689	C	R	325 Chemi	1540	39	1579
2006	ETHYLENE GLYCOL	'00010721	C	R	325 Chemi	960	260	1220
2006	METHANOL	'00006756	C	R	325 Chemi	2085	3820	5905
2006	METHYL ACRYLATE	'00009633	C	R	325 Chemi	1200	96	1296