Source Category: Chemical Manufacturing

INTRODUCTION

The purpose of this document is to provide a forum for public review and comment on the evaluation of candidate control measures that may be considered by the States in the Midwest Regional Planning Organization (MRPO) to develop strategies for ozone, PM2.5, and regional haze State Implementation Plans (SIPs). Additional emission reductions beyond those due to mandatory controls required by the Clean Air Act may be necessary to meet SIP requirements and to demonstrate attainment. This document provides background information on the mandatory control programs and on possible additional control measures.

The candidate control measures identified in this document represent an initial set of possible measures. The MRPO States have not yet determined which measures will be necessary to meet the requirements of the Clean Air Act. As such, the inclusion of a particular measure here should not be interpreted as a commitment or decision by any State to adopt that measure. Other measures will be examined in the near future. Subsequent versions of this document will likely be prepared for evaluation of additional potential control measures.

The evaluation of candidate control measures is presented in a series of "Interim White Papers." Each paper includes a title, summary table, description of the source category, brief regulatory history, discussion of candidate control measures, expected emission reductions, cost effectiveness and basis, timing for implementation, rule development issues, other issues, and a list of supporting references.

SOURCE CATEGORY DESCRIPTION

The chemical manufacturing category (Standard Industrial Classification {SIC} codes 2800-2899) includes a wide array of facilities that manufacture and process organic and inorganic chemical substances. This includes facilities that produce basis and specialty chemicals and chemical-based end-products such as inks, paints, cleaning agents, and polymers. Chemical processing facilities include equipment for storing, transferring, mixing, reacting, separating, purifying, and packaging chemical mixtures. This category includes facilities that utilize fuel to generate energy (e.g., boilers and engines) and directly in process equipment (e.g., heaters, furnaces, and reactors). Process equipment can generate both stack emissions, e.g., from process equipment vents, and fugitive emissions, e.g., leaks from pumps, seals, valves, etc. Control options for fuel combustion sources have been addressed in a separate paper. These options also apply to fuel burning operations at chemical manufacturing plants. This paper focuses on the control process emissions from chemical manufacturing operations.

The estimated emissions from chemical manufacturing facilities in the MPRO States for calendar year 2002 are summarized in Table 1. The Table segregates emissions into three subcategories: fuel combustion in boilers and engines, process fuel combustion operations, and chemical process operations. For NOx, SO2, and PM2.5, the majority of the emissions are attributable to fuel combustion. For CO and VOC, the majority of the emissions are from chemical process sources not involving fuel combustion.

The large majority of the estimated CO emissions are from a few facilities: 61% from an inorganic chemical production facility in Ohio and 96% from four facilities producing inorganic chemicals and cyclic organic compounds (two in Ohio, one in Illinois, and one in Indiana).

Table 1 - 2002 Emissions from Chemical Manufacturing (SIC 2800-2899) Facilities

	2002 Annual Emissions (tons per year)				
	CO	**NOx**	**SO2**	**PM-2.5**	**VOC**
Boilers and Engines					
Illinois	2,308	5,145	18,612	160	346
Indiana	830	4,880	7,595	214	74
Michigan	687	1,334	2,840	226	22
Ohio	1,750	4,862	7,244	227	66
Wisconsin	112	116	3	0	5
TOTAL Boilers and Engines	5,687	16,337	36,293	827	512
In-Process Fuel Combustion					
Illinois	120	359	17	0	21
Indiana	639	526	2,604	70	22
Michigan	83	299	34	0	10
Ohio	2,376	2,155	18	96	110
Wisconsin	3	12	0	0	1
TOTAL Process Fuel Combustion	3,220	3,351	2,673	166	164
Chemical Processes					
Illinois	10,992	404	3,878	0	8,309
Indiana	2,889	101	633	156	3,046
Michigan	236	82	8	4	1,374
Ohio	46,411	1,177	3,015	370	2,035
Wisconsin	68	21	2	0	1,106
TOTAL Chemical Processes	60,597	1,785	7,536	530	15,870
Total Chemical Manufacturing Emissions					
Illinois	13,421	5,908	22,506	160	8,676
Indiana	4,358	5,507	10,832	439	3,141
Michigan	1,006	1,715	2,881	230	1,406
Ohio	50,537	8,194	10,278	693	2,211
Wisconsin	183	148	5	0	1,112
TOTAL All Emissions	69,504	21,473	46,502	1,522	16,546
% Fuel Combustion	13%	92%	84%	65%	4%
% Process Emissions	87%	8%	16%	35%	96%

The majority of the NOx non-fuel combustion process emissions are from nitrogen-based fertilizer manufacturers operating nitric acid plants. The largest sources of non-fuel combustion process SO2 emissions include facilities operating sulfuric plants in the production of inorganic chemicals.

A wide array of chemical processing facilities are generating VOC and PM2.5 process emissions including plants producing inorganic and organic chemicals, inorganic fertilizers, plastics and ethanol. The PM2.5 process emissions from individual facilities are relatively small in comparison to the other criteria pollutants, with the largest process source a nitrogen-based fertilizer manufacturer.

REGULATORY HISTORY

On-the-Books Regulation

Under Section 111 of the Clean Air Act (CAA), EPA has developed New Source Performance Standards (NSPS) that apply to certain categories of new and modified stationary sources in the chemical manufacturing industries. Attachment 1 lists the NSPS potentially applicable to processes used in the chemical industry.

Title I also subjects new and modified large stationary sources that increase their emissions to permitting requirements that impose control technologies of varying levels of stringency (known as New Source Review, or NSR). NSR prescribes control technologies for new plants and for plant modifications that result in a significant increase in emissions, subjecting them to Best Available Control Technology (BACT) in attainment areas and to the Lowest Achievable Emission Rate (LAER) in nonattainment areas. Applicable NSPSs serve as the starting point for defining BACT or LAER. The stringency of BACT and LAER evolve over time as determined on a case-by-case basis in state permitting proceedings.

To facilitate the development of reasonably available control technology (RACT) regulations for VOC and NOx sources in State ozone non-attainment plans, EPA published Control Technology Guidelines (CTGs) and Alternative Control Techniques (ACT) documents that apply to certain sources in the chemical manufacturing industry. CTG documents provide recommendations on RACT controls while ACT documents list available controls with no recommendations. Attachment 2 lists the CTGs and ACT documents that addressed VOC emissions from chemical manufacturing process operations.

Chemical process operations are subject to several National Emissions Standards for Hazardous Air Pollutants (NESHAPs) promulgated under Title III of the CAA. NESHAP regulations under the 1970 CAA are published in Part 61 of the Code of Federal Regulations (CFR). NESHAPs developed under the 1990 CAA were published under Part 63 of the CFR and require the use of maximum achievable control technology (MACT) to control multiple organic and inorganic chemicals identified on a list of HAPs in the CAA. Since the majority of organic HAPs are also VOCs, compliance with the NESHAP limits will also control VOC emissions. Attachment 3 identifies the specific NESHAPs that are applicable to chemical manufacturing processes and their compliance date. The MACT standards are grouped according to whether their compliance date is before or after the 2002 MRPO emission inventory year.

Current regulations in the Midwest RPO States that apply to chemical process emissions are summarized below.

CO Limits – Chemical manufacturing process CO emissions are regulated by Illinois for “polybasic organic acid partial oxidation manufacturing processes”. There are no other MRPO State limits specific to CO emissions from chemical manufacturing processes.

NOx Limits – Process specific NOx limits apply to nitric acid plants and processes using nitric acid statewide in Illinois and to nitric acid plants in “priority 1” counties in Ohio. Indiana requires the use of

RACT for NOx sources in Clark and Boyd counties with 40 tons/year or greater potential emissions. Based on the 2002 inventory, they may not be any sources in those two counties that would be subject to that requirement based on process emissions.

PM Limits – There are no limits on PM emissions specific to chemical manufacturing operations in the MRPO States. PM emissions from chemical manufacturing process operations are subject to catchall process weight-based emission limitations, visible emissions restrictions, and fugitive dust controls in all MRPO states.

SO2 Limits – Process SO2 emission sources in Ohio with 1,000 pounds/hour and greater process throughput must comply with one of two process-weight-based curves dependant on location. No other MPRO state has adopted an across-the-board limitation for process SO2 emissions. Illinois, Michigan and Ohio have specific limits for SO2 emissions from sulfuric acid plants. The Illinois and Michigan limits are 4 and 0.5 lbs SO2 per ton of 100% acid produced, respectively. Ohio has established plant specific limits for sulfuric acid plant emissions for three different facilities at 6.5, 25, and 35 lbs SO2 per ton of 100% acid produced.

VOC Limits - Chemical manufacturing processes are regulated to varying degrees by the MRPO States. Differences in the types of manufacturing facilities located in each state have affected each State's regulatory coverage.

Storage of Organic Materials - Regulated in targeted counties in all States and statewide in Illinois, Michigan and Wisconsin. Illinois and Indiana requires the equivalent of 95% control in target counties. Illinois requires equivalent of 85% control statewide. Michigan, Ohio and Wisconsin require the equivalent of 90% control.

Material Transfer – Submerge filling is required statewide in Illinois and Michigan. Vapor recovery is required in target counties in Michigan, Ohio, and Wisconsin.

Pharmaceutical Manufacturing – All MRPO States have adopted requirements similar to EPA's CTG intended to achieved approximately 90% control of various pharmaceutical unit operations. The requirements apply statewide, except in Indiana and Ohio, where applicability outside of target areas is based on a new/modified source cutoff date.

Organic Chemical and Polymer Manufacturing Operations –Leak detection and repair programs comparable to EPA's CTG are required in target areas in Illinois, Michigan, and Ohio, and statewide for large facilities in Illinois and new units in Ohio.

Resin Manufacturing – Limits of emissions from resin manufacturing operations apply in target areas in Illinois, Michigan, and Wisconsin, and statewide in Ohio. The Illinois, Michigan, and Ohio requirements are similar to the EPA's CTG for polystyrene manufacture.

Paint Manufacturing – Similar requirements apply in target counties in Illinois, Michigan and Wisconsin. Ohio has requirements that apply specifically to a single paint manufacturing facility.

Other Requirements– Requirements based on EPA's CTGs apply in target counties in Illinois and Ohio to air oxidation processes and in Illinois to batch processes used in chemical manufacturing. Illinois also regulates statewide emissions from "miscellaneous equipment" not regulated elsewhere including separation operations, pumps, compressors, vapor blowdown systems, and relief valves. In target counties, the equivalent of 81% control or better is required for any formulation processes, chemical manufacturing operations or other emissions units not regulated elsewhere. Effluent-water separation systems are also subject to control requirements in target counties and new facilities statewide in Ohio. Ohio regulations include specific requirements that apply to seven individual facilities.

On-the-Way Regulations

We did not identify any ongoing regulatory development activities at the federal or MRPO State level that would affect emissions from chemical manufacturing processes. We do expect there to be future VOC reductions not accounted for in the 2002 inventory in the MRPO States because of control efforts to reduce HAP emissions at chemical manufacturing facilities in order to comply with MACT standards.

We analyzed the 2002 inventory data to assess the potential impact of future MACT compliance control efforts by MRPO chemical process sources. Facilities with reported VOC emissions of 15 tons per year or greater from chemical manufacturing process operations were identified as potential candidates for MACT applicability (i.e., their potential emissions may exceed 25 tons per year of HAPs; data is not available on the extent reported 2002 VOC emissions are also HAP emissions.). These facilities represent 91 percent of the chemical process VOC emissions in the 2002 inventory. The chemical process emissions for these facilities were grouped with the relevant MACT categories based on their assigned SCC and SIC codes. Attachment 4 summarizes the results of this analysis. The table shows the 2002 MRPO State emissions by potential MACT standard category and compliance date.

The analysis provides an approximation of the source coverage by MACT standards, particularly those with post-2002 compliance dates. Approximately half the sources and half the chemical process emissions come from facilities that have compliance dates after 2002. The potential for error in this analysis is significant. Some facilities may not meet the MACT applicability criteria or have potential HAP emissions below the MACT applicability thresholds of 10 tons/year individual HAP and 25 tons/year total HAPs. We may have assigned some facilities to the wrong MACT, for example, a facility may be subject to the MON with a 2006 compliance date rather than the HON or the Pharmaceutical MACT with 2001 compliance dates, and visa versa. The applicability of the polymer MACTs to facilities rather than the MON can also be in error. Applicability determinations require knowledge of specific HAPs used and products produced, and sometimes can result in more than one MACT applying to an individual facility. Based on this analysis, however, we expect a significant portion of the chemical manufacturing facilities to reduce the VOC emissions reported in the 2002 inventory to some degree in order to achieve MACT compliance during the calendar years 2003 through 2006.

CANDIDATE CONTROL MEASURES

Most of the NOx and SO2 emissions from the chemical process industry are generated from fuel combustion sources. Candidate control measures for these pollutants are discussed in the Industrial, Commercial, and Institutional Boiler White Paper. The majority of the NOx non-fuel combustion process emissions are from nitrogen-based fertilizer manufacturers operating nitric acid plants. The largest sources of non-fuel combustion process SO2 emissions include facilities operating sulfuric plants in the production of inorganic chemicals.

A wide array of chemical processing facilities are generating VOC and PM2.5 process emissions including plants producing inorganic and organic chemicals, inorganic fertilizers, plastics and ethanol. The PM2.5 process emissions from individual facilities are relatively small in comparison to the other criteria pollutants, with the largest process source a nitrogen-based fertilizer manufacturer.

Although general control options for these sources are discussed below, we recommend that detailed case-by-case assessments of these facilities are needed to accurately identify candidate control measures, possible emission reductions, and costs for obtaining any additional emission reductions.

NOx Control Options

We identified four facilities that operate nitric acid plants in the production of nitrogenous fertilizers as the large sources of chemical process NOx emissions:

- Royster Clark, North Bend, Ohio – 219 tons (217 tons from nitric acid)
- Royster Clark Nitrogen, East Dubuque, Illinois – 120 tons (all nitric acid plant)
- Orica Nitrogen, Morris, Illinois – 36 tons (all nitric acid plant)
- BP Chemicals, Lima, Ohio – 842 tons (34 tons from nitric acid plant; 750 tons from polymer production at site)

The Royster Illinois and BP Ohio plants are NSPS sources, and are controlled to meet 3.0 and 1.4 lbs/ton permit requirements, respectively, using synthetic catalytic reduction (SCR). The Orica Plant pre-dates the NSPS and is subject to Illinois 5.5 lb/ton requirement. The Royster Ohio Plant has no applicable NOx limit on NOx emissions making it a possible candidate for a control requirement. However, we did not determine its current emission rate relative to production and do not know the extent actual NOx reductions are achievable. Most States have NOx limits that are similar to those in the MRPO States (3.0 to 5.8 lbs/ton of 100% acid). The most stringent requirement identified was 2.0 lbs/ton applicable in the Houston/Galveston/Beaumont Texas areas.

In addition to fertilizer production and process emissions from polymer (acrylonitrile) production at the BP facility, there are four other sources with greater than 25 tons of NOx emissions from chemical process operations:

- GE Plastics, Mt. Vernon, Indiana – 83 tons (polymer production)
- Koppers Industries, Cicero – 69 tons (cyclic organics production)
- Dow Chemical Company, Midland, Michigan – 56 tons (industrial chemicals)
- Noveon, Henry, Illinois – 41 tons (industrial chemicals)

These eight sources account for 82 percent of the total NOx emissions from chemical manufacturing processes. We were unable to identify specific control options that would be potentially applicable to these kinds of operations. We did not identify any state or local NOx limits that apply to NOx emissions from chemical manufacturing operations (other than generic requirements for conduct of RACT analyses). The add-on NOx control systems, such as SCR and SNCR, which have proven effective in controlling NOx combustion emissions, would likely provide some degree of control to chemical process NOx emissions. However, to determine the percent reduction potentially achievable and the cost effectiveness of these approaches would require case-by-case analysis because of the uniqueness of each chemical manufacturing facility.

SO2 Control Options

There are eight sources with greater than 25 tons per year of SO2 emissions coming from chemical process operations in the 2002 inventory:

- Noveon, Henry, Illinois – 3,304 tons (industrial and inorganic chemicals manufacturing process)
- E.I. DuPont Fort Hill Plant, North Bend, Ohio – 1,574 tons (industrial chemicals, sulfuric acid plant)
- Chemtrades Logistics, Cairo, Ohio – 836 tons – (inorganic chemicals, sulfuric acid plant)
- GE Plastics, Mt. Vernon, Indiana – 633 tons (polymer production, plastic manufacturing process)
- Marsulex, Oregon, Ohio – 557 tons (inorganic chemicals, 2 sulfuric acid plants)
- Williams Ethanol Services (now Aventine Renewable Energy), – 349 tons (industrial chemical, sulfurous acid plant)

- Stepan, Elwood, Illinois – 69 tons (industrial chemicals, sulfonation processes)
- BP Chemicals, Lima, Ohio – 25 tons (nitrogenous fertilizer, wastewater treatment)

The SO2 emissions from chemical manufacturing processes at these eight facilities account for 97% of the total non-fuel combustion SO2 emissions in the 2002 inventory for chemical manufacturing process operations.

The current SO2 emissions from the Noveon facility are expected to be reduced dramatically from the reported 2002 level to less than 100 tons per year. Noveon's Title V permit requires the installation of a sulfur recovery system by December 1, 2005.

The sulfuric acid plants operated at the above facilities are all in Ohio and are subject to widely varying facility specific emission limits in terms of lbs SO2 per ton of 100% acid: DuPont, 25; Chemtrades, 35; and Marsulex, 6.5. We do not know the actual emission rate for these plants in terms of the emission limit (lbs/ton) for 2002 or under current operating condition. The NSPS limit for new/modified sulfuric acid plants is 4 lbs/ton. Recent BACT determinations, mostly in Florida, require achievement of 3.2 to 4.0 lbs/ton levels. As previously indicated, the sulfuric acid plant limit in Michigan is 0.2 lbs/ton. Further control of SO2 emissions from these sulfuric acid plants and the other process sources may be feasible. However, facility specific data and analyses would be required.

VOC Control Options

There is a wide variety of sources contributing VOC chemical manufacturing process emissions. We expect a large number of these sources to be subject to MACT requirements. Applicability of the MACT is not straightforward. Without specific facility details on HAP usage and products manufactured considerable uncertainty exists as to what MACTs apply. Our analysis indicates approximately 40 to 50 percent of the chemical manufacturing process VOC emissions in the 2002 inventory are likely from facilities that have already controlled to meet MACT, and a similar amount from facilities whose control efforts to meet MACT will be seen in post-2002 inventory years. Thus, in the neighborhood of 80 percent of the VOC emissions in the 2002 inventory are from chemical manufacturing processes subject MACT control requirements. Identifying additional control opportunities beyond MACT requirements at these facilities will be difficult and require specific details on the operations at each facility.

The opportunity to further reduce VOC emissions from this category is likely with those sources that are major sources of VOCs but are not using HAPs to the point of triggering MACT applicability. In the chemical manufacturing process source listing based on SIC Code 28 there are at least three ethanol facilities that produce industrial grade alcohol (The majority of ethanol producers are included with the SIC Code 20 group, Food and Kindred Products). We do not believe these facilities will trigger MACT applicability based on ethanol production activities, although other activities at the sites that require the use of HAPs, e.g., for solvent extraction, might. These facilities and their 2002 chemical process emissions are:

- New Energy Corporation, South Bend, Indiana – 1,187 tons
- Archer Daniels Midland, Peoria, Illinois – 755 tons
- Adkins Energy, Lena, Illinois – 48 tons

The Archer Daniels Midland facility in Peoria was one of several ethanol fermentation operations that recently agreed to consent agreements with EPA over potential Clean Air Act violations. The control requirements included in the consent agreement are expected to reduce VOC emissions by 95 percent or more from the installation f thermal oxidizers. We could not determine whether similar control efforts are under consideration for the New Energy Corporation facility.

The source category with the largest number of chemical manufacturing facilities contributing VOC process emissions is the manufacturing of inks, coatings and adhesives. Forty-five of the 118 facilities identified with greater than 15 tons of chemical process VOC emissions in the 2002 inventory fall in this category. We expect many of these facilities to be subject to the Miscellaneous Coating Manufacture MACT with a December 2006 compliance date. The MACT requirements, where applicable, are more stringent than the current requirements for control of VOCs that apply to an estimated 19 of these facilities that are located in the target counties in three States where VOC regulations apply. The 2002 emissions for all but eight of these facilities are less than 50 tons; four facilities are over 100 tons. Options for further controlling this source category include applying the current coating manufacturing requirements to all States and statewide potentially covering an additional 26 facilities. The stringency of the requirements can also be increased, modeled after the MACT. However, with the large number of smaller sources in this category and with some facilities subject to the MACT, the additional benefits attainable are expected be small.

CO Control Options

We identified four large sources of CO emissions from chemical process operations in the 2002 MRPO inventory:

- Millennium Inorganic Chemicals, Ashtabula, Ohio – 37,216 tons
- Koppers Industries, Cicero, Illinois – 9,380 tons
- Millennium Inorganic Chemicals, Ashtabula, Ohio - 8,877 tons
- Reilly Industries, Indianapolis, Indiana – 2,783 tons

All other chemical process sources in the MRPO States combined contributed 2,248 tons.

Afterburners are effective at controlling CO emissions from operations such as iron and steel industry melting and petroleum cracking and coking operations. MRPO States currently require the use of afterburners for these types of operations. Illinois, in Subpart N, Section 216.362 also requires the chemical manufacturing process "polybasic organic acid partial oxidation manufacturing" to utilize afterburners under certain conditions. This requirement, however, does not appear to apply to the Koppers facility identified above based on review of its Title V permit.

Additional control of CO emissions from chemical manufacturing processes is achievable by adding targeted chemical manufacturing processes to the types of facilities subject to the MRPO States CO limitations. Afterburners will achieve 90 percent and higher conversion of carbon monoxide to carbon dioxide. Annualized costs are highly dependent on the need for supplemental fuel dictated by the volume of air to be treated and CO concentrations.

EMISSION REDUCTIONS, COST EFFECTIVENESS AND BASIS

We recommend that detailed case-by-case assessments of these facilities are needed to accurately identify candidate control measures, possible emission reductions, and costs for obtaining any additional emission reductions.

RULE DEVELOPMENT ISSUES

Case-by-case RACT determinations may be needed to obtain additional emission reductions from the non-fuel combustion processes in the chemical process industry.

Attachment 1
Applicable New Source Performance Standards for the Chemical Industry

Subpart	Standard	Applicability Date
G	*Nitric Acid* – NOx emission limit based on process throughput	8/17/1971
H	Sulfuric Acid – SO2 and acid mist emission limits based on process throughput [Also required States to regulate existing units for acid mist only]	8/17/1971
VV	*Synthetic Organic Chemical Manufacturing Industry* – VOC emissions from equipment leaks controlled by equipment specifications and leak detection and repair	1/05/1981
HHH	*Synthetic Fiber Manufacturing* – VOC emissions limits based on solvent throughput for acrylic and non-acrylic fibers production	11/23/1982
III	*Synthetic Organic Chemical Manufacturing Industry – Air Oxidation Processes* – VOC limits on releases from vents	10/21/1983
NNN	*Synthetic Organic Chemical Manufacturing Industry – Distillation Columns* – VOC limits on releases from vents	12/30/1983
Kb	*Storage of Volatile Organic Liquids* – VOC emissions controlled through equipment specifications	7/23/1984
DDD	*Polymer Manufacturing* – VOC emission limits based on process throughput by polymer chemistry and process section	1/10/1989
RRR	*Synthetic Organic Chemical Manufacturing Industry – Process Reactors* – VOC limits on releases from vents	6/29/1990

Attachment 2
RACT Guidance for VOC Emissions from Chemical Manufacturing Operations

Document	Control of Covered Process Operations	Date Published
CTG	VOC emissions Manufacture of Synthesized Pharmaceutical Products	12/1978
CTG (draft)	VOC Emissions from the Storage of Volatile Organic Liquids in Floating and Fixed Roof Tanks	8/1981
CTG	VOC Emissions Manufacture of High-Density Polyethylene, Polypropylene and Polystyrene Resins	11/1983
CTG	Fugitive VOC Emissions from Synthetic Organic Chemical Polymer and Resin Manufacturing Equipment	3/1984
CTG	VOC Emissions Synthetic Organic Chemical Manufacturing Industry – Air Oxidation Processes	12/1984
CTG	VOC Emissions Synthetic Organic Chemical Manufacturing Industry – Reactor Processes	11/1993
ACT	VOC Emissions from Industrial Wastewater Operations	1/1990
ACT	VOC Emissions from Organic Waste Process Vents	12/1990
ACT	NOx Emissions from Nitric and Adipic Acid Plants	1991
ACT	VOC Emissions from Batch Processes	2/1994
ACT	VOC Emissions from the Storage of Volatile Organic Liquids in Floating and Fixed Roof Tanks	2/1994

Attachment 3
Applicable NESHAPs for Various Chemical Manufacturing Processes

Subpart	Chemical Manufacturing Process Operations	Compliance Date
Compliance Dates prior to 2002		
Part 61 NESHAPs (pre-1990 CAA)		
E	Mercury - includes chlor-alkali plant requirements (late replaced by Part 63, Subpart IIIII)	10/14/1975
F	Vinyl Chloride – vinyl chloride, ethylene chloride, and polyvinyl chloride production	10/21/1976
J	Benzene Leaks	6/06/1984
V	VHAP Equipment Leaks (benzene, vinyl chloride)	9/14/1989
Y	Benzene Storage	9/14/1989
FF	Benzene Waste Operations	3/07/1990
BB	Benzene Transfer Operations	7/23/1991
Part 63 NESHAPs		
U	Polymers and Resins I Categories	7/31/1997
JJJ	Polymers and Resins IV Categories	7/31/1997
W	Polymers and Resins II Categories	3/03/1998
H/I	Hazardous Organic NESHAP (HON) for Chemical Process Operations – equipment leaks	5/12/1999
F/G	Hazardous Organic NESHAP (HON) for Chemical Process Operations – vents, storage, transfer operations, wastewater treatment	5/14/2001
F	Tetrahydrobenzaldehyde Manufacture	5/12/2001
GGG	Pharmaceuticals Production	9/21/2001
UUUU	Cellulose Products Manufacturing	6/11/2005
YY	Generic MACT – Production of 22 categories of materials not covered by other MACTs	7/12/2005
Compliance Dates 2002 and Later		
PPP	Polyether Polyols Production	6/01/2002
OOO	Polymers and Resins IIII Categories	01/20/2003
MMM	Pesticide Active Ingredient Production	12/23/2003
J	Polyvinyl Chloride and Copolymers Production	7/10/2005
NNNNN	Hydrochloric Acid Production	4/17/2006
FFFF	Miscellaneous Organic Chemical Manufacturing Facilities	11/10/2006
HHHHH	Miscellaneous Coating Manufacturing Facilities	12/11/2006
IIIII	Mercury Cell Chlor-Alkali Plants (replaces Mercury NESHAP requirements for chlor-alkali plants)	12/19/2006
EEEE	Organic Liquids Distribution	2/05/2007

Attachment 4
MACT Applicability to MRPO Chemical Manufacturing
Process VOC Sources and Emissions

Subpart	Source Category	Compliance Date	Number of Facilities	2002 VOC Process Emissions tons/year
Pre-2002 MACT Compliance Date Potential Sources				
U	Polymers and Resins I Categories	7/31/1997	3	476
JJJ	Polymers and Resins IV Categories	7/31/1997	3	682
W	Polymers and Resins II Categories	3/03/1998	1	20
F, G, H, I	Hazardous Organic NESHAP (HON)	5/14/2001	28	4,090
GGG	Pharmaceuticals Production	9/21/2001	9	1,374
TOTAL PRE-2002 MACT Compliance Date Sources			**44**	**6,642**
Post-2002 MACT Compliance Date Potential Sources				
OOO	Polymers and Resins IIII Categories	01/20/2003	4	919
J	Polyvinyl Chloride and Copolymers Production	7/10/2005	1	34
YY	Generic MACT	7/12/2005	2	1,033
FFFF	Miscellaneous Organic Chemical Manufacturing Facilities (MON)	11/10/2006	11	1,196
HHHHH	Miscellaneous Coating Manufacturing Facilities	12/11/2006	45	1,846
EEEE	Organic Liquids Distribution	2/05/2007	1	755
TOTAL POST-2002 MACT Compliance Date Sources			**64**	**5,783**
Non-MACT Applicability Process VOC Sources				
Chemical Process Source Not Subject to a MACT Standard			**10**	**1,966**
TOTAL Sources			**118**	**14,391**