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National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Category: Miscellaneous Metal Parts and Products Surface Coating Operations -- Technical Support Document

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National Emission Standards for

Hazardous Air Pollutants (NESHAP) for Source Category:

Miscellaneous Metal Parts and Products Surface Coating Operations -

Technical Support Document

Emission Standards Division

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

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ENVIRONMENTAL PROTECTION AGENCY

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP) FOR SOURCE CATEGORY: MISCELLANEOUS METAL PARTS AND PRODUCTS SURFACE COATING OPERATIONS - TECHNICAL SUPPORT DOCUMENT

1. These standards regulate organic hazardous air pollutant (HAP) emissions from the surface coating of miscellaneous metal parts and products. Only those miscellaneous metal parts and products surface coating operations that are part of major sources under section 112(d) of the Clean Air Act (Act) will be regulated.

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Purpose of Document

This Technical Support Document (TSD) provides background information to support the U.S. Environmental Protection Agency's proposal of national emission standards for hazardous air pollutants (NESHAP) for the miscellaneous metal parts and products (MMPP) surface coating source category. It consists of a series of technical memoranda that were prepared during the development of the proposed NESHAP. The memoranda that are presented here provide information on the approach utilized to develop the MACT floors, the model plants, the projected impacts of the proposed NESHAP, and a preliminary attempt to characterize the affected industries. The memoranda contained in this TSD are intended to present the primary technical findings and analyses that the Agency used in developing the rationale and decisions presented in the preamble to the proposed standards. Additional supporting information, including the economic impact analysis for these standards, is also provided in the project docket (Docket Number A-97-34).

MACT Approach for Miscellaneous Metal Parts and Products

November 27, 2001

MACT Approach for Miscellaneous Metal Parts and Products

This document presents recommendations for the regulatory approach for the miscellaneous metal parts and products (MMPP) surface coating source category, including the maximum achievable control technology (MACT) floor and potential subcategorization. The intent of regulation of facilities within the MMPP source category is to provide some level of emission reduction for a diverse collection of sources not otherwise regulated under specific coating MACT source categories. Because of the broad diversity of the products coated and the coating technologies and application methods employed, identification of the top performing facilities in this category is inherently difficult, especially since the control techniques that make these facilities top performers must be transferrable to other facilities in the category. Consequently, it has been necessary to employ innovation in developing a regulatory approach for this category that provides significant emission reductions while being applicable across the source category. The evolution of this innovative approach is explained below through discussions of the various approaches pursued, the problems encountered, and the reasons for their eventual abandonment. Finally, the document presents the project team's recommendations for MACT floor determination, subcategorization, existing source MACT, and new source MACT requirements that will be the framework for the eventual national emission standards for hazardous air pollutants (NESHAP) for surface coating of MMPP.

Background

The MMPP surface coating source category includes facilities that coat metal parts and products for which other specific surface coating MACT source categories are not applicable. This source category comprises numerous diverse operations that apply surface coatings to metal parts and products including, but not limited to, railroad cars, medical equipment, electronic equipment, wheelbarrows, magnet wire, heavy duty trucks, hardware, power tools, pipes, structural steel, sporting goods, lawn mowers, bicycles, auto parts, musical instruments, steel drums, army tanks, and industrial machinery. The MMPP category is truly a "catch-all" source category. Although the industries in this category generally fall into Standard Industrial Classification (SIC) codes 33 through 39, applicability cannot be stated in terms of SIC codes, since SIC codes do not identify which facilities perform surface coating. In addition, other coating MACT source categories (e.g., large appliances, metal furniture, metal cans, metal coils, etc.) may cover portions of many of the same SIC categories, overlapping with

MMPP. To complicate matters further, a wide variety of coating technologies and application methods are employed across all these industry segments. Nationwide, there are thousands of facilities involved in coating of MMPP, with an estimated 1500 or more being classified as major sources.

Add-on controls are relatively rare in the MMPP category. Only a handful of facilities employing some sort of control device were identified through the data gathering effort. Therefore, early on, it was anticipated that reduction of emissions of hazardous air pollutants (HAP) would be achieved primarily through the use of low-HAP materials.

There are no existing federal or State regulations requiring control of HAP emissions from this category. Reasonably available control technology (RACT) requirements have been in place for reduction of volatile organic compound (VOC) emissions from this category since the late 1970s, and may have resulted in some degree of coincidental reductions in HAP emissions. However, since the RACT requirements generally apply only to facilities located in ozone nonattainment areas, and many States have applicability thresholds for the RACT requirements, there are a great number of unregulated MMPP facilities remaining.

Data Gathering Efforts

Data gathering involved industry surveys, site visits, consultation with State regulatory agencies, and extensive interaction with stakeholder groups. Existing facility information available through the Aerometric Information Retrieval System (AIRS) and the Toxic Release Inventory (TRI) database was also useful in identifying facilities potentially falling within the MMPP source category.

In May 1998, a two-page screening survey was sent to approximately 3000 facilities tentatively identified as MMPP operations. The results of the screening survey were used to identify major and synthetic minor sources that perform coating operations on MMPP. This list was augmented with names of facilities provided by trade associations and resulted in a list of 312 corporate owners to whom a subsequent, more detailed survey was distributed.

The detailed survey was mailed in November 1998 to 312 corporations who operated major or synthetic minor sources performing coating operations within the MMPP industry. This data gathering resulted in responses from 639 major and synthetic minor sources. Of the facilities responding to the survey, only 332 submitted data of sufficient quality to perform some degree of analysis on coating material usage.

In order to gain a better understanding of the processes and considerations associated with surface coating of MMPP, the project team visited a number of manufacturing facilities. The team made an effort to visit facilities representing a variety of industry segments. The industries visited include heavy duty trucks, magnet wire, railroad cars, extruded aluminum, aerospace ground support equipment, motorcycles, rubber-to-metal parts, steel drum recycling, defense equipment, and steel joists. Reports documenting these visits will be part of the rule-making docket.

Previous Approaches Examined

The project team explored various approaches to determining the MACT floor and eventual regulatory strategy based on the available information. These are summarized below, along with the problems encountered and reasons for their eventual abandonment. From the outset, the industry stakeholders and the various facilities were grouped into industry "segments" based on the type of products coated. This was done to identify trends among the segments and to indicate whether one or more segments were influencing the floor determination. It also enabled the stakeholders to more easily check the results for their respective industry segments and give EPA feedback on the apparent accuracy of the information reported. Furthermore, it provided a method of organizing meetings and teleconferences for specific industry segments to provide more focused discussions.

Coating Scenario Approach

From the outset, the industry has stressed the importance of coating performance and how it affects the functionality and appearance of the parts and products coated. Specifically these considerations involve the specific performance characteristics (corrosion resistance, high gloss, abrasion resistance, heat resistance, etc.) of the coatings. The project team believed that a reasonable approach would be to organize the data by grouping similar coating operations based on the type of product being produced, coating performance characteristics, and application methods, collectively referred to as a "coating scenario."

Although this approach was popular with the stakeholders, the data reported in the survey was not sufficient for analysis on that basis. The survey results lacked specific data needed to link performance requirements and application method with specific coatings used. Consequently, the "coating scenario" approach was abandoned early on.

Detailed Coating Category Approach

One early attempt to minimize the effect of the extreme diversity of the MMPP source category was to explore the feasibility of a "coating category" approach. In the coating category approach, the specific industry and the part or product coated had no bearing on the analysis. For this analysis, coatings would be grouped according to their type (primers, color coats, top coats, clear coats, adhesives, etc.) along with the thinners and additives specified for their use. They could be further categorized by resin type (acrylic, alkyd, epoxy, polyurethane, etc.). Then, the HAP content "as applied" (i.e., after thinning and mixing of additives) could be determined and the average of the best coatings in each category could represent the MACT floor for that coating category. This approach is similar to the coating category approaches used in the Wood Furniture Manufacturing MACT and the Shipbuilding and Repair MACT source categories. However, it is more complex than those since the MMPP category comprises a vast array of coatings and is further broken down by resin type.

A serious drawback to the detailed coating category approach was that the analysis depended on high quality survey responses that would allow EPA to correlate coating type with resin type and HAP content for a multitude of combinations. The survey data did not provide the level of information required to enable the team to perform a meaningful analysis. Therefore, the detailed coating category approach was also abandoned.

"One Number" Approach Based on Facility Emissions

After abandoning the detailed coating category approach, the project team attempted an analysis of each facility based on emissions reported from the various coating operations. In many cases, respondents reported HAP emissions for individual coating lines and other emission points as requested. In many others, however, such estimates were not provided. In those cases, the project team used available survey information on materials used to derive emission estimates for the various emission points at the facility. The combined reported and derived emission estimates were used in conjunction with material data reported to develop a facility-wide ratio of HAP emitted per volume of solids used. This "one-number" approach accounted for all coating-related emissions (painting, mixing, thinning, cleaning, etc.) and eliminated the need to separately account for thinning and cleaning solvents, paint additives, etc.

Although the "one number" approach is relatively simple, allows flexibility, and accounts for emissions from all operations within the boundaries of the coating operation, the project team questioned the dependability of using a combination of bases to estimate emissions. In order to check for potential problems, the team examined the emissions and materials data reported for several facilities. In many cases, the emissions reported could not be reconciled with the HAP content of the materials used. In some cases, the emissions were reported to be greater than the total HAP content of all materials reported. In order to avoid basing the MACT floor and eventual regulations on questionable, unreconcilable data, the team decided to abandon the "emissions" approach and rely solely on materials reported to determine the overall "one number" ratio of pounds HAP to gallons solids.

"One Number" Approach Based on Material Usage

To avoid inconsistencies and to avoid data that could not be verified, the "one number" approach was modified to rely solely on materials used in the entire coating and coating-related operations at a facility. Using material data reported in the survey, the volatile HAP content and the solids content were both summed across all materials, and a ratio of pounds HAP used per gallon solids used was calculated for each facility. This number was modified to reflect any reductions from add-on controls or from waste materials collected and shipped offsite. It was anticipated that under the eventual regulation, solvents recycled onsite would not be subtracted, since they would be reused within the boundaries of the coating operation and would not affect the material balance. Recycled materials coming into the operation from offsite would be counted the same as new materials purchased.

Once the overall HAP to solids ratio was determined for each facility, the facilities were ranked in ascending order based on this ratio (i.e., ranked best performing to worst performing). The top 12% of these facilities were identified and their average ratio represented the MACT floor for the entire source category. A similar procedure was performed on the facilities in the 16 individual industry segments, to determine the effect certain segments may have on the floor calculation and to qualitatively assess how individual segments may be affected by eventual regulations based on the floor. The floor calculation based on all facilities (i.e., no segmentation) yielded an average ratio of less than 0.1 pound HAP per gallon solids. The floor calculations for individual segments yielded averages ranging from zero lb HAP/gal solids (auto parts, structural steel) to very high averages of 13 lb HAP/gal solids (magnet wire) and 58 lb HAP/gal solids (rubber to metal products). This variation from segment to segment indicated that a single floor, with no subcategorization, would not be representative of similar sources. A tentative decision was made to divide the source category into at least three subcategories (magnet wire, rubber to metal, and a "general use" subcategory for all other segments).

In order for the floor (and eventual HAP/solids limit in the regulation) to be calculated based on similar sources within a subcategory, the makeup of the subcategory must be homogeneous enough to enable the vast majority of facilities to come into compliance by implementing controls or using materials and processes similar to those of the top performing facilities. Too much diversity (with respect to products coated, coating performance requirements, etc.) within a subcategory results in a meaningless MACT floor, since the top performing facilities (and the specific products they coat) may not be representative of the subcategory. After careful review of the survey results from individual facilities and consultation with several stakeholder groups, the project team concluded that the diversity within the general use subcategory remained extremely broad, and that some other means of disaggregating the subcategory was needed.

Because of this lack of homogeneity, the project team attempted to regroup the products coated into a different set of potential subcategories. For example, instead of "automobile parts," "large trucks and buses," "recreational vehicles," "heavy equipment," and "rail transportation," the products within these industry segments were regrouped as "vehicle finishing," "vehicle body parts," "vehicle mechanical parts," "engines and engine parts,"and "electrical parts" in order to group more homogeneous products and performance requirements within the subcategories. After meeting with stakeholders associated with these existing segments and potential subcategories, the team concluded that the top performing facilities within the newly regrouped subcategories were still unrepresentative. In an effort to sort out the various products into meaningful groups, the project team shared a non-CBI version of the database with the auto industry at their request. The auto industry stakeholders themselves were unable to determine appropriate subcategories for their own products. After approximately eight months of wrestling with various permutations of the industry segments and subcategories without any resolution in sight, the project team abandoned this approach.

Simplified Coating Category Approach

In an attempt to mitigate the effects of diversity within the general use subcategory and to minimize the need for a large number of additional subcategories, the project team revisited the coating category approach. This simplified approach, although similar to the detailed coating category approach discussed earlier, was based on a limited number of coating types only (primers, color coats, top coats, clear coats, adhesives, etc.) without regard to resin type used (acrylics, alkyds, epoxies, etc.). The team felt that a limited number of coating categories could be identified in a similar fashion as the seven categories used in the Wood Furniture Manufacturing MACT. Of course, the number, description, and HAP limits of the MMPP categories would be dependent on the data analysis. One drawback was that there would be no quantitative limit on cleaning solvents used, leaving work practices as the only means of HAP reduction from cleaning. The coating category approach, though an attractive one due to its inherent simplicity, was abandoned because the survey responses failed to provide the information needed to link specific coatings with the types and amounts of thinning solvents used, thereby making calculation of "as applied" HAP content impossible. In fact, one stakeholders group, the heavy duty truck industry, trying to provide input to EPA regarding coating categories by analyzing survey responses from their own facilities could not determine "as applied" HAP content for the coatings they use. This helped confirm the futility of this approach.

Current Approach

Modified "One-Number" Approach Using State VOC Limits as Surrogate for HAP

After exhaustive analysis of the various strategies discussed above, the project team realized that some sort of innovative approach was needed to provide reasonable HAP emission reductions from the MMPP general use subcategory while maintaining a realistic expectation that the control measures imposed could, in fact, be applicable across this diverse collection of industries. Instead of determining the MACT floor and eventual HAP limits directly from facility emissions or materials information, the project team decided to use a combination of State VOC limits and locations of specific MMPP facilities to establish the floor and eventual HAP limits for most industries using the VOC limits as a modified surrogate. The MACT floor process and other features of this approach are discussed below.

MACT Floor Methodology and Determination for Most MMPP Industries ("General Use Subcategory")

The MMPP database contains 321 facilities (332 facilities with usable materials information, minus the 11 magnet wire and rubber-to-metal facilities) that are major sources or synthetic minor sources. Using information from the survey, the project team identified the State in which each facility is located. A review of existing State and local VOC requirements showed that the most stringent limits are those imposed by the various air quality management districts in California. For most coating types, this limit is 2.8 pounds VOC per gallon of coating (as applied), less water and exempt (non-VOC) solvents. The State of Louisiana imposes a VOC limit of 3.0 lb VOC/gal coating as applied, less water and exempt solvents. The remainder of the States require the 3.5 lb VOC/gal coating limit presented in the Federal Control Techniques Guidelines (CTG) document (Massachusetts and North Carolina express their limits as 6.7 lb VOC/gallon solids, which is equivalent to 3.5 lb VOC/gallon coating, less water and exempt solvents). State and local limits for specialty coatings are discussed later.

Knowing the State VOC limits and the locations of the MMPP facilities in the database, the project team was able to determine what the average State VOC limit would be for the top 12 percent of the industry. From a total of 321 facilities, 39 facilities comprised the top 12 percent as follows: California -- 9 facilities @ 2.8 lb/gal; Louisiana -- no facilities @ 3.0 lb/gal; and other States -- 30 facilities @ 3.5 lb/gal. Using these limits and the facilities subject to them, the average State limit for the top 12 percent was calculated to be 3.3 lb VOC/gal coating, less water and exempt solvents, or 6.0 lb VOC/gal solids. Similarly, the best controlled similar sources would be those subject to the California limit of 2.8 lb VOC/gal coating, or 4.5 lb VOC/gal solids.

In order to use the average VOC limit as a surrogate for HAP emissions, the project team developed a correction factor that relates VOC emissions to HAP emissions within the MMPP category. To develop this factor, the team calculated the average HAP to VOC ratio for all material usage reported by the facilities in the MMPP database. By dividing the total amount of HAP reported by the total amount of VOC reported across the entire MMPP category (except for magnet wire and rubber-to-metal products), the team determined that the average HAP to VOC ratio for all materials used is 43 percent.

Using this approach, the MACT floor for existing sources was determined by multiplying the average of the top 12 percent (6.0 lb VOC/gal solids) by the correction factor (43 lb HAP/100 lb VOC). This results in an existing source MACT floor of 2.6 lb HAP/gal solids. A similar calculation using the California limit results in a new source MACT floor of 1.9 lb HAP/gal solids. These floor determinations apply to most sources (now referred to as the "general use subcategory") within the MMPP category. The development of MACT floors for the "rubber-to-metal," and "magnet wire subcategories" is discussed later in this paper.

For most industries within the general use subcategory, the coating type used will be defined as "general use coatings" and will be represented by the MACT floor values described above. Certain specialty coatings that are used by some facilities within the general use subcategory have been identified as "high performance coatings". These coatings are not used in any one industry exclusively, but may be used in varying amounts in many different industries. This coating type includes coatings used in severe conditions such as high temperatures or exposure to a variety of harsh chemicals. Certain architectural coatings are also included in this coating type. The proposed rule contains specific definitions that must be met for coatings to be considered high performance coatings. The new and existing source MACT floor for these types of coatings was developed from California's 6.20 lbs VOC per gallon of coating provisions for specialty coatings. This limit was used for both the new and existing source MACT floors because it is the most stringent limit found specifically for these coating types and because it is currently applicable to facilities in California. The HAP to VOC ratio of these coatings, based on information received from industry, is on average about 70 percent. The MACT floor for these coatings is, therefore, 27.54 lbs HAP/gal coating solids (3.30 kg HAP/liter coating solids).

The rubber-to-metal products industry segment is considered as a separate subcategory because acceptable low HAP coatings have not been demonstrated for many applications within this industry. Because there are less than 30 facilities within this subcategory, the MACT floor was based on data from the 5 best performing facilities for which we have data. An analysis of the HAP data provided by the industry in the survey responses lead to the development of a new source floor of 6.80 lbs HAP/gal coating solids (0.82 kg HAP/liter coating solids) and an existing source floor of 37.70 lbs HAP/gal coating solids (4.50 kg HAP/liter coating solids).

Magnet wire coating is also considered as a separate subcategory for which specific MACT floor values were determined. The magnet wire industry is unique within the source category because of the design of the curing ovens used in the industry. These ovens are designed to utilize volatile organics in the exhaust gas stream as a supplemental fuel. They typically operate at temperatures that achieve high volatile organic destruction efficiencies. Based on the HAP data provided by the best performing 5 of the 7 facilities for which we have data (there are less than 30 facilities in the subcategory), the new source MACT floor is 0.44 lbs HAP/gal coating solids (0.05 kg HAP/liter coating solids). The MACT floor for existing facilities is 1.00 lbs HAP/gal coating solids (0.12 kg HAP/liter coating solids). These values include a factor of 0.27 lbs HAP/gal coating solids (0.03 kg HAP/liter coating solids) to account for emissions from cleaning operations. This factor was necessary because the emissions from most cleaning operations that employ solvents containing HAP are not captured and controlled by the ovens.

Compliance Demonstration and Averaging Period

The method of demonstrating compliance with the MMPP NESHAP will be based on quantity of materials used (documented by usage records for each material used in the coating operation), combined with HAP and solids content data for each material used (documented by product data sheets or other formulation information). Of course, standard test methods could be used to verify HAP and solids content of materials for enforcement purposes.

Material usage and coating facility activities could fluctuate from week to week and from month to month. For example, a facility could coat varying types of products, shut down for cleaning from time to time, and use coatings and solvents of varying types and HAP content, all of which could result in production-related and/or seasonal fluctuations in material usage. Therefore, the project team realized the need for an extended averaging period to account for these fluctuations. A 12-month rolling average (i.e., compliance determined for the most recent 12 calendar months) would be long enough to accommodate seasonal as well as operational fluctuations.

Credit for Reductions Due to the Use of Add-on Controls

In calculating the overall ratio of pounds HAP to gallons of solids for compliance determination, allowance must be made for HAP emission reductions (i.e., HAP used at the facility but not emitted) achieved by add-on control devices. In some cases, facilities have existing add-on controls in place; in others, the need for very high-HAP coatings and solvents may make addition of new controls for at least part of the coating operation an acceptable option. In those cases, the facility would have to track coating and solvent usage within the facility to determine what portion of the materials used were routed to the controlled portion of the facility. In addition, the control efficiency of the device would have to be documented. The amount of HAP to be subtracted from overall usage would be calculated by taking into account the amount of HAP used in the controlled operation, capture efficiency, and efficiency of the control device. The facility would be responsible for documenting this calculation using procedures presented in the regulation.

Credit for Waste and Recycled Solvents

In addition to credit for add-on control devices, any documented amount of HAP in solvents collected for treatment or disposal at a hazardous waste treatment, storage, and disposal facility (i.e., HAP that was used at the facility but not emitted), should also be subtracted from the overall HAP usage figure. Under the Resource Conservation and Recovery Act (RCRA), hazardous waste materials being shipped must be manifested. Therefore, the RCRA manifest should provide the required information for accounting for HAP materials shipped offsite and subtracted from overall usage. Solvents reclaimed and reused onsite would be treated similarly.

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Development of Model Plants for the Miscellaneous Metal Parts and Products NESHAP

Development of Model Plants for the Miscellaneous Metal Parts and Products NESHAP

Five model plants were developed to represent the facilities in the database that have been projected to be potential major sources, and thus, subject to this rulemaking. The following paragraphs present the methodology used to develop the model plants and the rationale for the assumptions that were made. A model plant does not represent any single actual facility, but rather it represents a range of facilities with similar characteristics that may be impacted by a standard. Each model plant is characterized in terms of facility size and other parameters that affect the estimates of emissions, control costs, and secondary environmental impacts. The model plants developed for this source category incorporate the baseline characteristics presented in this memorandum.

EXISTING SOURCES

The "final" database from which model plants and estimated impacts were determined contains data from 332 facilities. Eleven of these facilities are in the magnet wire and rubber-metal industry segments and were not included in the analysis because they have their own emission rates and corresponding limits. Data from the remaining 321 facilities were grouped into 5 size ranges, with size measured by coating solids usage. Each size range is represented by a "model plant", designated as Model Plants 1 through 5. The data that were used for model plant development is presented in five attachments to this memo, one attachment for each model plant. To estimate the nationwide impacts of the NESHAP, the projected impacts on each of the model plants were scaled up to the estimated number of affected facilities nationwide. It is currently estimated that there are 1500 existing, major source facilities nationwide. The following table presents a breakdown of the 1500 facilities into the 5 model plant size categories.

Table 1. Model Plant Size Ranges

Model Plant	Size Range (gallons of solids)	No. of Database Facilities	% of Database Facilities	No. of Facilities Nationwide (est. total of 1,500)
1	< 5,000	105	33	495
2	5,000 - 15,000	74	23	345
3	15,001 - 35,000	81	25	375
4	35,001 - 75,000	44	14	210
5	> 75,000	17	5	75
		321	100	1,500

Many facilities within the source category are currently operating at HAP emission levels that comply with the draft emission limitation of 0.31 Kg HAP/L solids (2.6 lbs HAP/gallon of solids). These facilities would not be required to reduce their HAP emission levels. (Twelve synthetic minor facilities that do not meet the emission limit were assumed to be complying facilities because they would not have to reduce their emissions. These facilities are indicated in the attachments by shaded cells.) Therefore, the number and percentage of the facilities within each size range that would not comply with the draft standards for existing sources without emission reductions was determined. Model plant parameters related to material usage and HAP content were determined using data from only the non-complying segment of the database population. Parameter values from all non-complying facilities within each size range were averaged to determine the model plant value.

To estimate nationwide impacts, it was assumed that the population of facilities in the database (321 facilities) was a representative sample of the nationwide population (estimated to be 1,500 facilities) . Therefore, about 18 percent of the facilities nationwide would be represented by model plant 1 (33% are in that size range and 53.3% are non-complying). With 1,500 existing facilities in the source category, 264 (1,500*.33*.533 = 264) would be represented by model plant 1 and the impacts determined for it.

Table 2. Non-complying Facilities for Each Model Plant

Model Plant	# of Database Facilities That Are Non-complying	% of Database Facilities That Are Non-complying	No. of Facilities Nationwide (est. total of 1,500)	# of Non-complying Facilities Nationwide
1	56	53.3	495	264
2	47	63.5	345	219
3	35	43.2	375	162
4	16	36.4	210	76
5	3	17.6	75	13
	157	48.9	1,500	734

Table 3 presents the baseline, or "uncontrolled" HAP emission levels for each of the model plants, and the extrapolated nationwide levels. These baseline HAP emission levels will be used to determine the potential HAP emission reductions achieved by the NESHAP. Refer to the "HAP Emission Reductions" memo (presented on page 5-1 of this TSD) for details concerning how these values were calculated.

Table 3. Existing Source Nationwide Baseline Emissions by Model Plant

Model Plant	Baseline Emissions From Database Facilities (lbs)	Number of Database Facilities	Baseline Emissions Per Database Facility (lbs)	Nationwide Population of Facilities	Nationwide Baseline Emissions (lbs HAP)
1	1,600,527	105	15,243	495	7,545,342
2	4,481,434	74	60,560	345	20,893,172
3	5,468,793	81	67,516	375	25,318,486
4	6,988,913	44	158,839	210	33,356,176
5	4,674,992	17	275,000	75	20,624,965
				1,500	107,738,140

NEW SOURCES

To project impacts from the estimated 45 new facilities that become affected sources each year, the same method of distributing the facilities by model plant sizes and baseline compliant status was used. The assumption was made that, in the absence of the NESHAP, new sources would follow the same trends relative to size and HAP emission levels as the existing facilities in the database. Tables 4 and 5 present the projected number of new facilities by model plant size and the expected number of these facilities that would be “non-complying” in the absence of the NESHAP. Impacts for new sources were based on the projected number of facilities presented in tables 4 and 5.

Table 4. Distribution of New Sources By Model Plant

Model Plant	Size Range (gallons of solids)	No. of Database Facilities	% of Database Facilities	No. of New Facilities Nationwide (est. total of 45)
1	< 5,000	105	33	15
2	5,000 - 15,000	74	23	11
3	15,001 - 35,000	81	25	11
4	35,001 - 75,000	44	14	6
5	> 75,000	17	5	2
		321	100	45

Table 5. Distribution of "Non-Complying" New Facilities By Model Plant

Model Plant	# of Database Facilities That Are Non-complying	% of Database Facilities That Are Non-complying	No. of New Facilities Nationwide (est. total of 45)	# of Non-complying Facilities Nationwide

1	65	61.9	15	9
2	54	73.0	11	8
3	42	51.9	11	6
4	20	45.5	6	3
5	3	17.6	2	0
	184	57.3	45	26

ATTACHMENT 1

DATA FOR MODEL PLANT NUMBER 1

Facility ID	Coatings		Adhesives		Other Materials		Solvents	Waste Coating	Waste Solvent	HAP
	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	HAP (lbs)	HAP (lbs)	Controlled (lbs)
MMPP-2120	0	690			0	20		0		
MMPP-0026	0	860								
MMPP-2160	0	1,738			0	0	0	0	0	
MMPP-0029	0	1,923								
MMPP-2224	0	2,819			0	0		0		
MMPP-2122	0	3,407			0	15				
MMPP-1092	0	913	25	65			0		0	
MMPP-0408	258	2,582	18	2,323			177		0	
MMPP-2147	250	2,161								
MMPP-1411	102	717								
MMPP-0542	4	1,522			108	747	374	0	0	
MMPP-2114	874	2,004								
MMPP-2124	707	349			0	1,335	138			
MMPP-2299	1,774	3,374								
MMPP-0139	2,002	3,758								
MMPP-2115	97	910	702	472			0	60		
MMPP-2330	188	87	310	659			0		0	
MMPP-1525	693	2,197			0	223	1,003			
MMPP-1133	215	1,553					939	0	0	
MMPP-0577	3,430	4,586						0		

MMPP-2118	1,287	1,601						41		
MMPP-0083	40	45								
MMPP-0495	4,473	2,583						1,786		
MMPP-0628	2,575	1,420						431		
MMPP-1005	1,422	1,883					1,452			
MMPP-2253	5,218	2,571			0	570	0		0	
MMPP-0609	8,345	4,987								
MMPP-1399	5,616	4,694					2,381			
MMPP-0282	7,198	4,189					0			
MMPP-2140	85	48								
MMPP-0072	69	37								
MMPP-1068	3,650	4,064					4,410	157	0	
MMPP-2100	5,175	2,612								
MMPP-0287	7,660	3,812			0			61		
MMPP-1396	7,541	3,630						0		
MMPP-0456	436	230					122	52	15	

Facility ID	Net HAPs (lbs)	Gross Solids (gal)	Facility Ratio (lbs HAP/gal solids)	Baseline Emissions	**MACT** 2.6	EMISSION REDUCTIONS	**MACT** 1.9	EMISSION REDUCTIONS
MMPP-2120	0	710	0.000	-	0	0	-	
MMPP-0026	0	860	0.000	-	0	0	-	
MMPP-2160	0	1,738	0.000	-	0	0	-	
MMPP-0029	0	1,923	0.000	-	0	0	-	
MMPP-2224	0	2,819	0.000	-	0	0	-	0
MMPP-2122	0	3,422	0.000	-	0	0	-	0
MMPP-1092	25	978	0.026	25	25	0	25	0
MMPP-0408	453	4,905	0.092	453	453	0	453	0
MMPP-2147	250	2,161	0.116	250	250	0	250	0
MMPP-1411	102	717	0.142	102	102	0	102	0
MMPP-0542	486	2,269	0.214	486	486	0	486	0
MMPP-2114	874	2,004	0.436	874	874	0	874	0
MMPP-2124	845	1,684	0.501	845	845	0	845	0
MMPP-2299	1,774	3,374	0.526	1,774	1,774	0	1,774	0
MMPP-0139	2,002	3,758	0.533	2,002	2,002	0	2,002	0
MMPP-2115	738	1,382	0.534	738	738	0	738	0
MMPP-2330	498	746	0.667	498	498	0	498	0
MMPP-1525	1,696	2,420	0.701	1,696	1,696	0	1,696	0
MMPP-1133	1,154	1,553	0.743	1,154	1,154	0	1,154	0
MMPP-0577	3,430	4,586	0.748	3,430	3,430	0	3,430	0

MMPP-2118	1,246	1,601	0.778	1,246	1,246	0	1,246	0
MMPP-0083	40	45	0.889	40	40	0	40	0
MMPP-0495	2,686	2,583	1.040	2,686	2,686	0	2,686	0
MMPP-0628	2,144	1,420	1.510	2,144	2,144	0	2,144	0
MMPP-1005	2,874	1,883	1.526	2,874	2,874	0	2,874	0
MMPP-2253	5,218	3,141	1.662	5,218	5,218	0	5,218	0
MMPP-0609	8,345	4,987	1.673	8,345	8,345	0	8,345	0
MMPP-1399	7,997	4,694	1.704	7,997	7,997	0	7,997	0
MMPP-0282	7,198	4,189	1.719	7,198	7,198	0	7,198	0
MMPP-2140	85	48	1.771	85	85	0	85	0
MMPP-0072	69	37	1.865	69	69	0	69	0
MMPP-1068	7,903	4,064	1.945	7,903	7,903	0	7,721	182
MMPP-2100	5,175	2,612	1.981	5,175	5,175	0	4,963	211
MMPP-0287	7,599	3,812	1.993	7,599	7,599	0	7,243	356
MMPP-1396	7,541	3,630	2.077	7,541	7,541	0	6,897	644
MMPP-0456	491	230	2.133	491	491	0	437	54

Facility ID	Coatings		Adhesives		Other Materials		Solvents	Waste Coating	Waste Solvent	HAP
	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	HAP (lbs)	HAP (lbs)	Controlled (lbs)
MMPP-2254	1,140	529								
MMPP-2252	3,982	1,363			0	479	0		0	
MMPP-0599	4,030	3,114	940	893			4,442	714		
MMPP-0658	9,286	4,091								
MMPP-1491	351	461					869		19	
MMPP-2283	87	32								
MMPP-0351	714	215	0	11						
MMPP-2284	198	60								
MMPP-2257	106	45	828	210			0	35	0	
MMPP-1499	12,803	4,275			0		3,814	274	95	
MMPP-2134	108	26					0	0	0	
MMPP-2324	172	41								
MMPP-1424	25,742	4,016					1,351	10,224	0	
MMPP-2323	5,513	3,258			0	983	15,263	0	2,745	
MMPP-2181	5,139	796						1,710		
MMPP-1378	8,913	2,690					3,286	365	0	
MMPP-2280	68	27					54			
MMPP-0337	22,285	4,461								
MMPP-0430	585	111								
MMPP-2144	11,605	2,166						0		

MMPP-2254	1,140	529								
MMPP-2250	5,726	4,228			0	586	20,733		0	
MMPP-2146	3,777	812			0	50	8,772	0	7,750	
MMPP-1082	26,721	4,785								
MMPP-0158	9,245	2,290	4,197	98			3,086	2,012	386	
MMPP-1235	11,732	4,581					16,320			
MMPP-1305	5,298	1,395			16	0	4,336			776
MMPP-0243	27,773	4,500					1,295	0	0	
MMPP-2249	24,073	3,712					0			
MMPP-2216	15,996	2,895			705		2,422	0	206	
MMPP-0788	1,177	1,162	11,083	660			0		0	
MMPP-0821	17,692	3,165					6,029			
MMPP-2208	7,144	1,272			0		2,541	0	0	
MMPP-0202	4,492	967					3,198	0	0	
MMPP-2217	10,719	1,012			1,800	0	3,021	7,098	391	
MMPP-1353	716	462			0		2,967	0	0	
MMPP-1062	4,554	658					964	0	232	

Facility ID	Net HAPs (lbs)	Gross Solids (gal)	Facility Ratio (lbs HAP/gal solids)	Baseline Emissions	**MACT** 2.6	EMISSION REDUCTIONS	**MACT** 1.9	EMISSION REDUCTIONS
MMPP-2254	1,140	529	2.156	1,140	1,140	0	1,005	135
MMPP-2252	3,982	1,841	2.163	3,982	3,982	0	3,498	484
MMPP-0599	8,699	4,006	2.171	8,699	8,699	0	7,612	1,087
MMPP-0658	9,286	4,091	2.270	9,286	9,286	0	7,772	1,514
MMPP-1491	1,201	461	2.607	1,201	1,198	3	876	326
MMPP-2283	87	32	2.719	87	83	4	61	26
MMPP-0351	714	225	3.170	714	586	128	428	286
MMPP-2284	198	60	3.300	198	156	42	114	84
MMPP-2257	899	255	3.528	899	899	0	899	0
MMPP-1499	16,247	4,275	3.801	16,247	11,114	5,133	8,122	8,125
MMPP-2134	108	26	4.154	108	68	40	49	59
MMPP-2324	172	41	4.195	172	107	65	78	94
MMPP-1424	16,868	4,016	4.201	16,868	10,441	6,428	7,630	9,239
MMPP-2323	18,032	4,242	4.251	18,032	18,032	0	18,032	0
MMPP-2181	3,429	796	4.309	3,429	2,069	1,360	1,512	1,917
MMPP-1378	11,835	2,690	4.400	11,835	6,994	4,841	5,111	6,724
MMPP-2280	122	27	4.519	122	70	52	51	71
MMPP-0337	22,285	4,461	4.995	22,285	11,600	10,685	8,477	13,808
MMPP-0430	585	111	5.257	585	289	296	211	374
MMPP-2144	11,605	2,166	5.358	11,605	5,631	5,973	4,115	7,490

MMPP-2250	26,458	4,814	5.496	26,458	12,517	13,941	9,147	17,311
MMPP-2146	4,800	862	5.567	4,800	2,242	2,558	1,638	3,162
MMPP-1082	26,721	4,785	5.584	26,721	12,442	14,279	9,092	17,629
MMPP-0158	14,129	2,388	5.917	14,129	6,209	7,920	4,537	9,592
MMPP-1235	28,052	4,581	6.123	28,052	11,911	16,140	8,704	19,347
MMPP-1305	8,875	1,395	6.363	8,875	3,626	5,249	2,650	6,225
MMPP-0243	29,068	4,500	6.460	29,068	11,700	17,368	8,550	20,518
MMPP-2249	24,073	3,712	6.486	24,073	9,650	14,423	7,052	17,021
MMPP-2216	18,917	2,895	6.534	18,917	7,527	11,390	5,501	13,416
MMPP-0788	12,260	1,822	6.729	12,260	4,737	7,523	3,461	8,798
MMPP-0821	23,720	3,165	7.495	23,720	23,720	0	23,720	0
MMPP-2208	9,685	1,272	7.615	9,685	9,685	0	9,685	0
MMPP-0202	7,690	967	7.951	7,690	2,515	5,175	1,838	5,852
MMPP-2217	8,051	1,012	7.955	8,051	8,051	0	8,051	0
MMPP-1353	3,684	462	7.978	3,684	3,684	0	3,684	0
MMPP-1062	5,286	658	8.035	5,286	5,286	0	5,286	0

Facility ID	Coatings		Adhesives		Other Materials		Solvents	Waste Coating	Waste Solvent	HAP
	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	HAP (lbs)	HAP (lbs)	Controlled (lbs)
MMPP-2274	10,714	1,210						443		
MMPP-0831	14,075	4,383					23,384			
MMPP-1028	23,697	3,920					10,006			
MMPP-2315	8,391	488			0	811	23,011	0	20,211	
MMPP-0187	14,273	4,401					29,704	3,631	799	
MMPP-0511	34,961	4,064					3,001		122	
MMPP-0501	1,911	1,255					9,918			
MMPP-0475	25,647	2,763					4,122	0	421	
MMPP-1496	14,719	1,295					2,437	2,675		
MMPP-0444	50,061	4,419	1,986	205						
MMPP-0044	1,236	938					19,310	0	8,656	
MMPP-0780	26,085	1,979	3,684	81			2,161	3,036	1,515	
MMPP-0513	38	10					162	0	0	60
MMPP-0499	24,586	2,411					9,216			
MMPP-0730	13,351	3,754					43,442		2,542	
MMPP-1449	12,581	1,882					17,901	1,969	265	
MMPP-0182	5,969	1,023	10,700	90			51		0	
MMPP-0479	31,884	2,351	6,004	2,164	72	1	34,207	0	1,248	
MMPP-1426	9,652	1,487					21,679	2,884	4,301	
MMPP-0347	19,014	1,224			507		618		152	

MMPP-0222	30,571	2,186					54,747	0	40,852	
MMPP-2138	9,720	425								862
MMPP-0356	625	506					14,000	0	3,763	
MMPP-2191	2,154	767			18,052	0	706	1,172	396	
MMPP-1471	11,045	1,280					23,097	0	258	
MMPP-0123	22,817	3,032			0	70	68,197			
MMPP-1320	826	238	10	15	228		7,815	0	0	
MMPP-0346	30,130	822			0		0		0	
MMPP-2219	7,958	669					20,966		2,968	
MMPP-1693	941	271	6,000	181			10,774			
MMPP-2314	17,933	437	1,464	145			70,360	1,398	18,024	27,563
MMPP-0774	48,783	2,371					210,868		48,022	
MMPP-1592	3,214	281	38	36	6,605		20,063	0		
TOTALS	800,783	119,118	45,994	3,897	27,985	2,501	856,242	38,925	166,339	29,260
AVERAGES	12,320	1,833	708	60	431	38	13,173	599	2,559	450

Facility ID	Net HAPs (lbs)	Gross Solids (gal)	Facility Ratio (lbs HAP/gal solids)	Baseline Emissions	**MACT** 2.6	EMISSION REDUCTIONS	**MACT** 1.9	EMISSION REDUCTIONS
MMPP-2274	10,272	1,210	8.489	10,272	3,146	7,126	2,299	7,973
MMPP-0831	37,459	4,383	8.546	37,459	11,397	26,062	8,329	29,130
MMPP-1028	33,703	3,920	8.598	33,703	10,191	23,511	7,447	26,255
MMPP-2315	11,191	1,299	8.613	11,191	3,378	7,813	2,469	8,722
MMPP-0187	39,548	4,401	8.985	39,548	11,443	28,104	8,362	31,185
MMPP-0511	37,839	4,064	9.312	37,839	37,839	0	37,839	0
MMPP-0501	11,829	1,255	9.425	11,829	3,263	8,566	2,384	9,444
MMPP-0475	29,349	2,763	10.623	29,349	7,183	22,166	5,249	24,099
MMPP-1496	14,482	1,295	11.181	14,482	3,367	11,114	2,461	12,021
MMPP-0444	52,047	4,624	11.256	52,047	12,023	40,025	8,786	43,261
MMPP-0044	11,890	938	12.673	11,890	2,439	9,451	1,783	10,107
MMPP-0780	27,379	2,060	13.291	27,379	5,356	22,024	3,914	23,466
MMPP-0513	140	10	14.000	140	26	114	19	121
MMPP-0499	33,802	2,411	14.018	33,802	6,269	27,533	4,581	29,220
MMPP-0730	54,250	3,754	14.452	54,250	9,760	44,491	7,132	47,118
MMPP-1449	28,248	1,882	15.010	28,248	4,893	23,355	3,576	24,672
MMPP-0182	16,720	1,114	15.012	16,720	2,896	13,824	2,116	14,604
MMPP-0479	70,918	4,516	15.703	70,918	11,742	59,176	8,581	62,338
MMPP-1426	24,146	1,487	16.235	24,146	3,867	20,279	2,826	21,320
MMPP-0347	19,987	1,224	16.326	19,987	3,183	16,804	2,326	17,661

MMPP-0222	44,466	2,186	20.337	44,466	44,466	0	44,466
MMPP-2138	8,858	425	20.828	8,858	1,106	7,752	808
MMPP-0356	10,862	506	21.486	10,862	1,314	9,548	961
MMPP-2191	19,344	767	25.236	19,344	1,993	17,351	1,456
MMPP-1471	33,884	1,280	26.463	33,884	3,329	30,555	2,433
MMPP-0123	91,014	3,102	29.339	91,014	8,066	82,948	5,894
MMPP-1320	8,879	253	35.052	8,879	659	8,221	481
MMPP-0346	30,130	822	36.638	30,130	2,138	27,992	1,562
MMPP-2219	25,956	669	38.817	25,956	1,739	24,217	1,270
MMPP-1693	17,715	452	39.191	17,715	1,175	16,540	859
MMPP-2314	42,772	582	73.519	42,772	1,513	41,259	1,105
MMPP-0774	211,628	2,371	89.267	211,628	6,164	205,465	4,504
MMPP-1592	29,920	318	94.235	29,920	826	29,095	603
TOTALS	1,496,481	125,516	11.923	1,600,527	537,031	1,063,495	456,624
AVERAGES	23,023	1,931	11.923	15,243		18,991	4,349

ATTACHMENT 2

DATA FOR MODEL PLANT NUMBER 2

Facility ID	Coatings		Adhesives		Other Materials		Solvents	Waste Coating	Waste Solvent	HAP
	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	HAP (lbs)	HAP (lbs)	Controlled (lbs)
MMPP-2303	0	6,188						0		
MMPP-0558	0	9,191								
MMPP-0718	0	9,652					0			
MMPP-0508	0	13,557								
MMPP-1387	363	8,004			0	0		1		
MMPP-0191	1,613	14,905								
MMPP-2241	21,090	11,209						18,433		
MMPP-2242	2,405	9,038			0		801			
MMPP-2209	0	10,738			504	239	3,631			
MMPP-2113	1,325	11,582	0	3,290			7,645	0	7	
MMPP-2275	2,650	14,738					8,400	0		
MMPP-1175	18,545	6,170					58,795	13,830	58,643	
MMPP-1560	4,691	11,179			92	0	4,522	0	0	
MMPP-2329	3,163	5,053	4,144	2,789			1,311	1,887	0	
MMPP-0002	5,524	6,228								
MMPP-2247	6,545	5,281			0	57		858		
MMPP-0460	5,154	10,337					11,220	896	0	
MMPP-0330	13,111	9,537			0	195	3,920	44	1,661	
MMPP-0744	9,566	5,808								
MMPP-0016	8,999	8,755					13,174	1,369	2,376	
MMPP-2260	12,200	14,143					21,777	256	3,492	
MMPP-1266	12,968	8,042					6,213	0	1,263	
MMPP-2211	15,897	6,939			0	0				
MMPP-0666	9,516	8,884					27,977	735	15,508	
MMPP-0979	32,432	13,295								
MMPP-2317	15,279	6,206					337	203		
MMPP-0171	9,048	9,529					15,825	0	0	
MMPP-2334	37,813	14,385								
MMPP-2328	8,604	3,699	10,859	4,670	44	0	14,753		11,849	
MMPP-2207	25,327	8,645			0	4,394	11,761	0	1,612	
MMPP-2171	3,187	9,209			22,031	0				
MMPP-0438	35,086	12,336								
MMPP-2193	19,340	5,922			344	0	276	2,973	72	
MMPP-0583	44,275	12,984								
MMPP-0963	128,224	14,693					42,642	100,496	17,793	
MMPP-2251	45,124	12,348					0			

Facility ID	Net HAPs (lbs)	Gross Solids (gal)	Facility Ratio (lbs HAP/gal solids)	Baseline Emissions	**MACT** 2.6	EMISSION REDUCTIONS	**MACT** 1.9	EMISSION REDUCTIONS
MMPP-2303	0	6,188	0.000	-	0	0	-	
MMPP-0558	0	9,191	0.000	-	0	0	-	
MMPP-0718	0	9,652	0.000	-	0	0	-	
MMPP-0508	0	13,557	0.000	-	0	0	-	
MMPP-1387	362	8,004	0.045	362	362	0	362	0
MMPP-0191	1,613	14,905	0.108	1,613	1,613	0	1,613	0
MMPP-2241	2,657	11,209	0.237	2,657	2,657	0	2,657	0
MMPP-2242	3,206	9,038	0.355	3,206	3,206	0	3,206	0
MMPP-2209	4,135	10,977	0.377	4,135	4,135	0	4,135	0
MMPP-2113	8,963	14,872	0.603	8,963	8,963	0	8,963	0
MMPP-2275	11,050	14,738	0.750	11,050	11,050	0	11,050	0
MMPP-1175	4,866	6,170	0.789	4,866	4,866	0	4,866	0
MMPP-1560	9,305	11,179	0.832	9,305	9,305	0	9,305	0
MMPP-2329	6,731	7,842	0.858	6,731	6,731	0	6,731	0
MMPP-0002	5,524	6,228	0.887	5,524	5,524	0	5,524	0
MMPP-2247	5,688	5,339	1.065	5,688	5,688	0	5,688	0
MMPP-0460	15,478	10,337	1.497	15,478	15,478	0	15,478	0
MMPP-0330	15,326	9,732	1.575	15,326	15,326	0	15,326	0
MMPP-0744	9,566	5,808	1.647	9,566	9,566	0	9,566	0
MMPP-0016	18,429	8,755	2.105	18,429	18,429	0	16,635	1,794
MMPP-2260	30,229	14,143	2.137	30,229	30,229	0	26,872	3,358
MMPP-1266	17,919	8,042	2.228	17,919	17,919	0	15,280	2,639
MMPP-2211	15,897	6,939	2.291	15,897	15,897	0	13,184	2,713
MMPP-0666	21,250	8,884	2.392	21,250	21,250	0	16,879	4,371
MMPP-0979	32,432	13,295	2.439	32,432	32,432	0	25,261	7,171
MMPP-2317	15,413	6,206	2.484	15,413	15,413	0	11,791	3,622
MMPP-0171	24,873	9,529	2.610	24,873	24,776	97	18,105	6,767
MMPP-2334	37,813	14,385	2.629	37,813	37,402	411	27,332	10,481
MMPP-2328	22,411	8,369	2.678	22,411	21,759	652	15,901	6,510
MMPP-2207	35,477	13,039	2.721	35,477	35,477	0	35,477	0
MMPP-2171	25,218	9,209	2.738	25,218	23,943	1,275	17,497	7,721
MMPP-0438	35,086	12,336	2.844	35,086	32,073	3,013	23,438	11,648
MMPP-2193	16,916	5,922	2.856	16,916	15,398	1,518	11,252	5,663
MMPP-0583	44,275	12,984	3.410	44,275	33,758	10,517	24,669	19,605
MMPP-0963	52,577	14,693	3.578	52,577	38,203	14,374	27,918	24,659
MMPP-2251	45,124	12,348	3.655	45,124	32,104	13,021	23,460	21,664

Facility ID	Coatings		Adhesives		Other Materials		Solvents	Waste Coating	Waste Solvent	HAP
	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	HAP (lbs)	HAP (lbs)	Controlled (lbs)
MMPP-1032	24,427	6,647								
MMPP-0913	38,591	11,469					24,373			19,939
MMPP-2285	26,363	7,440	240	79	0		1,640	0	0	
MMPP-0829	48,535	12,074					15,107	1,860	14,091	
MMPP-0485	6,389	5,041					14,783			
MMPP-2190	57	8,642					50,021		13,178	
MMPP-0899	36,997	4,700	12,816	4,181			1,119		0	9,677
MMPP-1535	0	7,214			0	195	34,646	0		
MMPP-0218	36,814	8,917					9,933		2,703	
MMPP-2177	30,174	6,085								
MMPP-1288	31,452	12,657					38,628			
MMPP-0413	7,093	11,581	6,914	1,812	9,246		51,636	0		
MMPP-2149	30,047	6,929			891	54	12,915			1,338
MMPP-2322	18,053	5,851			0	660	23,405	0	0	
MMPP-1053	77,614	11,974					0	861		
MMPP-1383	47,214	5,873			0	0	0		0	
MMPP-0186	13,668	6,128					44,506	4,304	1,262	
MMPP-1341	32,801	10,774					75,141	0	15,028	
MMPP-0799	158,541	10,990					2,851	57,094	0	
MMPP-1131	48,586	5,106								
MMPP-0571	82,231	10,252					18,022			
MMPP-2179	55,546	9,356					39,591			
MMPP-1339	128,980	11,870					226	0		
MMPP-2214	48,221	10,435			0	833	104,612	8,347	20,248	
MMPP-1145	20,740	5,243					45,298	0	6,219	
MMPP-0532	71,306	11,703					64,315		0	
MMPP-2279	106,647	6,988					128,129	14,661	14,725	123,850
MMPP-1359	46,490	8,850					60,092	0	0	
MMPP-0457	86,663	12,183					83,282		0	
MMPP-0427	46,932	5,290	143	18	10	1,851	58,776	0	5,670	
MMPP-2288	154,408	10,478					119,523		115,879	
MMPP-0037	86,578	10,713			0	0	133,744	0	34,840	
MMPP-0520	4,092	6,332	10,383	1,290			120,421	54	1,008	
MMPP-0178	131,226	6,720								
MMPP-1369	125,123	10,944					213,630	4,863	119,366	
MMPP-2153	7,189	387	129,611	3,229	1,238	6,020	134,382			75,782

Facility ID	Net HAPs	Gross Solids	Facility Ratio	Baseline Emissions	**MACT**	EMISSION	**MACT**	EMISSION
	(lbs)	(gal)	(lbs HAP/gal solids)		2.6	REDUCTIONS	1.9	REDUCTIONS
MMPP-1032	24,427	6,647	3.675	24,427	17,281	7,145	12,629	11,798
MMPP-0913	43,025	11,469	3.752	43,025	29,818	13,207	21,790	21,235
MMPP-2285	28,243	7,519	3.756	28,243	19,549	8,694	14,286	13,957
MMPP-0829	47,690	12,074	3.950	47,690	31,392	16,297	22,941	24,749
MMPP-0485	21,172	5,041	4.200	21,172	13,106	8,067	9,577	11,595
MMPP-2190	36,901	8,642	4.270	36,901	22,469	14,432	16,420	20,481
MMPP-0899	41,255	8,881	4.645	41,255	23,089	18,165	16,873	24,382
MMPP-1535	34,646	7,410	4.676	34,646	19,265	15,381	14,079	20,567
MMPP-0218	44,043	8,917	4.939	44,043	23,185	20,859	16,943	27,101
MMPP-2177	30,174	6,085	4.959	30,174	15,820	14,354	11,561	18,613
MMPP-1288	70,081	12,657	5.537	70,081	32,909	37,172	24,049	46,032
MMPP-0413	74,890	13,394	5.591	74,890	34,824	40,066	25,448	49,442
MMPP-2149	42,516	6,983	6.089	42,516	18,155	24,360	13,267	29,248
MMPP-2322	41,458	6,512	6.367	41,458	16,930	24,528	12,372	29,086
MMPP-1053	76,753	11,974	6.410	76,753	31,133	45,620	22,751	54,002
MMPP-1383	47,214	5,873	8.040	47,214	15,269	31,945	11,158	36,056
MMPP-0186	52,609	6,128	8.585	52,609	15,933	36,676	11,643	40,966
MMPP-1341	92,914	10,774	8.624	92,914	28,013	64,901	20,471	72,443
MMPP-0799	104,298	10,990	9.490	104,298	28,574	75,724	20,881	83,417
MMPP-1131	48,586	5,106	9.516	48,586	13,275	35,310	9,701	38,885
MMPP-0571	100,253	10,252	9.779	100,253	26,656	73,597	19,479	80,773
MMPP-2179	95,136	9,356	10.168	95,136	24,327	70,810	17,777	77,359
MMPP-1339	129,206	11,870	10.885	129,206	30,862	98,344	22,553	106,653
MMPP-2214	124,239	11,268	11.026	124,239	29,297	94,942	21,409	102,830
MMPP-1145	59,818	5,243	11.409	59,818	13,632	46,187	9,962	49,857
MMPP-0532	135,620	11,703	11.589	135,620	30,427	105,193	22,235	113,385
MMPP-2279	81,540	6,988	11.669	81,540	18,169	63,371	13,277	68,263
MMPP-1359	106,582	8,850	12.043	106,582	23,010	83,573	16,815	89,768
MMPP-0457	169,945	12,183	13.949	169,945	31,676	138,269	23,148	146,797
MMPP-0427	100,191	7,158	13.997	100,191	18,611	81,580	13,601	86,590
MMPP-2288	158,052	10,478	15.084	158,052	27,244	130,809	19,909	138,143
MMPP-0037	185,482	10,713	17.313	185,482	27,854	157,628	20,355	165,127
MMPP-0520	133,834	7,622	17.559	133,834	19,817	114,017	14,482	119,352
MMPP-0178	131,226	6,720	19.528	131,226	17,472	113,754	12,768	118,458
MMPP-1369	214,524	10,944	19.602	214,524	28,454	186,070	20,794	193,731
MMPP-2153	196,638	9,636	20.408	196,638	25,052	171,585	18,307	178,330

Facility ID	Coatings		Adhesives		Other Materials		Solvents	Waste Coating	Waste Solvent	HAP
	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids	HAP (lbs)	Solids (gal)	HAP (lbs)	HAP (lbs)	HAP (lbs)	Controlled
MMPP-1342	133,852	9,366					149,736	0		
MMPP-2300	39,154	7,382					456,593	10,820	8,071	
TOTALS	2,444,821	424,333	170,966	15,279	33,804	14,008	2,416,334	206,333	403,612	230,586
AVERAGES	50,934	8,840	3,562	318	704	292	50,340	4,299	8,409	4,804

Facility ID	Net HAPs	Gross Solids	Facility Ratio	Baseline	**MACT**	EMISSION	**MACT**	EMISSION
	(lbs)	(gal)	(lbs HAP/gal solids)		2.6	REDUCTIONS	1.9	REDUCTIONS
MMPP-1342	283,588	9,366	30.277	283,588	24,353	259,235	17,796	265,792
MMPP-2300	476,856	7,382	64.597	476,856	19,193	457,663	14,026	462,830
TOTALS	4,225,394	453,620	9.315	4,481,434	1,437,029	3,044,406	1,102,952	3,378,482
AVERAGES	88,029	9,450		60,560	19,419	64,775	14,905	62,564

ATTACHMENT 3

DATA FOR MODEL PLANT NUMBER 3

Facility ID	Coatings		Adhesives		Other Materials		Solvents	Waste Coating	Waste Solvent	HAP
	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	HAP (lbs)	HAP (lbs)	Controlled (lbs)
MMPP-1397	0	20,124					0	0	0	0
MMPP-1265	0	23,040					0			
MMPP-1180	22	107	0	20,286				0		
MMPP-2156	36	22,804			0	104		2		
MMPP-2142	93	582			0	33,551	14			
MMPP-1855	883	32,734					0			
MMPP-0642	914	20,130					0			
MMPP-1857	577	17,348					656			
MMPP-2256	4,054	33,509					0	512	0	
MMPP-1905	2,028	18,997					122		120	
MMPP-2155	0	14,919	780	1,501	0	7,640	6,000		4,110	
MMPP-1398	17,805	20,145					0	15,052	0	138
MMPP-2165	149	20,977	1,810	92			1,154			
MMPP-0570	3,042	22,428	707	1,883	0	38		8		
MMPP-1252	52,348	20,942			0	0	118,215	50,388	114,993	1,174
MMPP-0502	1,403	15,036					2,242			
MMPP-1360	2,785	19,497			0		4,804			
MMPP-0472	15,278	29,056						1,006		
MMPP-2154	3,648	1,670	6,618	18,258	0	288				
MMPP-2230	17,331	33,936								
MMPP-2117	11,368	18,578			374		1,360			2,032
MMPP-1289	13,547	17,075	0	8,932			2,396	0	0	
MMPP-0231	14,215	22,899					0	0	0	
MMPP-1881	13,889	21,046			0		46			
MMPP-0999	9,364	16,457					2,753	0	997	
MMPP-2184	23,017	30,506			49	2,266	28,329	15,594	8,245	
MMPP-1162	23,473	24,815					0	568	0	
MMPP-1633	81,061	30,884					9,355	60,499		
MMPP-0561	45,782	22,042					10,678	30,967		
MMPP-0088	47,801	23,049					59	18,140	0	
MMPP-1214	27,620	17,176					18,341	19,434	4,373	
MMPP-1434	16,776	16,696			0	3,511	17,462	2,395	1,618	
MMPP-1338	72,576	27,422					2,688	34,103		
MMPP-0286	17,020	4,037	1,317	408	547	11,352	4,920			
MMPP-1642	75,882	33,740					17,530	41,817		

MMPP-2259	16,141	15,133					12,814	2,036	3,168

Facility ID	Net HAPs	Gross Solids	Facility Ratio	Baseline Emissions	**MACT**	EMISSION	**MACT**	EMISSION
	(lbs)	(gal)	(lbs HAP/gal solids)		2.6	REDUCTIONS	1.9	REDUCTIONS
MMPP-1397	0	20,124	0.000	-	0	0	-	
MMPP-1265	0	23,040	0.000	-	0	0	-	
MMPP-1180	22	20,393	0.001	22	22	0	22	
MMPP-2156	34	22,908	0.001	34	34	0	34	
MMPP-2142	107	34,134	0.003	107	107	0	107	0
MMPP-1855	883	32,734	0.027	883	883	0	883	0
MMPP-0642	914	20,130	0.045	914	914	0	914	0
MMPP-1857	1,233	17,348	0.071	1,233	1,233	0	1,233	0
MMPP-2256	3,543	33,509	0.106	3,543	3,543	0	3,543	0
MMPP-1905	2,030	18,997	0.107	2,030	2,030	0	2,030	0
MMPP-2155	2,670	24,060	0.111	2,670	2,670	0	2,670	0
MMPP-1398	2,616	20,145	0.130	2,616	2,616	0	2,616	0
MMPP-2165	3,112	21,068	0.148	3,112	3,112	0	3,112	0
MMPP-0570	3,740	24,348	0.154	3,740	3,740	0	3,740	0
MMPP-1252	4,008	20,942	0.191	4,008	4,008	0	4,008	0
MMPP-0502	3,646	15,036	0.242	3,646	3,646	0	3,646	0
MMPP-1360	7,590	19,497	0.389	7,590	7,590	0	7,590	0
MMPP-0472	14,272	29,056	0.491	14,272	14,272	0	14,272	0
MMPP-2154	10,266	20,216	0.508	10,266	10,266	0	10,266	0
MMPP-2230	17,331	33,936	0.511	17,331	17,331	0	17,331	0
MMPP-2117	11,070	18,578	0.596	11,070	11,070	0	11,070	0
MMPP-1289	15,942	26,007	0.613	15,942	15,942	0	15,942	0
MMPP-0231	14,215	22,899	0.621	14,215	14,215	0	14,215	0
MMPP-1881	13,935	21,046	0.662	13,935	13,935	0	13,935	0
MMPP-0999	11,121	16,457	0.676	11,121	11,121	0	11,121	0
MMPP-2184	27,555	32,772	0.841	27,555	27,555	0	27,555	0
MMPP-1162	22,905	24,815	0.923	22,905	22,905	0	22,905	0
MMPP-1633	29,917	30,884	0.969	29,917	29,917	0	29,917	0
MMPP-0561	25,493	22,042	1.157	25,493	25,493	0	25,493	0
MMPP-0088	29,719	23,049	1.289	29,719	29,719	0	29,719	0
MMPP-1214	22,155	17,176	1.290	22,155	22,155	0	22,155	0
MMPP-1434	30,226	20,208	1.496	30,226	30,226	0	30,226	0
MMPP-1338	41,162	27,422	1.501	41,162	41,162	0	41,162	0
MMPP-0286	23,805	15,797	1.507	23,805	23,805	0	23,805	0
MMPP-1642	51,595	33,740	1.529	51,595	51,595	0	51,595	0

MMPP-2259	23,751	15,133	1.570	23,751	23,751	0	23,751	0

Facility ID	Coatings		Adhesives		Other Materials		Solvents	Waste Coating	Waste Solvent	HAP
	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	HAP (lbs)	HAP (lbs)	Controlled (lbs)
MMPP-2289	16,073	11,606			0	12,586	49,377	0	24,969	
MMPP-0973	20,699	17,249			0	116	11,966			
MMPP-0983	52,060	26,892					435	0	0	
MMPP-0281	49,206	19,883						8,898		
MMPP-0197	77,192	27,543					24,489	16,968	20,875	
MMPP-1637	33,569	16,063					6,229	0		
MMPP-1450	52,418	20,653			0	1,287	2,523	238	0	
MMPP-0779	119,844	28,378			0	113	33,468	30,217	0	51,577
MMPP-0470	17,394	5,282	3,909	208	830	10,425	35,075	0	17,108	
MMPP-2157	81,705	29,139			0	3,091	6,220	1,669	0	
MMPP-0804	17,166	33,496			723		150,073		0	74,575
MMPP-1508	45,720	16,762					2,179	0		
MMPP-0597	50,153	17,362								
MMPP-1495	28,245	18,780	107	109			28,107	0	0	
MMPP-0716	57,336	18,738								
MMPP-0636	46,900	25,063	125	440	0	0	32,522	0	0	
MMPP-0105	92,558	28,660					6,558	7,034		
MMPP-0605	121,006	28,851	439	38	0		534	25,513	0	
MMPP-1587	64,664	33,333					48,849	0		
MMPP-1572	16,642	28,573	293	163	0	0	438,807	4,059	353,792	
MMPP-2321	65,961	20,733	2,436	376			11,725	0	4,783	
MMPP-0081	99,593	25,123						7,469		
MMPP-0212	63,730	17,045					24,043		23,988	
MMPP-0826	120,614	14,288			0	2,395	185,841	28,116	110,813	103,866
MMPP-0442	71,179	16,163								
MMPP-0585	102,756	25,539	15,242	1,780			3,688		1,072	
MMPP-2246	72,965	25,959			0		75,035	0	28,853	
MMPP-0770	147,041	32,040			0		739			
MMPP-0500	27,606	16,135					65,600	16,058	0	
MMPP-0284	84,311	15,923								
MMPP-2198	121,974	22,548								
MMPP-0279	35,702	22,380			0	820	93,024	0	62	
MMPP-0270	51,903	15,998					37,062	0		
MMPP-1150	132,849	33,968					61,196	0		
MMPP-2176	98,103	16,687						355		

Facility ID	Net HAPs (lbs)	Gross Solids (gal)	Facility Ratio (lbs HAP/gal solids)	Baseline Emissions	**MACT** 2.6	EMISSION REDUCTIONS	**MACT** 1.9	EMISSION REDUCTIONS
MMPP-0920	88,996	15,921			5,996			
MMPP-2289	40,480	24,193	1.673	40,480	40,480	0	40,480	0
MMPP-0973	32,665	17,364	1.881	32,665	32,665	0	32,665	0
MMPP-0983	52,495	26,892	1.952	52,495	52,495	0	51,095	1,399
MMPP-0281	40,308	19,883	2.027	40,308	40,308	0	37,777	2,531
MMPP-0197	63,837	27,543	2.318	63,837	63,837	0	52,331	11,506
MMPP-1637	39,798	16,063	2.478	39,798	39,798	0	30,519	9,279
MMPP-1450	54,703	21,940	2.493	54,703	54,703	0	41,687	13,016
MMPP-0779	71,519	28,491	2.510	71,519	71,519	0	54,133	17,385
MMPP-0470	40,101	15,915	2.520	40,101	40,101	0	30,239	9,862
MMPP-2157	86,255	32,230	2.676	86,255	83,798	2,457	61,237	25,018
MMPP-0804	93,387	33,496	2.788	93,387	87,089	6,298	63,642	29,745
MMPP-1508	47,899	16,762	2.858	47,899	43,580	4,319	31,847	16,052
MMPP-0597	50,153	17,362	2.889	50,153	45,140	5,013	32,987	17,166
MMPP-1495	56,459	18,888	2.989	56,459	56,459	0	56,459	0
MMPP-0716	57,336	18,738	3.060	57,336	48,718	8,618	35,602	21,734
MMPP-0636	79,548	25,503	3.119	79,548	66,307	13,241	48,455	31,093
MMPP-0105	92,082	28,660	3.213	92,082	74,516	17,566	54,454	37,628
MMPP-0605	96,466	28,888	3.339	96,466	75,110	21,356	54,888	41,578
MMPP-1587	113,513	33,333	3.405	113,513	86,665	26,847	63,332	50,180
MMPP-1572	97,890	28,736	3.406	97,890	74,714	23,176	54,599	43,291
MMPP-2321	75,339	21,109	3.569	75,339	54,883	20,455	40,107	35,231
MMPP-0081	92,124	25,123	3.667	92,124	65,320	26,804	47,734	44,390
MMPP-0212	63,785	17,045	3.742	63,785	44,318	19,467	32,386	31,398
MMPP-0826	63,660	16,683	3.816	63,660	43,376	20,283	31,698	31,962
MMPP-0442	71,179	16,163	4.404	71,179	42,023	29,156	30,709	40,470
MMPP-0585	120,614	27,319	4.415	120,614	71,030	49,584	51,906	68,708
MMPP-2246	119,147	25,959	4.590	119,147	67,492	51,655	49,321	69,826
MMPP-0770	147,781	32,040	4.612	147,781	83,305	64,476	60,877	86,904
MMPP-0500	77,148	16,135	4.782	77,148	41,950	35,199	30,656	46,493
MMPP-0284	84,311	15,923	5.295	84,311	41,399	42,912	30,253	54,058
MMPP-2198	121,974	22,548	5.410	121,974	58,625	63,350	42,841	79,133
MMPP-0279	128,663	23,200	5.546	128,663	60,319	68,344	44,080	84,584
MMPP-0270	88,964	15,998	5.561	88,964	41,594	47,371	30,395	58,569
MMPP-1150	194,045	33,968	5.713	194,045	88,316	105,729	64,539	129,506
MMPP-2176	97,748	16,687	5.858	97,748	43,386	54,363	31,705	66,043

MMPP-0920	94,992	15,921	5.967	94,992	41,394	53,598	30,250	64,742

Facility ID	Coatings		Adhesives		Other Materials		Solvents	Waste Coating	Waste Solvent	HAP
	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	HAP (lbs)	HAP (lbs)	Controlled (lbs)
MMPP-1405	20,483	17,343					84,959		0	
MMPP-0168	165,556	23,608					1,154			
MMPP-1702	147,049	24,748	39	236	0		35,378		1,450	
MMPP-1064	90,493	21,944					113,168	20,366	22,047	
MMPP-0166	160,731	26,920					65,794		0	
MMPP-1149	29,199	15,608					102,804	0		
MMPP-1232	57,142	24,685	70	1,119			252,434	0	0	50,008
MMPP-0543	225,965	15,954			0	5,137	24,916			
MMPP-0169	423,496	26,052					267,773		126,892	
TOTALS	3,327,493	812,066	18,751	4,261	723	11,443	2,226,178	110,639	673,751	228,449
AVERAGES	92,430	22,557	521	118	20	318	61,838	3,073	18,715	6,346

Facility ID	Net HAPs	Gross Solids	Facility Ratio	Baseline Emissions	**MACT**	EMISSION	**MACT**	EMISSION
	(lbs)	(gal)	(lbs HAP/gal solids)		2.6	REDUCTIONS	1.9	REDUCTIONS
MMPP-1405	105,442	17,343	6.080	105,442	45,093	60,349	32,952	72,490
MMPP-0168	166,710	23,608	7.062	166,710	61,380	105,330	44,855	121,855
MMPP-1702	181,017	24,985	7.245	181,017	64,960	116,057	47,471	133,546
MMPP-1064	161,248	21,944	7.348	161,248	57,054	104,194	41,694	119,555
MMPP-0166	226,525	26,920	8.415	226,525	69,992	156,533	51,148	175,377
MMPP-1149	132,003	15,608	8.457	132,003	40,581	91,421	29,656	102,347
MMPP-1232	259,638	25,804	10.062	259,638	67,091	192,547	49,028	210,610
MMPP-0543	250,882	21,092	11.895	250,882	54,838	196,044	40,074	210,808
MMPP-0169	564,377	26,052	21.664	564,377	67,734	496,643	49,498	514,879
TOTALS	4,560,305	827,770	5.509	5,468,793	3,068,040	2,400,753	2,436,844	3,031,949
AVERAGES	126,675	22,994		67,516		68,593	30,084	72,189

ATTACHMENT 4

DATA FOR MODEL PLANT NUMBER 4

Facility ID	Coatings		Adhesives		Other Materials		Solvents	Waste Coating	Waste Solvent	HAP
	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	HAP (lbs)	HAP (lbs)	Controlled (lbs)
MMPP-2105	0	57,873			0			0		
MMPP-0986	0	45,521					1,275			
MMPP-1161	5,327	62,147					0	233		
MMPP-1395	5,965	56,182					0			
MMPP-1237	5,854	54,170					0	54		
MMPP-1461	6,372	56,898					395	84	0	
MMPP-0960	16,052	30,941	123	80	0	7,906	2,420	8,512	815	
MMPP-1478	30,067	53,638	568	127			19,094	18,019	13,101	
MMPP-0245	20,865	43,646								
MMPP-1588	79,850	36,029					11,885	73,050		
MMPP-2258	16,125	52,734			0		38,931		22,608	
MMPP-0340	31,776	67,038					12,359			
MMPP-0596	9,032	55,501			306		34,030	414		
MMPP-2127	33,040	42,312					167			
MMPP-0645	18,340	26,834	12,009	15,771			13,039		4,608	
MMPP-1022	25,615	64,032					127,024	0	87,986	
MMPP-2098	39,317	36,268						1,028		
MMPP-1221	106,489	39,034					4,155	65,566		
MMPP-0439	74,053	50,566	967	529	292		15,167	10,247	1,038	
MMPP-1024	63,572	47,273					13,001	0		
MMPP-0076	54,511	69,791	0	62	912		308,312	0	238,882	
MMPP-0962	146,939	38,314			0	1,105	85,472	90,608	37,385	32,182
MMPP-1656	86,367	56,823			0	0	81,400	3,059	45,677	13,305
MMPP-1583	66,032	45,242					92,171		70,820	
MMPP-0496	139,026	63,952						14,988		
MMPP-2255	77,836	33,856	796	5,039	29,341	13,547	196			
MMPP-1329	27,167	7,307	53,265	30,022	0	1	1,354			
MMPP-0173	113,042	46,466	8,962	1,841			75,463	0	55,531	
MMPP-1635	141,203	53,695					16,612	0		
MMPP-1281	66,683	57,781					118,178			
MMPP-0120	132,820	38,430			0	0	14,890	22,698	0	
MMPP-0537	147,002	51,037					25,138	3,514		
MMPP-0567	89,985	54,551	41,621	7,685	26,666	437	74,298			
MMPP-0493	113,867	36,900	8,641	1,211			52,311	0	0	
MMPP-1155	57,792	36,496					126,761	0	0	
MMPP-2292	253,006	48,234	0	1,790	14,983			10,805		

Facility ID	Net HAPs	Gross Solids	Facility Ratio	Baseline Emissions	**MACT**	EMISSION	**MACT**	EMISSION
	(lbs)	(gal)	(lbs HAP/gal solids)		2.6	REDUCTIONS	1.9	REDUCTIONS
MMPP-2105	0	57,873	0.000	-	0	0	-	0
MMPP-0986	1,275	45,521	0.028	1,275	1,275	0	1,275	0
MMPP-1161	5,093	62,147	0.082	5,093	5,093	0	5,093	0
MMPP-1395	5,965	56,182	0.106	5,965	5,965	0	5,965	0
MMPP-1237	5,800	54,170	0.107	5,800	5,800	0	5,800	0
MMPP-1461	6,682	56,898	0.117	6,682	6,682	0	6,682	0
MMPP-0960	9,267	38,927	0.238	9,267	9,267	0	9,267	0
MMPP-1478	18,609	53,765	0.346	18,609	18,609	0	18,609	0
MMPP-0245	20,865	43,646	0.478	20,865	20,865	0	20,865	0
MMPP-1588	18,685	36,029	0.519	18,685	18,685	0	18,685	0
MMPP-2258	32,448	52,734	0.615	32,448	32,448	0	32,448	0
MMPP-0340	44,136	67,038	0.658	44,136	44,136	0	44,136	0
MMPP-0596	42,953	55,501	0.774	42,953	42,953	0	42,953	0
MMPP-2127	33,207	42,312	0.785	33,207	33,207	0	33,207	0
MMPP-0645	38,781	42,605	0.910	38,781	38,781	0	38,781	0
MMPP-1022	64,652	64,032	1.010	64,652	64,652	0	64,652	0
MMPP-2098	38,289	36,268	1.056	38,289	38,289	0	38,289	0
MMPP-1221	45,078	39,034	1.155	45,078	45,078	0	45,078	0
MMPP-0439	79,194	51,095	1.550	79,194	79,194	0	79,194	0
MMPP-1024	76,573	47,273	1.620	76,573	76,573	0	76,573	0
MMPP-0076	124,852	69,854	1.787	124,852	124,852	0	124,852	0
MMPP-0962	72,236	39,419	1.833	72,236	72,236	0	72,236	0
MMPP-1656	105,726	56,823	1.861	105,726	105,726	0	105,726	0
MMPP-1583	87,382	45,242	1.931	87,382	87,382	0	85,959	1,424
MMPP-0496	124,038	63,952	1.940	124,038	124,038	0	121,509	2,529
MMPP-2255	108,169	52,441	2.063	108,169	108,169	0	99,638	8,531
MMPP-1329	81,787	37,330	2.191	81,787	81,787	0	70,927	10,860
MMPP-0173	141,936	48,307	2.938	141,936	125,599	16,338	91,784	50,153
MMPP-1635	157,815	53,695	2.939	157,815	139,607	18,207	102,021	55,794
MMPP-1281	184,862	57,781	3.199	184,862	150,231	34,630	109,784	75,077
MMPP-0120	125,011	38,430	3.253	125,011	99,919	25,093	73,017	51,994
MMPP-0537	168,627	51,037	3.304	168,627	132,697	35,930	96,971	71,656
MMPP-0567	232,570	62,673	3.711	232,570	162,950	69,620	119,079	113,491
MMPP-0493	174,818	38,111	4.587	174,818	99,088	75,730	72,410	102,408
MMPP-1155	184,552	36,496	5.057	184,552	94,890	89,662	69,343	115,210
MMPP-2292	257,184	50,024	5.141	257,184	130,063	127,121	95,046	162,138

Facility ID	Coatings		Adhesives		Other Materials		Solvents	Waste Coating	Waste Solvent	HAP
	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP (lbs)	HAP (lbs)	HAP (lbs)	Controlled (lbs)
MMPP-0203	352,320	60,239						37,566		
MMPP-0839	350,170	71,172					190,413	6,992	1,962	159,488
MMPP-1655	326,443	43,182			0	0	252,400	82,817	165,963	95,110
MMPP-1439	119,231	53,731	122,204	12,967	0	878	496,709	0	290,455	
MMPP-0458	269,288	36,073					84,544		0	
MMPP-0170	768,461	47,344					562,927		348,913	260,222
MMPP-0164	792,314	40,576					467,900		60,129	433,381
MMPP-0070	72,842	44,424	0	103	705,295		294,341	0	215,012	
TOTALS	4,166,468	820,334	181,428	25,597	746,944	1,315	2,852,885	164,391	1,137,964	948,202
AVERAGES	245,086	48,255	10,672	1,506	43,938	77	167,817	9,670	66,939	55,777

Facility ID	Net HAPs	Gross Solids	Facility Ratio	Baseline Emissions	**MACT**	EMISSION	**MACT**	EMISSION
	(lbs)	(gal)	(lbs HAP/gal solids)		2.6	REDUCTIONS	1.9	REDUCTIONS
MMPP-0203	314,754	60,239	5.225	314,754	156,622	158,132	114,455	200,299
MMPP-0839	372,140	71,172	5.229	372,140	185,048	187,092	135,227	236,912
MMPP-1655	234,954	43,182	5.441	234,954	112,274	122,680	82,046	152,908
MMPP-1439	447,690	67,576	6.625	447,690	175,698	271,992	128,395	319,295
MMPP-0458	353,831	36,073	9.809	353,831	93,791	260,041	68,539	285,292
MMPP-0170	722,253	47,344	15.255	722,253	123,094	599,159	89,953	632,300
MMPP-0164	766,705	40,576	18.896	766,705	766,705	0	766,705	0
MMPP-0070	857,466	44,528	19.257	857,466	115,772	741,694	84,603	772,863
TOTALS	5,697,168	847,246	6.724	6,988,913	4,155,792	2,833,121	3,567,779	3,421,134
AVERAGES	335,128	49,838		158,839	94,450	177,070	81,086	171,057

ATTACHMENT 5

DATA FOR MODEL PLANT NUMBER 5

Facility ID	Coatings		Adhesives		Other Materials		Solvents	Waste Coating	Waste Solvent	HAP
	HAP (lbs)	Solids (gal)	HAP (lbs)	Solids (gal)	HAP	Solids (gal)	HAP (lbs)	HAP (lbs)	HAP (lbs)	Controlled (lbs)
MMPP-0469	88	126,337	0	4,399			0	9	0	
MMPP-2112	12,511	79,926			0			458		
MMPP-0236	41,949	200,492			0		4,600	635	0	14,677
MMPP-0732	24,067	127,635			0	2,146	0			
MMPP-1241	35,541	94,281			0		260			
MMPP-1146	54,049	133,990			0		0			
MMPP-0389	102,489	21,378	0	210,930			7,988			
MMPP-0872	89,695	42,401			0	44,089	30,488	76,527		
MMPP-0180	65,992	89,326	0	4,346			3,485	0	0	
MMPP-1209	77,590	78,681			0	1,221	22,093	0	0	34,889
MMPP-0904	93,173	52,970	27,638	88,152	299	15	51,331	0	0	
MMPP-0613	104,465	77,084	4,228	7,244	536	5,144	44,127	0	16,411	
MMPP-2128	129,226	79,924	120	102	3,195	1,696	981	0	0	
MMPP-0372	386,708	58,476	26,597	6,300	9,441	142,286	462,837	91,048	323,131	103,776
MMPP-1247	237,395	194,047					791,125			404,980
MMPP-1047	1,829,474	345,229						0		
MMPP-2206	38,771	20,076			4	56,619	926,973			
TOTALS	2,105,639	559,353	0	0	4	56,619	1,718,098	0	0	404,980
AVERAGES	701,880	186,451	0	0	1	18,873	572,699	0	0	134,993

Facility ID	Net HAPs	Gross Solids	Facility Ratio	Baseline Emissions	**MACT**	EMISSION	**MACT**	EMISSION
	(lbs)	(gal)	(lbs HAP/gal solids)		2.6	REDUCTIONS	1.9	REDUCTIONS
MMPP-0469	79	130,736	0.001	79	79	0	79	0
MMPP-2112	12,053	79,926	0.151	12,053	12,053	0	12,053	0
MMPP-0236	31,237	200,492	0.156	31,237	31,237	0	31,237	0
MMPP-0732	24,067	129,781	0.185	24,067	24,067	0	24,067	0
MMPP-1241	35,801	94,281	0.380	35,801	35,801	0	35,801	0
MMPP-1146	54,049	133,990	0.403	54,049	54,049	0	54,049	0
MMPP-0389	110,477	232,308	0.476	110,477	110,477	0	110,477	0
MMPP-0872	43,656	86,490	0.505	43,656	43,656	0	43,656	0
MMPP-0180	69,478	93,671	0.742	69,478	69,478	0	69,478	0
MMPP-1209	64,794	79,903	0.811	64,794	64,794	0	64,794	0
MMPP-0904	172,441	141,137	1.222	172,441	172,441	0	172,441	0
MMPP-0613	136,946	89,472	1.531	136,946	136,946	0	136,946	0
MMPP-2128	133,523	81,722	1.634	133,523	133,523	0	133,523	0
MMPP-0372	367,629	207,062	1.775	367,629	367,629	0	367,629	0
MMPP-1247	623,540	194,047	3.213	623,540	504,523	119,017	368,690	254,850
MMPP-1047	1,829,474	345,229	5.299	1,829,474	897,596	931,878	655,935	1,173,538
MMPP-2206	965,748	76,695	12.592	965,748	199,408	766,340	145,721	820,027
TOTALS	3,418,761	615,972	5.550	4,674,992	2,857,757	1,817,234	2,426,577	2,248,415
AVERAGES	1,139,587	205,324		275,000		605,745	142,740	749,472

Available Add-on Control Devices for Use in the Miscellaneous Metal Parts and Products (MMPP) NESHAP

Available Add-on Control Devices for Use in the Miscellaneous Metal Parts and Products (MMPP) NESHAP

This memorandum describes the types of add-on control devices that could be used to reduce volatile HAP emissions from miscellaneous metal parts and products surface coating operations and explains the associated monitoring requirements. The first section of this memorandum describes the types of add-on control devices. The second section presents the monitoring requirements for these devices and provides the rationale for selecting these monitoring parameters.

ADD-ON CONTROL DEVICES

There are many types of emission control technologies that could be used to reduce emissions from miscellaneous metal parts and products surface coating operations. While the most common method of volatile HAP emission reduction utilized in surface coating operations is the reformulation of coating materials, add-on control devices are another technique available for use in reducing HAP emissions. This memorandum describes the types of add-on control devices that are available.

Organic Solvent Recovery

Recovery of organic solvent from air streams is not widely practiced in surface coating operations since many organic solvents used in the coating industry are relatively inexpensive. Also, coatings contain a mixture of several organic solvents in order to maximize gloss, transfer efficiency, and other desirable coating properties. Organic solvent recovery is usually most effective economically and technically when used with air streams containing a few, expensive organic solvents [1].

Carbon Adsorption with Steam Desorption

In a carbon adsorption system with steam desorption, carbon beds adsorb organic solvents from the air stream passing through them. In most cases, one bed is in the adsorption phase while the second bed is in the steam desorption phase. In the desorption phase, steam is passed through the carbon to release the collected organic solvent. Once the steam has been passed through the carbon, it is then condensed and the organic solvent is removed through the process of settling or distillation. The carbon desorption phase can be performed on site or the spent carbon can be shipped off-site for regeneration. The efficiency of this type of system can be very high when there are low organic solvent concentrations in the air exhausted from the application booths [1].

Advantages of the carbon adsorption/steam desorption system are that they are relatively inexpensive and have been proven effective over the years. They can handle a relatively high volume of air (about 30 to 1,400 cubic meters per minute) efficiently. Also, because the organic solvent is reclaimed there are no carbon monoxide (CO), carbon dioxide (CO_2), or nitrogen oxide (NO_x) emissions that are usually associated with the destruction of used organic solvent in air streams by combustion. Also, if the recovered organic solvents can be re-used it reduces the demand for production of additional organic solvent [1].

The disadvantages of these systems result from the difficulty of separating organic solvents from each other for re-use. Also, if water soluble organic solvents (i.e., alcohols, etc.) are used, it may be difficult to separate the organic solvents from water. In addition, carbon does not adsorb all organic solvents. Therefore, the blend of organic solvents in use must be determined and considered before choosing this type of system. Another problem with systems of this type is that organic solvent quality can be degraded while the organic solvent is held on the carbon [1].

<u>Low-Temperature Condensation</u>

All organic solvents will condense to liquid form when reduced to a low enough temperature. Using some newly developed equipment and heat recovery techniques borrowed from the Brayton cycle, the condensation process can be used to recover organic solvent from waste air streams [1].

This system can be costly and requires air streams of 30 cubic meters per minute (1,060 cfm) or less. It also requires humidity controls on the exhaust stream being treated because water vapor condenses and freezes in pipes [1].

Once the organic solvent is recovered it can be used for non-production activities such as spray gun cleaning, or it can be sent off site to be filtered and reconditioned [1].

<u>Organic Solvent Destruction</u>

The prevalent method of destruction of organic solvent emissions from coatings is thermal oxidation or incineration. The organic solvent-containing exhaust air is heated to a very high temperature, which converts it to carbon dioxide and water through the process of combustion. There are several options for VOC and/or HAP control by incineration. They include: 1) direct, gas-fired, thermal recuperative incineration; 2) direct, gas-fired, thermal regenerative incineration; 3) direct, electrically heated, thermal regenerative incineration; 4) direct, electrically heated, catalytic incineration;

and 5) direct, gas-fired, catalytic incineration [1].

Direct, gas-fired, thermal recuperative incinerators usually operate at temperatures of 760 EC (1400 EF) and use a natural gas burner. The residence time for organic solvent rich air is about 0.5 seconds. This type of unit is usually constructed solely of steel and utilizes heat exchangers to recover heat. These incinerators can achieve a high VOC destruction (98 percent efficient or better), especially when the VOC concentration in the inlet stream is high [1]. These devices are not the most efficient for heat recovery, but it is possible to use waste heat to produce steam or heated air. Their all steel construction becomes a problem when hydrochloric acid is produced as a product of the combustion of chlorinated organic solvents [1].

Direct, gas-fired, thermal regenerative incinerators utilize ceramic towers in a 3-, 5- or 7-chamber configuration to achieve heat recovery efficiencies in the 80-95 percent range. For this reason, the unit produces less NO_x emissions and uses very little natural gas. Regenerative incinerators can be effective for airstreams with flow rates of 280 to 4,250 cubic meters per minute (10,000 to 150,000 cfm) [1]. Regenerative incinerators are capable of achieving high destruction efficiencies similar to those of recuperative incinerators [1].

Direct, electrically heated, thermal regenerative incinerators are based on the principle that if enough organic solvent emissions enter the unit at high concentrations then the combustion process will maintain itself using only the heat of the organic solvent combustion. Electric coils within the unit are used to bring the unit up to its operating temperature (760 EC) as well as to help maintain operating temperature when the organic solvent concentrations in the effluent stream drop below critical levels [1]. The unit itself creates no NO_x, CO, or CO_2 emissions because it operates on electricity instead of the combustion of natural gas or other fuels [1]. Some problems with these types of units include a long startup time and costly operation due to the electricity required to operate them properly. Another problem with this type of incinerator is that hydrochloric acid from the incineration of chlorinated organic solvents can destroy the electric coils in the unit [1].

Direct, electrically heated, catalytic incinerators use precious metal catalysts as an integral part of the combustion chamber which allows for lower combustion temperatures in the range of 320 to 430 EC (versus 760 EC for non-catalytic incinerators). These units use electric coils for startup and temperature maintenance [1]. These units are typically constructed completely of steel with integrated catalyst units. They do not produce NO_x or CO, nor do they require large amounts of electricity because they run at relatively low temperatures and they use heat exchangers to pre-heat incoming air. The catalyst must be cleaned periodically. Also, the catalyst effectiveness may be masked by halogens, metals, non-organic solvent resins, and other materials. If appropriate materials are used in the combustion chamber and the electric coils, halogenated solvents can be incinerated [1].

Direct, gas-fired, catalytic incinerators are similar to the electric catalytic incinerators except that they use gas fired burners, instead of electric coils, for makeup heat. They also use precious metal catalysts. These incinerators utilize heat exchangers to pre-heat exhaust air, which reduces fuel requirements to relatively small amounts. If their catalysts are contaminated by halogen resins or high boiling organic solvents, the units may produce some NO_x or CO emissions [1].

*Catalytic Magnet Wire Oven*s are similar in nature to many of the previously mentioned destruction technologies. However, these units combine the coating application, curing, and solvent destruction into one unit. With the aid of a catalyst, the solvents released from the application of coating to magnet wire are incinerated and the heat generated is used to cure the wire coating. These units are unique to the wire coating industry. Destruction efficiencies from these types of units can range from 85 to 99 percent. In general, newer units have a destruction efficiency closer to the 99 percent while the older units have lower destruction efficiencies. While these units are not typically considered "add-on" control devices because they are integrated into the application unit, the more typical "add-on" control devices can be applied downstream from these units in order to achieve increased reductions.

Organic Solvent Concentrators

In some cases it is necessary to concentrate organic solvents before incineration because they are not present in high enough concentrations for incineration equipment to perform efficiently. Increased organic solvent concentration can reduce the size, installation costs, and operating costs required for incinerators [1].

There are two common types of organic solvent concentration: rotary carbon adsorption and zeolite adsorption.

The *rotary carbon adsorber* consists of carbon blocks on a rotating carousel. These blocks adsorb organic solvents, which are then released by passing a stream of hot air over a small area of the rotating carbon. The hot air stream is sent to some type of control unit or organic solvent recovery system [1]. Rotary carbon systems are not expensive because the carbon they use to adsorb organic solvents is relatively inexpensive. They are also relatively easy to operate. Exhaust streams can be concentrated from 10 to 100 times their original concentration. However, the exhaust streams need some type of humidity control to prevent interference of water with the organic solvent adsorption. Another potential pitfall of these systems is that carbon may not readily adsorb some organic solvents [1].

Zeolites are naturally formed materials that adsorb organic solvent readily. They can be tailored to collect organic solvents selectively by molecular size. This tailoring process can eliminate the need for humidity controls like those required for carbon systems. Zeolite systems are set up much like the rotary carbon adsorbers. However, zeolites are more efficient than carbon at adsorbing low concentrations of organic solvent [1]. The major problem with zeolites is their higher expense versus carbon and the fact that some organic solvents produce exhaust fumes in zeolite systems [1].

Alternative Oxidation Technologies

In *ultraviolet light, ozone oxidation (uv/ox) systems* an organic solvent is exposed to high-intensity ultraviolet light. It is then mixed with an ozone-rich water wash which converts the organic solvent to carbon dioxide and water through an oxidation process. The water is then filtered through activated carbon beds where more ozone is injected and further oxidation occurs on the carbon. These systems can produce high destruction efficiencies with no CO or NO_x emissions [1]. The disadvantages of these systems are that they have high costs, they are complex units, and they produce a wastewater stream. Also, this technology has not been used extensively for coating finishing applications [1].

Bioreactors (or biofilters) are large, bacteria-charged chambers. When air laden with organic solvent is passed through a bioreactor, organic solvent is captured in the packed medium and degraded to CO_2 and water (HCL is released if the solvent is chlorinated). Bioreactors consume little energy and produce no NO_x, but they are very sensitive to fluctuations in the supply of organic material they receive, as well as to humidity and temperature. Early conventional or packed bed systems required large amounts of space. However, more compact designs are becoming available. There has been little past experience with bioreactor units in the context of the finishing industry [1].

MONITORING REQUIREMENTS AND RATIONALE

The proposed standards require continuous monitoring system installation, operation and maintenance for control and recovery devices. The use of parameter monitoring can accurately demonstrate proper operation and maintenance of the control or recovery device, without the expense associated with CEMS. The monitoring parameters for the proposed standards were selected because they are good indicators of control or recovery device performance, and instruments are readily available at a reasonable cost to continuously monitor these parameters. The operating parameter levels are established during performance tests. The continuous monitoring ensures that the operating parameter levels indicating proper performance during the performance test continue to be achieved during the operation of the control device. The proposed standards contain monitoring requirements for capture system bypass lines, thermal and catalytic oxidizers, magnet wire ovens, carbon adsorbers, condensers, and emission capture systems.

Emission capture system that contains bypass lines

For each emission capture system that contains bypass lines that could divert emissions away from the control device to the atmosphere, the proposed standards require the owner or operator to monitor or secure the valve or closure mechanism in a nondiverting position. By ensuring that emissions are not escaping through a bypass line, the emissions are properly routed to the control device for destruction or recovery.

Thermal oxidizer

For a thermal oxidizer, the proposed standards require the owner or operator to install a gas temperature monitor in the firebox of the thermal oxidizer or in the duct immediately downstream of the firebox before any substantial heat exchange occurs. Thermal oxidizers can achieve high destruction efficiencies when operated properly. Tests have indicated that lower temperature can cause significant decreases in control device efficiencies, while temperature increases can adversely affect control device efficiency by decreasing the thoroughness of mixing of offgas, burner gases, and combustion air. Given the large effect of temperature on efficiency, monitoring the temperature in the firebox is an effective parameter to monitor for a thermal oxidizer. In addition, temperature monitors are relatively inexpensive to buy and operate.

Catalytic oxidizer

For a catalytic oxidizer, the proposed standards require the owner or operator to install gas temperature monitors both upstream and downstream of the catalyst bed to measure the temperature difference across the bed. The temperature rise across the bed is proportional to the VOC loading to the system. By monitoring the temperature rise, system performance can be ensured.

Carbon adsorber

For a carbon adsorber used as an add-on control device, the proposed standards require the owner or operator to monitor the total regeneration desorbing gas (e.g., steam or nitrogen) mass flow for each regeneration cycle and the carbon bed temperature after each regeneration and cooling cycle. These parameters are indicative of carbon adsorber performance. Carbon bed temperature monitors and steam flow meters, which indicate the quantity of steam used over a period of time, are available at reasonable cost.

Condenser

For a condenser, the proposed standards require the owner or operator to monitor the condenser outlet (product side) gas temperature. The outlet temperature of a condenser is correlated to the performance of the device and, therefore, monitoring the condenser outlet gas temperature is a good indicator of condenser performance. By ensuring that the outlet gas temperature of the condenser stays within the range measured during the performance test, a correlation can be made that the desired amount of recovery is being achieved. Condenser temperature monitors are available at a reasonable cost.

Flow measurement device

For each flow measurement device, the proposed standards require the owner or operator to install a flow sensor in the duct to measure flow from the emission capture system to the add-on control device. For each pressure drop measurement device, the proposed standards require the owner or operator to install a pressure sensor in a position that will measure the pressure drop across each opening being monitored. The efficiency of an emission capture system is directly related to the amount of air designed to flow through the enclosure. Monitoring the flow rate through the enclosure is the best measure of the continued performance of the capture system. If the measurement devices indicate a change in flow or pressure drop (compared to the design or tested values), then this is an indication that the emission capture system may not be performing as it did during the compliance demonstration.

REFERENCES

1. 1997 Organic Finishing Guidebook and Directory Issue, Volume 95, Number 5A, Metal Finishing, Tarrytown, NY, May 1997.

HAP Emission Reductions, Non-Air Quality Health and Environmental Impacts, and Energy Requirements for the Miscellaneous Metal Parts and Products NESHAP

HAP Emission Reductions, Non-Air Quality Health and Environmental Impacts, and Energy Requirements for the Miscellaneous Metal Parts and Products NESHAP

This memorandum presents the estimated HAP emission reductions and discusses the non-air quality health and environmental impacts and energy requirements associated with implementing the MACT level of control at existing and new facilities within the miscellaneous metal parts and products (MMPP) source category. The projected HAP emission reductions were developed using a model plant approach and were then scaled up to the expected number of affected facilities nationwide.

APPROACH

The HAP emission reductions associated with implementing the MACT standard for the MMPP industry were analyzed for each of the five model plants that were identified in the memorandum entitled "Development of Model Plants for the Miscellaneous Metal Parts and Products NESHAP Project" (presented on page 3-1 of this TSD). The estimated HAP emission reductions for each model plant were then multiplied by the number of existing facilities represented by each model to project the impacts to a nationwide value.

Non-air quality health and environmental impacts and energy requirements resulting from the implementation of the proposed standards were also considered. Sufficient information was not available to allow these impacts to be quantified, but the potential impacts of proposed standards are discussed below.

ESTIMATED HAP EMISSION REDUCTIONS

The estimated reduction in HAP emissions resulting from implementing the proposed standards at existing facilities is presented in Tables 1a and 1b. Emission reductions for each of the model plants were based on the existing source MACT floor of 0.31 kg HAP emitted per liter of coating solids (2.6 lb HAP/gallon of solids). Estimates of the HAP reductions that would be achieved through implementation of the draft standards were determined for existing sources based on a facility-by-facility examination of the 321 facilities in the database. The HAP/solids ratio (corresponding to the units of the emission limitation in the draft standards) was determined for each facility in the database. For those facilities where the HAP/solids ratio exceeded 2.6, it was assumed that the facility would take the necessary actions to bring the ratio down to, but not beyond, this level. It was also assumed that the amount of solids used by the facility would not change. Therefore, the compliant emission level for these facilities was calculated by multiplying their solids usage by the compliant emission limitation of 2.6 lbs HAP/gal solids. The resulting emission level, in pounds of HAP, was subtracted from their current (non-complying) emission level (lbs HAP) to yield their emission reductions. The emission reductions to be achieved by each non-complying facility were summed to estimate the reductions from all database facilities.

To extrapolate the emission reductions calculated for the database facilities to a nationwide basis, the average reduction per facility in each size range was determined and the results multiplied by the estimated number of non-complying facilities in that size range. The five resultant values (one for each size range) were then summed to give a nationwide total. As shown in Tables 1a and 1b, total nationwide HAP emission reductions from implementing the MACT level of control at existing facilities are estimated to be about 23.4 million kg (51.6 million lbs) per year. This represents a 48 percent reduction in HAP emissions industrywide. In Tables 1a and 1b, each model plant was assumed to comply with the standard by converting to non-HAP surface preparation materials, cleaning materials, and adhesives as well as reduced-HAP coatings and thinners.

HAP emission reductions were calculated for new facilities in a similar manner as the existing facilities. The reductions were for each of the model plants were based on the new source MACT floor of 0.23 kg HAP emitted per liter of coating solids (1.94 lb HAP/gallon of solids). As shown in Tables 2a and 2b, total nationwide HAP emission reductions from implementing the MACT level of control at new facilities are estimated to be about 728 thousand kg (1.6 million lbs) per year. This represents a 57 percent reduction in HAP emissions industry wide. Since there is no baseline emission level for new facilities, it was assumed that new facilities would follow the same trends as existing facilities in the absence of the standard. As a result, the emissions per model plant were calculated in the same manner as for existing facilities using the new source limit.

NON-AIR QUALITY HEALTH AND ENVIRONMENTAL IMPACTS

The compliance options expected to be used by the industry for this standard are not expected to create significant adverse environmental impacts. Coating material reformulation is expected to be used by most facilities to reduce their emissions of hazardous air pollutants (HAP) from their coating operations. The use of reformulated coating materials is expected to result in the generation of equal, or smaller, amounts of solid waste, waste solvents, and wastewater. In addition, the reformulated coating materials have the benefit of reduced percentages of HAP in the wastes that are generated. The expected increase in the use of powder coatings will result in a decrease in the generation of waste because most powder coating booths utilize dry filters to collect overspray. The dry powder that is collected as overspray can often be recycled, thus reducing the overall amount of waste material. Because of the many variables involved, and the lack of specific information on the control approach that will be selected by the affected sources, these impacts could not be quantified.

ENERGY REQUIREMENTS

The impact of the standard on the amount of energy consumed by surface coating operations within the affected industry could not be determined with the information available. Energy consumed is extremely variable and depends on the type and formulation of coating materials used, the film thickness needed for each product, the size and shape of the products being coated, curing oven capacity and desired line speed, and the method of heating the curing oven. Increases in energy consumption by the existing capture systems and add-on control devices is also variable and depends on whether increased utilization of these devices will be a part of the control strategy used by the facilities that have these devices. Because there is such a range of factors, and because some compliance options may result in a decrease in energy consumption (for example, high solids coatings may require less energy to cure than conventional coatings), it was assumed that on a nationwide basis there would be no quantifiable change in energy consumption as a result of the standard.

Table 1a. Summary of Estimated HAP Reductions for Existing Sources (kg/yr)

Model Plant	Total # of Non-complying Facilities Nationwide	Average HAP Reductions/ Facility (kg/yr)	Nationwide HAP Reduction (kg/yr)
1	264	8,614	2,274,142
2	219	29,381	6,434,494
3	162	31,113	5,040,344
4	76	80,318	6,104,135
5	13	274,761	3,571,897
	734		23,425,012

Table 1b. Summary of Estimated HAP Reductions for Existing Sources (lbs/yr)

Model Plant	Total # of Non-complying Facilities Nationwide	Average HAP Reductions/ Facility	Nationwide HAP Reduction (lbs/yr)
1	264	18,991	5,013,624
2	219	64,775	14,185,632
3	162	68,593	11,112,057
4	76	177,070	13,457,315
5	13	605,745	7,874,685
	734		51,643,313

Table 2a. Summary of Estimated HAP Reductions for New Sources (kg/yr)

Model Plant	Total # of Non-complying Facilities Nationwide	Average HAP Reductions/ Facility (kg/yr)	Nationwide HAP Reduction (kg/yr)
1	9	7,983	71,843
2	8	28,379	227,030
3	6	32,744	196,467
4	3	77,590	232,770
5	0	339,955	0
	26		728,110

Table 2b. Summary of Estimated HAP Reductions for New Sources (lbs/yr)

Model Plant	Total # of Non-complying Facilities Nationwide	Average HAP Reductions/ Facility (lbs/yr)	Nationwide HAP Reduction (lbs/yr)
1	9	17,599	158,387
2	8	62,564	500,516
3	6	72,189	433,136
4	3	171,057	513,170
5	0	749,472	0
	26		1,605,209

APPENDIX A

MODEL PLANT DEVELOPMENT

- The "final" database from which model plants and estimated impacts were determined contains data from 332 facilities. Eleven of these facilities are in the magnet wire and rubber-metal categories and were not included in the analysis because they will be in separate subcategories. Data from the remaining 321 facilities were grouped into 5 size ranges, with size measured by solids usage. Each size range is represented by a "model plant", designated as Model Plants 1 through 5. It is currently estimated that there are 1500 existing, major source facilities nationwide. The following table presents a breakdown of the 1500 facilities into the 5 model plant size categories.

Table a1. Distribution of Existing Facilities by Model Plant

Model Plant	Size Range (gallons of solids)	No. of Database Facilities	% of Database Facilities	No. of Facilities Nationwide (est. total of 1,500)
1	< 5,000	105	33	495
2	5,000 - 15,000	74	23	345
3	15,001 - 35,000	81	25	375
4	35,001 - 75,000	44	14	210
5	> 75,000	17	5	75
		321	100	1,500

- Many facilities within the source category are currently operating at HAP emission levels that comply with the draft emission limitation (assumed to be **2.6** lbs HAP/gallon of solids). These facilities would not be required to reduce their HAP emission levels. (Twelve synthetic minor facilities that do not meet the 2.6 lbs HAP/gallon limit were assumed to be complying facilities because they would not have to reduce their emissions.) Therefore, the number and percentage of the facilities within each size range that would **not comply** with the draft standards for existing sources without emission reductions was determined. Model plant parameters related to material usage and HAP content were determined using data from **only the non-complying** segment of the database population. Parameter values from all non-complying facilities within each size range were averaged to determine the model plant value.

- To estimate nationwide impacts, it was assumed that the population of facilities in the database (321 facilities) was a representative sample of the nationwide population (estimated to be 1,500 facilities) . Therefore, about 18 percent of the facilities nationwide would be represented by model plant 1 (33% are in that size range and 53.3% are non-complying). With 1,500 existing facilities in the source category, 264 (1,500*.33*.533 = 264) would be represented by model plant 1 and the impacts determined for it.

Table a2. Summary of Non-Compliant Existing Facilities

Model Plant	# of Database Facilities That Are Non-complying	% of Database Facilities That Are Non-complying	No. of Facilities Nationwide (est. total of 1,500)	# of Non-complying Facilities Nationwide
1	56	53.3	495	264
2	47	63.5	345	219
3	35	43.2	375	162
4	16	36.4	210	76
5	3	17.6	75	13
	157	48.9	1,500	734

- To project impacts from the estimated 45 new facilities that become affected sources each year, the same method of distributing the facilities by model plant sizes and baseline compliant status was used.

Table a3. Distribution of New Facilities by Model Plant

Model Plant	Size Range (gallons of solids)	No. of Database Facilities	% of Database Facilities	No. of New Facilities Nationwide (est. total of 45)
1	< 5,000	105	33	15
2	5,000 - 15,000	74	23	11
3	15,001 - 35,000	81	25	11
4	35,001 - 75,000	44	14	6
5	> 75,000	17	5	2
		321	100	45

Table a4. Summary of Non-Compliant New Facilities

Model Plant	# of Database Facilities That Are Non-complying	% of Database Facilities That Are Non-complying	No. of New Facilities Nationwide (est. total of 45)	# of Non-complying Facilities Nationwide
1	65	61.9	15	9
2	54	73.0	11	8
3	42	51.9	11	6
4	20	45.5	6	3
5	3	17.6	2	0

	184	57.3	45	26

Methodology for Estimation of Monitoring, Recordkeeping, and Reporting (MR&R) Burden

Methodology for Estimation of Monitoring, Recordkeeping, and Reporting (MR&R) Burden

The purpose of this memo is to present assumptions used to determine an estimate of the burden, in terms of labor hours and costs, that will be imposed on affected sources by the monitoring, recordkeeping, and reporting requirements of the NESHAP. The methodology and assumptions presented here are based on the expectation that nearly all facilities in the source category will choose to, and be able to, comply with the emission limits by using reformulated (low-HAP, or non-HAP) coating materials. The use of add-on control devices to reduce HAP emissions from surface coating operations in the source category is very rare, and no attempt has been made to estimate the costs associated with monitoring these devices.

Attachment A presents a list of the burden items, and the estimated effort for those items, that are included in the calculation of MR&R burden that is reported in the OMB 83-I package. A draft of the values that were estimated for these burden items was presented to industry stakeholders at a meeting held on February 8, 2001. Several industry stakeholders commented that the MR&R burden faced by industry is highly variable and that our approach to estimating these costs should account for the fact that some facilities will incur significantly higher costs than others. In response to these comments, we considered several methods whereby we could account for the range of anticipated burden. The number of coating materials used by facilities responding to the industry questionnaire was selected as the primary measure of the burden. We assumed that the burden of tracking coating material usage and formulation would increase as the number of materials used at a facility increased. Facility size was considered to be less accurate measure because very small facilities may use many different coating materials and very large facilities may use only a few materials, depending on the products being coated.

The facilities in the MACT database were ranked and divided into three ranges based on the number of coating materials they reported in the questionnaire responses. In preparing this ranking, we found that the responses often reported "groups" of similar materials as one entry. To generate a reliable count of the total number of materials used by facilities, the number of materials included in these groups had to be determined. Since it was not always noted how many materials were in each group, an assumption was needed to determine how many materials were represented by the group. A random sampling of the materials contained in the groups of data was taken. The sample results indicated that the average reported "group" of coatings represents 7 materials.

The following three ranges were developed, based on the number of coating materials reported:

Range I < 25 Materials (183 database facilities, 57% of the facilities in the database)

Range II 25 to 100 Materials (114 facilities, 36%)

Range III >100 Materials (23 facilities, 7%)

The maximum number of materials reported by any one facility in the database was 288.

We made the assumption that the Range II facilities would require two times the recordkeeping and reporting effort that Range I facilities would require. In addition, it was assumed that Range III facilities would require three times the effort that Range I would require. This is based on the assumption that as number of materials increase, automation and increased efficiency would allow the larger facilities to perform tasks at a faster rate.

The number of facilities in each Range nationwide was then projected from the distribution (by percentages) of facilities in the MACT database. This was based on our previous assumption of 1500 existing facilities and 45 new facilities per year. The projected number of facilities in each Range across the MMPP industry is:

Range I	855 existing facilities;	26 new facilities
Range II	540 existing facilities;	16 new facilities
Range III	105 existing facilities;	3 new facilities

After reviewing the list of burden items attributed to the MR&R requirements (presented in Attachment A), we concluded that burden items 5 (Gather Information, Monitor and Inspect) and 6 (Process/Compile Review) were the activities that would be affected by the number of materials used.

In the draft presentation made at the February 8, 2001 stakeholders meeting, we had assumed that for Item 5 all facilities would require 12 hours per month. For our current estimate we are assuming that facilities in Range I (those using the fewest coating materials) would require 12 hours and that other facilities would require more effort. Using the 12 hour value and the scaling factors developed above, we calculated the following estimates for the number of hours to assign to Item 5:

Range I (12 hours effort per facility per month)

855 facilities X 12 hours per facility = 10,260 hours

Range II (2x the effort for Range I)

540 facilities X 24 hours per facility = 12,960 hours

Range III (3x the effort for Range I)

105 facilities X 36 hours per facility = 3,780 hours

Total for all Ranges = 27,000 hours

Average burden (1500 facilities) = 18 hours

For burden Item 6, our original assumption of 8 hours effort per month for all facilities was used as the estimated effort for those facilities in Range I . The following is a summary of the estimated burden for Item 6 for each of the three Ranges:

Range I (8 hours effort per facility per month)

855 facilities X 8 hours per facility = 6,840 hours

Range II (2x the effort for Range I)

540 facilities X 16 hours per facility = 8,640 hours

Range III (3x the effort for Range I)

105 facilities X 24 hours per facility = 2,520 hours

Total for all Ranges = 18,000 hours

Average burden (1500 facilities) = 12 hours

The projected industry-wide average values of 18 hours for burden Item 5, and 12 hours for burden Item 6 were used, along with the other burden item estimates and labor rates presented in Attachment A, to generate the values reported in the OMB 83-I.

The industry-wide fifth year MR&R cost using these assumptions is estimated to be $44,758,958.

ATTACHMENT A

ASSUMPTIONS USED IN BURDEN ESTIMATES

Description of Respondent Activities (Burden Items)

(1) Read Rule and Instructions are the activities, less training, which involve comprehending the provisions in the standard and understanding how they apply to the respective points at a facility.

(2) Plan Activities represents such burdens as design, redesign, scheduling, and selecting methods of compliance.

(3) Training represents the portion of activities from (1) Read Rule and Instruction for which an average facility would elect to provide classroom instruction. The standard does not require specific training itself.

(4) Create, Test, and Research and Development are the activities involving testing, retesting, establishing parameter monitoring levels and determining emission point applicability.

(5) Gather Information, Monitor, and Inspect are the activities involving collection of monitored data and other related activities.

(6) Process/Compile and Review are the activities that involve analysis of the information collected during the compliance period for accuracy and completeness, and include generation of appropriate internal reports and records required as a result.

(7) Complete Reports represents the activities normally associated with filling out required forms. Because the rule requires no standardized forms, these activities relate to the preparing of formal reports and cover letters as appropriate.

(8) Record/Disclose are activities that are solely recordkeeping that occur once the appropriate report information has been extracted. These activities involve software translation, duplication, or

archival processes normally associated with data management and storage common to this industry.

(9) Store/File are again activities that are solely recordkeeping that occur once the appropriate report information has been extracted. The activities involve the management life cycle of records, from the time they are filed and stored, to the time they are disposed.

(10) LDAR Reporting and Recordkeeping is the burden that is associated with requirements to develop and implement a leak detection and repair plan. (This rule has no LDAR requirements)

(11) Capital Costs of Monitoring and Recordkeeping Equipment is the cost for purchasing automated monitoring and recording devices that are required by the standards.

Assumptions Used in Burden Estimates

(m) There are 1500 major (or "affected") sources and all are assumed to come into compliance three years after the effective date of the rule, as required by the rule.

(n) There are expected to be 135 new, modified, or reconstructed sources during the first three years (45 in each year).

(o) A total of 40 hours were estimated for obtaining, reading, and understanding the requirements of the standard.(Burden Item 1)

(p) An estimated 40 hours would be required for communication and coordination with materials suppliers to ensure that all needed information relative to HAP and solids content of materials is provided with each purchase or shipment.(Burden Item 2)

(q) A total of 76 hours were estimated for training an additional employee in the preparation of records and reports, as well as creating a "template" for the reports.(Burden Items 3 &4)

(r) A total of 30 hours per month were assumed for gathering or retrieving the inventory data from which the monthly compliance determination will be made and for the analysis of the data.(Burden Items 5&6)

(s) An estimated 8 hours would be required for each of the semi-annual compliance reports submitted to EPA.(Burden Item 7)

(t) A total of 8 hours were estimated for managing (copying, distributing, storing, etc). each of the semi-annual reports.(Burden Items 8&9)

(u) Average labor costs per hour are; technical - $54.92, management - $78.10, clerical - $36.16.

(v) In addition to the technical hours described above, management hours equal to 5 percent and clerical hours equal to 10 percent of the technical hours are included in the total burden estimate.

For the second year (and subsequent years) after facilities begin complying with the rule, the following estimates were included:

(a) A total of 20 hours were assumed annually for rereading portions of the standards, coordination with suppliers, and training additional employees.

(b) A total of 30 hours per month were assumed for completing the compliance determination.

(c) An estimated 8 hours were assumed for preparing each semi-annual compliance report.

(d) An estimated 8 hours were assumed for "managing" each semi-annual report.

(e) Average labor costs per hour are; technical - $54.92, management - $78.10, clerical - $36.16.

(f) Management hours equal to 5 percent and clerical hours equal to 10 percent of the technical hours are included in the total burden estimate.

Cost Impact Analysis for the Miscellaneous Parts and Products NESHAP

Cost Impact Analysis for the Miscellaneous Metal Parts and Products NESHAP

This memorandum presents the approach developed to estimate the cost impacts of implementing the MACT level of control at existing and new miscellaneous metal parts and products surface coating operations. The cost impacts were developed using a model plant approach and were then projected to a nationwide number of facilities. The first section of this memorandum describes the approach that was used to estimate the compliance alternatives and the costing assumptions. The second section presents the results of the cost analysis on a model plant and nationwide basis.

APPROACH

The basic approach used to estimate the cost impacts of the standards was to predict the method of compliance to be used by each model plant and the costs associated with that method. The model plants and estimated impacts were determined from the final MACT database of 321 facilities. It was estimated that there are 1500 existing, major source facilities nationwide. The following table presents a breakdown of the 1500 facilities into 5 model plant size categories.

Model Plant	Size Range (gallons of solids)	No. of Database Facilities	% of Database Facilities	No. of Facilities Nationwide (est. total of 1,500)
1	< 5,000	105	33	495
2	5,000 - 15,000	74	23	345
3	15,001 - 35,000	81	25	375
4	35,001 - 75,000	44	14	210
5	> 75,000	17	5	75
		321	100	1,500

Many facilities within the source category are currently operating at HAP emission levels that comply with the emission limitation of 0.23 kg HAP/L solids (1.9 lb HAP/gal solids) for new sources, and 0.31 kg HAP/L solids (2.6 lb HAP/gal solids) for existing sources. These facilities were assumed to already be in compliance, and therefore, would not have to reduce their emissions. The numbers and percentage of facilities that would not comply with the draft standards for new and existing sources without emission reductions was determined.

Model Plant	# of Database Facilities That Are Non-complying	% of Database Facilities That Are Non-complying	No. of Facilities Nationwide (est. total of 1,500)	# of Non-complying Facilities Nationwide
1	56	53.3	495	264
2	47	63.5	345	219
3	35	43.2	375	162
4	16	36.4	210	76
5	3	17.6	75	13
	157	48.9	1,500	734

Because an affected source-wide average HAP limit approach was selected for the standard, there is a wide variety of actions that a facility could take to lower its HAP emissions from coating-related operations to a compliant level. Reductions in the HAP contents of adhesives, surface preparation materials, thinning solvents, and cleaning materials as well as the coatings themselves, all contribute toward compliance. Converting from HAP-containing liquid coatings to powder coatings can essentially eliminate HAP emissions from the coating operation. Add-on control devices could be installed to reduce HAP emissions from selected exhaust gas streams, such as a curing oven exhaust. (Thermal incinerators can achieve HAP reductions in excess of ninety percent.) Various combinations of the actions outlined above can also be implemented to achieve the necessary HAP emission reductions.

It was estimated that no facility within the industry would install add-on control devices as a result of the proposed standards. The capital costs and annual operating costs of add-on control devices usually make them less desirable than other compliance options for reducing volatile organic emissions from coating operations. The data collected in the miscellaneous metal parts and products survey indicate that there are a few add-on control devices in use in this industry. Even though these facilities may consider the devices' HAP emission reductions when determining compliance with the proposed standards, no additional cost was attributed to them in our analysis because they would be operated even in the absence of the proposed standards.

For the reasons presented above, the option that would likely be selected by most facilities within the industry is the use of a combination of lower HAP liquid coatings and non-HAP adhesives, surface preparation materials, and cleaning materials. It was also assumed that the use of lower HAP coatings would be accompanied by the use of lower HAP coating thinners.

Because the compliance option expected to be used by most facilities to comply with the standard utilizes reformulated raw materials rather than a different coating technology or add-on controls, no capital costs were estimated. Some facilities will, no doubt, encounter up-front costs during a materials conversion. Some facilities may need to upgrade application equipment to be able to apply reformulated lower HAP coatings that may have a higher viscosity. These costs will be site specific, however, and will most likely be offset by increased efficiencies of the new equipment and by reductions in the cost of handling and disposal of HAP-containing wastes. The impacts of variables such as shelf life of coatings, curing requirements, or spray booth ventilation rates could also be positive or negative depending on the specific facility being evaluated. No cost information was available for these variables. It should also be noted that there will be some cost incurred for testing or qualifying new coating materials. These costs are also very site specific depending on the products manufactured, the relative usage of each type of material, and the availability of demonstrated reformulated materials.

For liquid coatings there exists a wide range of HAP contents, coating solids contents, and prices. Because of the variability from one facility to another regarding coating needs, it was not possible to estimate each of the variables that must be considered to determine the increase or decrease in costs that would be encountered in converting to a lower HAP coating. During the development of the Large Appliances NESHAP, several contacts were made with industry representatives in an attempt to obtain data on the relative costs of lower HAP coatings versus higher HAP coatings (Docket A-97-41, Item II-E-12). Most of these contacts did not result in useful cost data. Because the cost of coatings is usually compared in terms of coating solids content ($/L coating solids) or actual coverage capability ($/sq m), we found that cost data was not readily available in terms of HAP content. An assumption was made, therefore, that it was reasonable to expect that the higher percentage of solvent in a low solids coating would result in a corresponding higher percentage of HAP. Likewise, the lower percentage of solvent in a high solids coating would result in a lower percentage of HAP. This assumption correlating high solids to lower-HAP and low solids to higher-HAP allowed us to use available data comparing the costs of low solids and high solids coatings. In an article appearing in Products Finishing Magazine, the costs of high solids coatings were reported to be about 30 percent less than the costs of low solids coatings [1]. One industry representative supplied information indicating that the costs of their new high solids coatings are about 10 percent higher than the costs of low solids coatings [2]. Information from a third source indicated practically no difference in the costs between low solids and high solids coatings [3]. Because of the many site specific variables, and the lack of a trend in the cost information available, it was assumed that overall there would be no change in annual costs for coatings and, therefore, no cost was estimated for this analysis. It is likely, however, that the annual costs of coatings will increase for some facilities, will remain about the same for many facilities, and may decrease for some when the reformulation to lower HAP coatings is accompanied by an increase in coating solids content (and thus, greater coverage and less waste per a given volume).

For adhesives, as for other coatings, no change in costs was predicted for converting to non-HAP materials. Individual facilities may experience cost increases or decreases depending on the types and quantities of adhesives used. A telephone survey of several adhesives manufacturers conducted during the development of the NESHAP for the Plastic Parts and Products Surface Coating Source Category resulted in the collection of cost and HAP data for seventeen different adhesives. The data showed no clear relationship between the costs of the adhesives and the HAP content, and it was assumed that reformulating to non-HAP adhesives in miscellaneous metal parts and products would result in no additional costs [4].

The surface preparation materials, thinning solvents, and cleaning materials used by the miscellaneous metal parts and products surface coating industry in 1997 were evaluated to determine the constituent compositions and the amount of product used. Xylene is a commonly used, inexpensive HAP surface preparation/thinning/cleaning product and isopropyl alcohol is a commonly used, and much more expensive, non-HAP solvent. The cost of non-HAP alternative solvents such as isopropyl alcohol and acetone was estimated to be one hundred percent higher than the cost of higher-HAP solvents. A summary of cost information for xylene and isopropyl alcohol is presented in Docket A-97-41 Item II-B-12. The selection of acceptable non-HAP alternative solvents will be a case-by-case decision to be made by each facility, and the comparison of xylene to isopropyl alcohol is used here only for the purpose of establishing a cost differential. Many types of solvent blends, which have much reduced levels of HAP, may also be acceptable substitutes and may cost less than the non-HAP materials. The one hundred percent increase in cost for these materials is believed to be a conservative (worst-case) assumption, however, and also does not consider the savings that could result from current waste solvent disposal costs [5].

For new sources it is projected that most, if not all, will use coating technologies that are considered to be "state-of-the-art" coatings (e.g., powder coatings and low HAP liquid coatings) even in the absence of the proposed standards. Powder coating technology has advanced rapidly in recent years, and is gaining widespread acceptance in the miscellaneous metal parts and products industry. Powder coatings are not only very cost effective, their use eliminates the problems associated with worker exposure to organic solvents. Due to the cost and performance advantages of powder coatings, it is expected that many facilities will want to convert to powder coatings if possible. However, due to the complexity of many of the products within the miscellaneous metal parts and products source category, many of the affected industries may not find it feasible to switch to powder coatings. It is assumed that sufficient low HAP coatings, coating solvents, and cleaning solvents are available to make the HAP reductions possible while maintaining similar costs. Costs for new facilities were based on the same compliance costs as existing facilities. This is based on the assumption that new facilities would use similar methods of compliance as existing facilities. However, it is expected that new facilities will have the advantage of increased flexibility over existing operations. In addition, new facilities are expected to incur monitoring, recordkeeping, and reporting costs and these have been included in the analysis.

ESTIMATED COST IMPACTS

Tables 1 through 7 present the model plants and the estimated cost that each would incur as a result of complying with the standard. All existing sources were assumed to come into compliance at the end of the three-year compliance period in the proposed standards. New sources are assumed to comply when initial operation begins. Each model plant would comply with the standards by switching to non-HAP adhesives, surface preparation materials, and cleaning materials and reducing the HAP content of the coating materials and thinners to meet the existing source emission limit of 0.31 kg HAP /L of coating solids (2.6 lb HAP per gallon of solids). The total nationwide annual cost for existing sources to comply with the standard is estimated to be approximately $8,943,813, the sum of the costs for each of the five model plants. Costs were developed for existing affected facilities and for an estimated 45 new sources each year after the proposed standards become final. The total nationwide annual cost for new sources to comply with the standard is estimated to be approximately $716,771. Therefore, the cost for new sources increases by $716,771 each year as each new set of 45 facilities is added (ie. Year 1 = 1 X $716,771 for 45 facilities, and year 2 = 2 X $716,771 for 90 facilities).

In addition to the costs associated with complying with the proposed HAP emissions limitation, affected facilities will incur costs associated with the monitoring, recordkeeping, and reporting (MR&R) requirements of the proposed standards. The MR&R costs were developed for the first five years after proposal, and are summarized in Table 6 [6]. Table 7 presents a summary of the estimated nationwide costs for the proposed standards, including the costs to comply with the HAP emissions limit and the monitoring, recordkeeping, and reporting requirements. The fifth-year nationwide total cost is projected to be approximately $57,286,624.

REFERENCES

1. G. Bocchi, The Powder Coating Institute. Products Finishing, "Powder Coating Advantages." June 1997. 5 pp.

2. Telecon from K. Maw, PES, Inc., to B. Vogt, Whirlpool. Discussion of costs of lower HAP coatings and thinners. July 29, 1999. 1 p. Docket No. A-97-41, Item No. II-E-10.

3. Facsimile from C. Profilet, Thermal Engineering Corporation, to J. Paumier, PES, Inc. Information on costs and emissions for coatings and two spreadsheets dated January 18 and 27, 1997. 4 pp. Docket No. A-97-41, Item No. II-D-433.

4. Letter from K. Teal, EPA:CCPG, to M. Serageldin, EPA:CCPG. Adhesive Cost Information Prepared for the Plastic Parts and Products Surface Coating NESHAP. December 5, 2000. Docket No. A-97-41, Item No. II-B-13.

5. Alternative Control Techniques Document - Industrial Cleaning Solvents. EPA-453/R-94-015. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, February 1994, pp. 5-8 and 5-9.

6. OMB 83-I and Supporting Statement for the Miscellaneous Metal Parts and Products Surface Coating Operations NESHAP. EPA Tracking Number 2056.01. Docket No. A-97-34, Item No. II-F-1.

Table 1. Year 1 Compliance Costs

Model Plant	Solvent Usage (pounds)	Incremental Cost of Using No-HAP Solvent ($/lb)	Incremental Cost Per Facility ($)	Number of Non-complying Existing Facilities	Projected Number of New Facilities	Nationwide Incremental Cost ($)
1	13,173	$0.20	2,634.60	0	15	39,519
2	50,340	$0.20	10,068.00	0	11	110,748
3	61,838	$0.20	12,367.60	0	11	136,044
4	167,817	$0.20	33,563.40	0	6	201,380
5	572,699	$0.20	114,539.80	0	2	229,080
				0	45	716,771

Table 2. Year 2 Compliance Cost

Model Plant	Solvent Usage (pounds)	Incremental Cost of Using No-HAP Solvent ($/lb)	Incremental Cost Per Facility ($)	Number of Non-complying Existing Facilities	Projected Number of New Facilities	Nationwide Incremental Cost ($)
1	13,173	$0.20	2,634.60	0	30	79,038
2	50,340	$0.20	10,068.00	0	22	221,496
3	61,838	$0.20	12,367.60	0	22	272,087
4	167,817	$0.20	33,563.40	0	12	402,761
5	572,699	$0.20	114,539.80	0	4	458,159
				0	90	1,433,541

Table 3. Year 3 Compliance Costs

Model Plant	Solvent Usage (pounds)	Incremental Cost of Using No-HAP Solvent ($/lb)	Incremental Cost Per Facility ($)	Number of Non-complying Existing Facilities	Projected Number of New Facilities	Nationwide Incremental Cost ($)
1	13,173	$0.20	2,634.60	0	45	118,557
2	50,340	$0.20	10,068.00	0	33	332,244
3	61,838	$0.20	12,367.60	0	33	408,131
4	167,817	$0.20	33,563.40	0	18	604,141
5	572,699	$0.20	114,539.80	0	6	687,239
				0	135	2,150,312

Table 4. Year 4 Compliance Costs

Model Plant	Solvent Usage (pounds)	Incremental Cost of Using No-HAP Solvent ($/lb)	Incremental Cost Per Facility ($)	Number of Non-complying Existing Facilities	Projected Number of New Facilities	Nationwide Incremental Cost ($)
1	13,173	$0.20	2,634.60	264	60	853,610
2	50,340	$0.20	10,068.00	219	44	2,647,884
3	61,838	$0.20	12,367.60	162	44	2,547,726
4	167,817	$0.20	33,563.40	76	24	3,356,340
5	572,699	$0.20	114,539.80	13	8	2,405,336
				734	180	11,810,896

Table 5. Year 5 Compliance Costs

Model Plant	Solvent Usage (pounds)	Incremental Cost of Using No-HAP Solvent ($/lb)	Incremental Cost Per Facility ($)	Number of Non-complying Existing Facilities	Projected Number of New Facilities	Nationwide Incremental Cost ($)
1	13,173	$0.20	2,634.60	264	75	893,129
2	50,340	$0.20	10,068.00	219	55	2,758,632
3	61,838	$0.20	12,367.60	162	55	2,683,769
4	167,817	$0.20	33,563.40	76	30	3,557,720
5	572,699	$0.20	114,539.80	13	10	2,634,415
				734	225	12,527,666

Table 6. Summary of Estimated Monitoring, Recordkeeping, and Reporting Costs -- Years 1 - 5

YEAR	EXISTING SOURCE COSTS ($)	EXISTING SOURCE BURDEN (HRS)	NEW SOURCE COSTS ($)	NEW SOURCE BURDEN (HRS)	TOTAL NATIONWIDE ANNUAL COST ($)	TOTAL NATIONWIDE BURDEN (HRS)
1	3,746,460	69,000	1,539,795	28,359	5,286,255	97,359
2	0	0	2,697,451	49,680	2,697,451	49,680
3	10,864,734	200,100	3,855,107	71,001	14,719,841	271,101
4	38,588,538	710,700	5,012,763	92,322	43,601,301	803,022
5	38,588,538	710,700	6,170,420	113,643	44,758,958	824,343

Table 7. Total Estimated Cost of Proposed Standards -- Years 1 - 5

YEAR	COST TO COMPLY ($)	MONITORING, RECORDKEEPING, REPORTING COSTS ($)	TOTAL ANNUAL COSTS ($)
1	716,771	5,286,255	6,003,026
2	1,433,541	2,697,451	4,130,992
3	2,150,312	14,719,841	16,870,153
4	11,810,896	43,601,301	55,412,197
5	12,527,666	44,758,958	57,286,624

PRELIMINARY INDUSTRY CHARACTERIZATION: MISCELLANEOUS METAL PARTS & PRODUCTS SURFACE COATING SOURCE CATEGORY

Coatings and Consumer Products Group
Emission Standards Division
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711

September 30, 1998

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I. OVERVIEW OF THE DEVELOPMENT OF MACT STANDARDS

Under Section 112(d) of the Clean Air Act (the Act), the U.S. Environmental Protection Agency (EPA) is developing national emission standards for hazardous air pollutants (NESHAP) for the Miscellaneous Metal Parts and Products Surface Coating source category. The EPA is required to publish final emission standards for the Miscellaneous Metal Parts and Products source category by November 15, 2000. For this category, national volatile organic compound (VOC) rules or control techniques guidelines under Section 183(e) are being developed on a similar schedule.

The Act requires that the emission standards for new sources be no less stringent than the emission control achieved in practice by the best controlled similar source. For existing sources, the emission control can be less stringent than the emission control for new sources, but it must be no less stringent than the average emission limitation achieved by the best performing 12 percent of existing sources (for which the EPA has emissions information). In categories or subcategories with fewer than 30 sources, emission control for existing sources must be no less stringent than the average emission limitation achieved by the best performing 5 sources. The NESHAP are commonly known as maximum achievable control technology (MACT) standards.

The MACT standards development for the Miscellaneous Metal Parts and Products industry began with a Coating Regulations Workshop for representatives of EPA and interested stakeholders in April 1997 and continues as a coordinated effort to promote consistency and joint resolution of issues common across nine coating source categories.[1] The first phase was one in which EPA gathered readily available information about the industry with the help of representatives from the regulated industry, State and local air pollution agencies, small business assistance providers, and environmental groups. The goals of the first phase were to either fully or partially:

- Understand the coating process;
- Identify typical emission points and the relative emissions from each coating process;
- Identify the range(s) of emission reduction techniques and their effectiveness;

[1] The workshop covered eight categories: fabric printing, coating and dyeing; large appliances; metal can; metal coil; metal furniture; miscellaneous metal parts; plastic parts; and wood building products. The automobile and light-duty truck project was started subsequently.

- Make an initial determination on the scope of each category;
- Determine the relationships and overlaps of the categories;
- Locate as many facilities as possible, particularly major sources;
- Identify and involve representatives for each industry segment;
- Complete informational site visits;
- Identify issues and data needs and develop a plan for addressing them;
- Develop questionnaire(s) for additional data gathering; and
- Document results of the first phase of regulatory development for each category.

The industry associations that have been identified as representatives of miscellaneous metal parts and products surface coaters are listed in Table 1.

TABLE 1. MISCELLANEOUS METAL PARTS AND PRODUCTS INDUSTRY ASSOCIATIONS

Trade Association	Active
Adhesive and Sealant Council	X
Aerospace Industries Association	X
Air-Conditioning and Refrigeration Institute	
Air Transport Association	
Aluminum Association	
Aluminum Extruders Council	X
Aluminum Foil Container Manufacturers Association	
American Automobile Manufacturers Association	X
American Electroplaters and Surface Finishers Society	X
American Foundrymens Society	
American Gear Manufacturers Association	
American Institute for International Steel	
American Institute of Steel Construction	X
American Iron and Steel Institute	
American Railway Car Institute	X
Association of Container Reconditioners	X
Association of Home Appliance Manufacturers	
Association of International Automobile Manufacturers	X
Automotive Parts and Accessories Association	X
Chemical Manufacturers Association	X
Cookware Manufacturers Association	
Copper and Brass Fabricators Council	

Trade Association	Active
Ductile Iron Pipe Research Association	X
Electronic Industries Association	X
Equipment Manufacturers Institute	
Federation of Societies for Coating Technology	
Hearth Products Association	X
Industrial Heating Equipment Association	
International Fabricators and Manufacturers Association	
Iron and Steel Society	
Metal Building Manufacturers Association	
Metal Construction Association	
Metal Finishing Association	X
Metal Finishing Suppliers' Association	
Metal Powder Industries Federation	
Motor Equipment Manufacturers Association	
National Association of Chain Manufacturers	
National Association of Manufacturers	
National Association of Metal Finishers	X
National Electrical Manufacturers Association	X
National Paint and Coatings Association	X
National Screw Machine Products Association	
Powder Coating Institute	X
Precision Machined Products Association	
Precision Metalforming Association	
Recreational Vehicle Industry Association	
Rubber Manufacturers Association	X
Society For Protective Coatings	X
Specialty Steel Industry of North America	
Spring Manufacturers Institute	
Steel Deck Institute	
Steel Founders Society of America	
Steel Joist Institute	X
Steel Manufacturers Association	
Steel Plate Fabricators Association	
Steel Shipping Container Institute	X
Steel Structures Painting Council	
Steel Tank Institute	
Steel Tube Institute	
Suppliers of Advance Composite Materials Association	
Tube and Pipe Association International	

Trade Association	Active
Valve Manufacturers Association	
Wire Association International	

The States that have participated in the stakeholder process are California, Florida, Illinois, Wisconsin, Oklahoma, North Carolina, Nebraska, West Virginia, New York, Georgia, Alabama, Louisiana, Tennessee, Virginia, and Kentucky. The Air Pollution Control District of Jefferson County (KY) and the Ventura County Air Pollution Control District (CA) have also participated. The U.S. EPA has been represented by EPA Regions 4, 7, and 9, the EPA Office of Air Quality Planning and Standards (EPA/OAQPS), and the EPA Office of Research and Development.

The information summarized in this document can be used by States that may have to make case-by-case MACT determinations under Sections 112(g) or 112(j) of the Act. The initial phase of the regulatory development focused primarily on characterizing the Miscellaneous Metal Parts and Products industry and collecting preliminary emission information from facilities applicable to the category. This document represents the conclusion of that phase of rule development.

This document includes a description of the emission control technologies, identified by EPA, that are currently used in practice by the industry and that could serve as the basis of MACT. Within the short time-frame intended for this initial phase, however, only limited data were collected. The information summarized in this memorandum was collected prior to July 1, 1998. Additional information will be collected and considered before the Miscellaneous Metal Parts and Products standards are promulgated.

During the next phase, EPA will continue to build on the knowledge gained to date and proceed with more focused investigation and data analyses. We will also continue our efforts to coordinate cross-cutting issues. We will continue to identify technical and policy issues that need to be addressed in the rule-making and enlist the help of the stakeholders in resolving those issues.

II. SUMMARY OF DATA SOURCES AND NEXT STEPS

Data sources considered in this analysis of the MMPP surface coating source category included:

- EPA's Source Test Information Retrieval System (STIRS) database (which includes test reports from facilities nationwide);
- EPA's Toxic Reporting Inventory (TRI) database;
- EPA's Aerometric Information Retrieval System (AIRS), which includes emission inventory data nationwide;
- Data from individual States which was specifically requested for use in this and the other 10-year MACT surface coating projects;
- Data provided by facilities at which site visits were conducted (including Title V permit applications); and
- Input from State and industry stakeholders at Stakeholder meetings and Conference Calls.

EPA also considered coating emission limits included in current regulations for sources similar to MMPP surface coating. During the course of this effort, the "Regulatory Subgroup", consisting of the EPA project team and EPA Regional and State/Local Agency representatives, convened to discuss the process and the potential approaches to identify data gaps.

This document provides summary information, including a summary of existing State and Federal rules pertaining to this source category, that may be useful in making a 112(g) determination. Information obtained by the EPA from site visits (aluminum extruders, defense contractors, magnet wire facilities, large truck manufacturers, railcar manufacturers, curtain wall manufacturers, and NASA) and information provided by industry associations is included in the Industry Sector Profiles. Future site visits are planned to facilities that coat automobile parts, recreational vehicles, rubber-to-metal bonded parts, steel joists, and structural metal parts.

The development of the final MACT standard for MMPP surface coating will require the gathering of additional information specific to all segments represented within this source category. In addition to the information gathering techniques outlined above, data has been collected via a Screening Survey, which was sent to approximately 3,000 facilities in June 1998, and will be collected from a subsequent Detailed Questionnaire, which is planned to be distributed in October 1998. This information will be used to further characterize and understand the coating operations from the various industry segments included in this source category. The information will then be used to calculate a precise MACT floor, and will enable EPA to develop pollution prevention alternatives that are directly applicable to industries within the MMPP Surface Coating source category.

III. SOURCE CATEGORY OVERVIEW

Applicability

The MMPP Surface Coating source category encompasses all industries that coat metal parts and products, but are not subject to other surface coating regulations. The Miscellaneous Metal Parts and Products source category includes thousands of small, medium, and large size facilities that apply coatings to a metal substrate to produce a wide range of parts and products generally found under Standard Industrial Classification (SIC) codes 33 through 39 and others. Coating is defined as a protective, decorative, or functional film applied as a thin layer to a substrate or surface which cures to form a continuous solid film. This term applies to paints such as lacquers or enamels, but also is used to refer to films applied to paper, plastics, or foil. Adhesives and caulks are also being treated as coatings. In general, this source category is broad and includes all those metal parts and products that are not covered by another coating source category, including original equipment manufacturers (OEM) and refurbishment shops. Careful attention has been and will continue to be placed on the potential for overlaps between this and other source categories including the following:

- Aerospace Surface Coating
- Architectural and Industrial Maintenance Coatings (VOC)
- Automobile and Light-Duty Truck Surface Coating
- Boat Manufacturing
- Iron and Steel Foundry
- Large Appliance Surface Coating
- Metal Can Surface Coating
- Metal Coil Surface Coating
- Metal Furniture Surface Coating
- Paint Stripping
- Plastic Parts and Products Surface Coating
- Ship Building and Repair

Other operations associated with surface coating (e.g. cleaning, mixing, surface preparation, storage, waste handling, etc.) are also being considered for regulation at facilities in the MMPP Surface Coating source category.

Many of the problems associated with developing regulations for the MMPP Surface Coating source category have been related to the many possible overlapping categories, and the uncertainty of defining the universe of MMPP facilities. A condensed list of the SIC codes that are potentially useful in identifying MMPP facilities for analysis are shown in Table 2. As of January 1, 1997, a new numerical coding system for classifying industries has been implemented by the U.S. Department of Commerce. This new system is called the North American Industrial Classification System (NAICS). The MMPP project team intends to use the NAICS codes as well as SIC codes in identifying potential facilities within this source category for analysis, although using NAICS/SIC codes alone does not identify whether individual sources within that industry perform surface coating.

TABLE 2. LIST OF SIC CODES FOR MISCELLANEOUS METAL PARTS AND PRODUCTS

Major Group 33 - Primary Metal Industries

331x	Steel Works, Blast Furnaces, and Rolling and Finishing Mills
332x	Iron and Steel Foundries
335x	Rolling, Drawing, and Extruding of Nonferrous Metals
336x	Nonferrous Foundries (Castings)
3399	Primary Metal Products, Not Elsewhere Classified

Major Group 34 - Fabricated Metal Products, Except Machinery and Transportation Equipment

3412	Metal Shipping Barrels, Drums, Kegs, and Pails
342x	Cutlery, Hand tools, and General Hardware
343x	Heating Equipment, Except Electric and Warm Air; and Plumbing Fixtures
344x	Fabricated Structural Metal Products
345x	Screw Machine Products, and Bolts, Nuts, Screws, Rivets, and Washers
346x	Metal Forgings and Stampings
347x	Coating, Engraving, and Allied Services, Not Elsewhere Classified
348x	Ordnance and Accessories, Except Vehicles and Guided Missiles
349x	Miscellaneous Fabricated Metal Products

TABLE 2. LIST OF SIC CODES FOR MISCELLANEOUS METAL PARTS AND PRODUCTS (CONTINUED)

Major Group 35 - Industrial and Commercial Machinery and Computer Equipment

351x	Engines and Turbines
352x	Farm and Garden Machinery and Equipment
353x	Construction Machinery and Equipment
354x	Metalworking Machinery and Equipment
355x	Special Industry Machinery, Except Metalworking Machinery
356x	General Industrial Machinery and Equipment
357x	Computer and Office Equipment
358x	Refrigeration and Service Industry Machinery
359x	Miscellaneous Industrial and Commercial Machinery and Equipment

Major Group 36 - Electronic and Other Electrical Equipment and Components, Except Computer Equipment

361x	Electric Transmission and Distribution Equipment
362x	Electrical Industrial Apparatus
3631	Household Cooking Equipment
3634	Electric Housewares and Fans
3635	Household Vacuum Cleaners
3639	Household Appliances, Not Elsewhere Classified
364x	Electric Lighting and Wiring Equipment
3651	Household Audio and Video Equipment
366x	Communications Equipment
367x	Electronic Components and Accessories
369x	Miscellaneous Electrical Machinery, Equipment, and Supplies

Major Group 37 - Transportation Equipment

371x	Motor Vehicles and Motor Vehicle Equipment
3724	Aircraft Engines and Engine Parts
3728	Aircraft Parts and Auxiliary Equipment, Not Elsewhere Classified
374x	Railroad Equipment
375x	Motorcycles, Bicycles, and Parts

376x Guided Missiles and Space Vehicles and Parts

379x Miscellaneous Transport Equipment

TABLE 2. LIST OF SIC CODES FOR MISCELLANEOUS METAL PARTS AND PRODUCTS (CONTINUED)

Major Group 38 - Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks

(ENTIRE GROUP)

Major Group 39 - Miscellaneous Manufacturing Industries

3911 Jewelry, Precious Metal

3914 Silverware, Plated Ware, and Stainless Steel Ware

3931 Musical Instruments

3944 Games, Toys, and Children's Vehicles, Except Dolls and Bicycles

3949 Sporting and Athletic Goods, Not Elsewhere Classified

396x Costume Jewelry, Costume Novelties, Buttons, and Miscellaneous Notions, Except Precious Metal

399x Miscellaneous Manufacturing Industries

Major Group 97 - National Security and International Affairs

9711 National Security

Another approach that has proven useful in limiting MMPP sources identified by NAICS/SIC to those involved in surface coating is using the emissions inventory data that is stored in the EPA's Aerometric Information Retrieval System (AIRS). In that system, Source Classification Codes (SCCs) specify the type of process that emits pollutants. Figure 1 shows the locations of the facilities that were identified from AIRS as being MMPP sources.

Emissions/Emission Reduction Techniques

Due to the broad scope of the Miscellaneous Metal Parts and Products category, there are a variety of products coated and application techniques used by the different industry sectors.

Emissions from Miscellaneous Metal Parts and Products surface coating facilities typically come from surface preparation, coating application and flash-off, and curing.

Surface preparation is often performed to clean the substrate and improve adhesion. Types of chemicals for pretreatment include aqueous caustic solutions, phosphate, chromate rinse, and organic solvent cleansers. After cleaning, parts are usually dried in an oven prior to coating application steps. Surface preparation can also involve paint stripping, blasting (with sand, shot, or other blast media), and other methods to physically alter the surface prior to coating application.

There are several coating application techniques used in the different industry sectors. Variations in emissions from the application of solvent-based coatings are most commonly attributed to transfer efficiency, evaporation and flash-off. Possible emission reduction techniques for coating application include the use of waterborne coatings, high-solids coatings, powder coatings, and add-on control devices. Many sectors of the category, however, may have performance requirements for their coatings that would not allow the use of many of these more innovative technologies.

Current Industry Control Status

One of the most critical pieces of information that will be used for the determination of the MACT floor will be the analysis of the control level used in the top performing 12% of sources within the source category or within any yet-to-be identified subcategories. However, using the information that is available through AIRS, a summary of the control techniques used for the SCCs that have been identified as at least being potentially associated with the MMPP Surface Coating source category was developed. Information on control techniques will be collected via the Screening and Detailed Questionnaires and will be used for further analysis of industries within the Miscellaneous Metal Parts and Products Surface Coating category.

Industry Sector Profiles

The MMPP Surface Coating source category covers a wide variety of industry types; no single description could cover all of these different industry sectors. The industry sectors that have been individually studied thus far in the course of this project are listed below, followed by a description of each.

- Aerospace Ground Support Equipment
- Agricultural and Construction Machinery
- Aluminum Extrusion
- Automobile Parts
- Contract Coating Facilities
- Heavy-Duty Trucks and Buses
- Magnet Wire
- Metal Shipping Containers
- Pipe and Foundry
- Rail Transportation
- Recreational Vehicles
- Rubber-to-Metal Bonded Part Manufacturing
- Structural Steel

This list should not be misconstrued as being all-inclusive, and industries that may be subject to future regulations being developed for this source category may not be listed here. This document is for informational purposes only and an omission of an industry from the list does not mean it will not be regulated within this source category.

Additionally, the discussion of industry segments here should not be misconstrued as being a default subcategorization scheme. The purpose of identifying industry segments in this document is to provide some framework for presenting the information collected thus far in the process of regulatory development and to demonstrate the breadth of the source category. The information provided in this document will be expanded upon as the project moves forward.

Aerospace Ground Support Equipment Industry

General. More than 12,000 part or equipment types can be considered ground support equipment (GSE) in the aerospace industry. GSE is classified by the function of the equipment and by the items the equipment is used to support. GSE is used for auxiliary purposes, testing and checkout, handling of other equipment and cargo, mechanical site testing, packaging and transport, servicing, and other miscellaneous purposes.

Trade Associations. The following trade associations have been identified for this industry sector:

- Aerospace Industries Association
- Air Transport Association

Process Description. Detailed information is not available at this time.

Coatings. Detailed information is not available at this time.

Emission Control Techniques. Detailed information is not available at this time.

Agricultural and Construction Machinery Industry

General. The Agricultural and Construction Machinery Industry is covered by NAICS code series 3331 (Agricultural, Construction, and Mining Machinery Manufacturing) and series 33392 (Material Handling Equipment Manufacturing). This industry is also described using the 1987 Standard Industrial Classification (SIC) code series 352 (Farm and Garden Machinery and Equipment) and 353 (Construction, Mining, and Materials Handling Machinery and Equipment). The Agricultural and Construction Machinery Industry excludes corrals, stalls, and holding gates which are covered by SIC code 3523 (Farm Machinery and Equipment). These products are included with NAICS code 332323 (Ornamental and Architectural Metal Work Manufacturing) and are categorized within the Structural Metal Industry. Railway truck maintenance equipment, which is covered by SIC code 3531 (Construction Machinery and Equipment), is also excluded from this industry. These products are included with NAICS code 33651 (Railroad Rolling Stock Manufacturing) and are categorized in the Rail Transportation Industry. Hand-held clippers for shearing or grooming animals, covered by SIC 3523, are also excluded from the Agricultural and Construction Machinery Industry. A list of the NAICS codes that describe this industry and corresponding SIC codes is provided below [1].

333111	Farm Machinery and Equipment Manufacturing [includes SIC 3523 (Farm Machinery and Equipment), except corrals, stalls, and holding gates; farm conveyors and farm elevators, stackers and bale throwers; and hand hair clippers for animal use.]
333112	Lawn and Garden Tractor and Home Lawn and Garden Equipment Manufacturing [includes SIC 3524 (Lawn and Garden Tractors and Home Lawn and Garden

Equipment), except non-powered lawnmowers]

33312 Construction Machinery Manufacturing
[includes SIC 3531 (Construction Machinery and Equipment), except railway truck maintenance equipment; and winches, aerial work platforms and automotive wrecker hoists.]

333131	Mining Machinery and Equipment Manufacturing [includes SIC 3532 (Mining Machinery and Equipment, Except Oil and Gas Field Machinery and Equipment)]
333132	Oil and Gas Field Machinery and Equipment Manufacturing [includes SIC 3533 (Oil and Gas Field Machinery Equipment)]
333921	Elevator and Moving Stairway Manufacturing [includes SIC 3534 (Elevator and Moving Stairways)]
333922	Conveyor and Conveying Equipment Manufacturing [includes SIC 3535 (Conveyors and Conveying Equipment); and farm conveyors and farm elevators, stackers and bale throwers from SIC 3523 (Farm Machinery and Equipment)]
333923	Overhead Traveling Crane, Hoist, and Monorail System Manufacturing [includes SIC 3536 (Overhead Traveling Cranes, Hoists, and Monorail Systems); and winches, aerial work platforms, and automotive wrecker hoists from SIC 3531 (Construction Machinery and Equipment)]
333924	Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing [includes SIC 3537 (Industrial Trucks, Tractors, Trailers, and Stackers), except metal pallets, and metal air cargo containers]

Trade Associations. No trade associations have been identified for this industry sector.

Process Description. HAP and VOC emissions are expected from pretreatment processes (when organic solvents are involved in the pretreatment process), and in coating application (including flash-off areas and curing ovens). Detailed information, however, is not available at this time.

Coatings. Detailed information is not available at this time.

Emission Control Techniques. Detailed information is not available at this time.

<u>**Aluminum Extrusion Industry**</u>

General. The Aluminum Extrusion Industry is covered by the NAICS code 331316 (Aluminum Extruded Product Manufacturing), and by the SIC code 3354 (Aluminum Extruded

Products). Under SIC 3354, the Aluminum Extrusion Industry is grouped with establishments primarily engaged in extruding aluminum and aluminum-based alloy basic shapes, such as rod and bar, pipe and tube, and tube blooms, including establishments producing tube by drawing [2].

The MMPP project team developed a census of aluminum extrusion facilities from the AIRS database and from information supplied by the Aluminum Extruders Council. A search of the AIRS database indicated 11 aluminum extrusion facilities with in-house coating capabilities [3]. The AEC's 1997 Buyers Guide gives a complete listing of all AEC members. This list showed 144 aluminum extrusion facilities nationwide and 43 facilities abroad. Only 50 of the U.S. AEC member facilities possess in-house coating capabilities [4]. These facilities are located in 25 States, with Ohio having the largest number of facilities.

One of the key reasons for the continuous growth in popularity of extrusion applications is the nominal cost of extrusion dies. Complex extruded shapes almost always cost less than they would if formed, rolled, or machined [5]. In addition, aluminum extrusions provide a high strength-to-weight ratio, close tolerances, ease of joining, good machinability, excellent corrosion resistance, and high electrical conductivity [6]. Aluminum extrusions also have remarkable thermal properties and are excellent for use in highly flammable atmospheres or with explosive materials [7]. Extruded aluminum will not burn, and does not emit any toxic, hazardous fumes when exposed to high temperatures. Aluminum extrusions have substantial scrap value and can be recycled. Recycling aluminum takes only five percent as much energy as producing new aluminum [6]. Aluminum extrusions have the capacity to accommodate a variety of coatings and finishes. Coatings such as powder paint or traditional enamel paints can be applied with a variety of finishes from rough to mirror smooth.

Aluminum extrusion manufacturers produce a wide array of products for several market sectors. The major market categories serviced by aluminum extruders and included in the MMPP source category are building and construction, transportation, and consumer durables. The building and construction market category consists of doors, windows and shutters, mobile homes, curtain walls, bridge rails and decks, street and highway construction, architectural shapes, patio and pool enclosures, light and flag poles, louvers and vents, and conduits. Included in the transportation category are aircrafts, trailers and semitrailers, passenger cars, trucks and buses, travel trailers, and recreational vehicles. The consumer durables market covers products such as refrigerators and freezers, major appliances, furniture, boats, outboard motors, sports and athletic equipment, and toys. Other major market categories serviced by the aluminum extrusion industry include electrical goods, machinery and equipment, distributors and jobbers, and exports. Most aluminum extruders produce products for multiple market sectors. Thirty-five percent of all extruded aluminum is produced for the building and construction industry [8].

Trade Associations. The following trade association has been identified for this industry sector:

- Aluminum Extruders Council

Process Description. HAP and VOC emissions are expected from pretreatment processes (when organic solvents are involved in the pretreatment process), in coating application (including flash-off areas and curing ovens), and in thermal filling of extruded aluminum products.

Pretreatment. The pretreatment of aluminum lays the foundation for the coating and allows the film to properly adhere to the substrate. Typically, pretreatment is a 5 to 7 stage process of either immersion or in-line spraying of the substrate with several cleaning solutions. After pretreatment, the aluminum part is dried in an oven before it is coated [9].

Cladding. To increase the natural corrosion resistance of extruded aluminum, a process known as cladding is used. In the cladding process, an additional layer of pure aluminum or an appropriate alloy is applied to the surface of a strong aluminum alloy to increase corrosion resistance [6]. No HAP or VOC emissions are known to be released from the cladding process.

Thermal Filling. Thermal filling is a common practice for aluminum extruders who manufacture windows and doors. In this process, the cavity of a window or door is filled with epoxy and allowed to dry. Then a portion of the metal and epoxy is removed creating a discontinuity of the surfaces, thereby providing greater insulation potential for the parts [10].

Coating Application. Aluminum extrusions are coated on two types of lines: vertical and horizontal. Both processes offer quality coated products and can handle a variety of shapes and sizes [9]. The vertical coating line can accommodate extruded profiles of more than 30 feet in length. Vertical coating processes can be customized based on the shape and length of a part. It is used for longer shapes such as pool edges. It produces less waste than the horizontal process. The horizontal coating line offers a higher efficiency than the vertical process, however, it coats extrusions up to four times slower than the vertical line. Both horizontal and vertical systems share the same basic stages for coating application: pretreatment, dry, coating application, curing, and unloading.

Electrostatic spray application is the most popular way to coat aluminum extrusions and is used for virtually all aluminum extrusion coating processes. Rotary atomization is a variation of the electrostatic coating method which is used to apply liquid enamels.

Coatings. Both organic solvent-borne liquid enamels and low-VOC powder coatings are used to paint aluminum extrusions. Typical resins found in liquid and powder aluminum extrusion coatings are polyester, acrylic, siliconized polyester, and fluoropolymer. Aluminum extrusion coatings must be resistant to stresses caused by UV radiation, moisture, high temperatures and temperature fluctuations, aggressive environments, and physical damage [9].

Specifications for aluminum extrusion coatings have been developed by the American Architectural Manufacturers Association (AAMA) and the Architectural Spray Coaters Association (ASCA). Coatings covered by these specifications are rated on their performance in the following areas: ease of application, solvent resistance, chemical resistance, corrosion resistance, exterior durability, hardness, adhesion, flexibility, mar resistance, and color/gloss retention.

Emission Control Techniques. Powder coatings and oxidizers are the primary means of VOC/HAP emissions control in the aluminum extrusion industry. Powder coatings contain from 0 to 10 percent entrapped volatiles [11]. Oxidation, or incineration, is the most common method of controlling VOC/HAP emissions produced during the aluminum extrusion manufacturing process and are present in many areas associated with the coating process including pretreatment stations, coating booths, curing ovens, and flash-off areas.

Automobile Parts Industry

General. The Automobile Parts Industry is covered by the NAICS codes 336211 (Motor Vehicle Body Manufacturing) and the NAICS code series 3363 (Motor Vehicle Parts Manufacturing). This industry is also described by SIC code 3714 (Motor Vehicle Parts and Accessories). Under SIC code 3714, the Automobile Parts Industry includes establishments primarily engaged in manufacturing

motor vehicle parts and accessories, but not engaged in manufacturing complete motor vehicles or passenger car bodies [2]. NAICS code 336211 includes dump truck lifting mechanisms and fifth wheels which are also covered by SIC code 3714. In accordance with NAICS code series 3363, this industry sector includes automobile
parts that are covered by various SIC codes including 3714. A list of the NAICS codes in series 3363 and corresponding SIC codes (except SIC 3714) that are relevant to the miscellaneous metal parts and products source category is provided below [1].

336311	Carburetor, Piston, Piston Rings, and Valve Manufacturing [includes SIC 3592 (Carburetor, Pistons, Piston Rings, and Valve Manufacturing)]
336312	Gasoline Engine and Engine Parts Manufacturing
336321	Vehicular Lighting Equipment [includes SIC 3647 (Vehicular Lighting Equipment)
336322	Other Motor Vehicle Electrical and Electronic Equipment Manufacturing [includes SIC 3694 (Electrical Equipment for Internal Combustion Engines)]
33633	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing
33634	Motor Vehicle Brake System Manufacturing
33635	Motor Vehicle Transmission and Power Train Parts Manufacturing
33636	Motor Vehicle Seating and Interior Trim Manufacturing [includes metal motor vehicle seat frames SIC 3499 (Fabricated Metal Products, Not Elsewhere Classified)]
33637	Motor Vehicle Stamping, Metal [includes SIC 3465 (Automotive Stampings)]
336391	Motor Vehicle Air-Conditioning Manufacturing [includes motor vehicle air-conditioning from SIC 3585 (Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment)]
336399	All Other Motor Vehicle Parts Manufacturing [includes luggage and utility racks from SIC 3429 (Hardware, Not Elsewhere Classified); stationary engine radiators from SIC 3519 (Internal Combustion Engines, Not Elsewhere Classified); gasoline, oil, and intake filters for internal combustion engines from SIC 3599 (Industrial and Commercial Machinery and Equipment, Not Elsewhere Classified); and trailer hitches from SIC 3799 (Transportation Equipment, Not Elsewhere Classified)]

The AIRS database indicates that there are approximately 263 facilities nationwide located in 23 States that manufacture automobile parts [3].

Trade Associations. The following trade associations have been identified for this industry sector:

- American Automobile Manufacturers Association
- Association of International Automobile Manufacturers
- Automotive Parts and Accessories Association

Process Description. HAP and VOC emissions are expected from pretreatment processes (when organic solvents are involved in the pretreatment process), and in coating application (including flash-off areas and curing ovens). Detailed information on these processes, however, is not available at this time.

Coatings. Detailed information is not available at this time.

Emission Control Techniques. Detailed information is not available at this time.

Contract Coating Facilities

General. Contract coating facilities, or "job shops", may be described as facilities that perform surface coating operations for a variety of industries on a contract basis. These facilities may specialize in coating products for one specific industry; or may coat several products for several different industries. Job shops may be covered by several SIC codes and NAICS codes including SIC code 3479 (Coating, Engraving, and Allied Services) and NAICS code 332812 (Metal Coating, Engraving (except Jewelry and Silverware) and Allied Services to Manufacturers). SIC code 3479 includes establishments primarily engaged in performing enameling, lacquering, and varnishing services of metal products for the trade. Also included in this industry are establishments which perform these types of activities on their own account on purchased metals or formed products [2].

Job shops showed dramatic increases in numbers of facilities and in sales between 1996 and 1998 [12]. Job shops utilize a variety of coating techniques to apply coatings to virtually all types of products and substrates.

Trade Associations. No trade associations have been identified for this industry sector.

Process Description. HAP and VOC emissions are expected from pretreatment processes (when organic solvents are involved in the pretreatment process), and in coating application (including flash-off areas and curing ovens). Detailed information, however, is not available at this time.

Coatings. Detailed information is not available at this time.

Emission Control Techniques. Detailed information is not available at this time.

Heavy-Duty Trucks and Buses Industry

General. The Heavy-Duty Trucks and Buses Industry is covered by the NAICS code 331316 (Motor Vehicle Body Manufacturing) and the SIC code 3713 (Truck and Bus Bodies). Under SIC code 3713, the Heavy-Duty Truck and Buses Industry is grouped with establishments primarily engaged in manufacturing large truck and bus bodies and cabs for sale separately or for assembly on purchased chassis, or in assembling large truck and bus bodies on purchased chassis. Also included in this industry sector are truck trailers which are covered by the NAICS code 336212 (Truck Trailer Manufacturing), and the SIC code 3715 (Truck Trailers). Under SIC code 3715, the truck trailer industry is grouped with establishments primarily engaged in manufacturing truck trailers, truck trailer chassis for sale separately, detachable trailer bodies (cargo containers) for sale separately, and detachable trailer (cargo container) chassis, for sale separately.

The AIRS database indicates that there are approximately 81 heavy-duty truck, trailer, and bus manufacturing facilities nationwide located in 18 States [3]. AAMA (American Automobile Manufacturers Association) reports that 346,000 large trucks (14,000+ lbs.) were sold in the United States in 1996.

Trade Associations. The following trade associations have been identified for this industry sector:

- Truck Manufacturers Association
- American Automobile Manufacturers Association

Process Description. Heavy-duty trucks consists of three major parts: chassis, cab, and trailer. Most parts are coated separately and prior to assembly. The basic chassis is formed using metal rails, axles, and cross beams. The chassis structure is completed by adding metallic brake lines, plastic wiring harnesses, and other metal and plastic parts. Chassis components are usually primed individually prior to assembly at the heavy-duty truck manufacturing facility. In some cases, chassis components are primed off-site by the parts manufacturers before being shipped to truck manufacturing facilities. Individual parts may be sanded and touched up, if necessary, before chassis assembly using a solvent-borne or waterborne paint. HAP and VOC emissions are expected from pretreatment processes (when organic solvents are involved in the pretreatment process), and in coating application (including flash-off areas and curing ovens) [13,14,15].

The assembled chassis enters a paint booth where a top coat is applied. Heavy-duty truck manufacturers use conventional, electrostatic, and HVLP spray guns for this coating application. Black is the primary color used for chassis coating, however, some facilities use several other colors in addition to black. Greater than eighty percent of all heavy-duty truck chassis are black. Both solvent-borne and waterborne paints are used for chassis top coats. Solvent-borne top coats are likely to be high-solids acrylic or polyurethane coatings.

Cabs and cab components are primed prior to cab assembly; this is done for both metal and plastic parts. Following assembly, metal and plastic cab components are coated together. Cab assemblies are pretreated to prevent corrosion and promote coating adhesion. After pretreatment, cab seams are sealed with an emulsion caulk which may be water-based. Cabs are primed in a spray booth, using either conventional, HVLP, or electrostatic spray application methods. Cabs are then sent to a flash-off area, followed by a curing oven where they are dried under either “hi-bake” (350^{o}F or higher) or “lo-bake” (approximately 180^{o}F) conditions, depending on whether plastic parts have been assembled to the cab. Once dry, some manufacturers apply a low-VOC asphalt undercoat spray as a rust preventative measure. Cab surfaces are then sanded in preparation for the base coat. The base coat is applied in a spray booth, typically using HVLP application, followed by a flash-off area or lo-bake convection oven. Some cabs require multiple base coats. Typically, only one base coat is applied per day, with 24 hours allowed for the coating to cure. The final layer is a clear top coat which is often applied using conventional, HVLP, or electrostatic spray guns. Finally, the hood of the cab is removed and the interior parts (i.e. seats, dash) are inserted.

Coatings. Both waterborne and solvent-borne coatings are used for a variety of applications throughout the heavy-duty trucks and buses industry sector. Chassis are primed and coated with both solvent-borne and waterborne coatings. Solvent-borne paints used for chassis coating may be high-solids acrylics, polyurethanes, or other low-VOC coatings. Heavy-duty truck manufacturers use several hundred colors for cab coating applications. The use of solvent-borne coatings may be necessary for color matching, durability, and other coating requirements in this industry. However, heavy-duty truck manufacturers work closely with coating suppliers to find low solvent and low-HAP coating solutions, where feasible [13,14,15].

Emission Control Techniques. Add-on control devices were not observed in site visits to three heavy-duty truck facilities. Reviews of Title V permit applications, likewise, indicated that no add-on control devices are used in typical heavy-duty truck facilities.

Magnet Wire Industry

General. The Magnet Wire Industry is covered by the NAICS codes 331319 (Other Aluminum Rolling and Drawing), 331421 (Copper Rolling, Drawing, and Extruding); 331422 (Copper Wire [except mechanical] Drawing), 33149 (Nonferrous Metals [except copper and aluminum] Rolling, Drawing, and Extruding), and 335929 (Other Communication and Energy Wire Manufacturing). This industry is also described using the SIC code 3357 (Drawing and Insulating of Nonferrous Wire). Under SIC code 3357, the Magnet Wire Industry is grouped with establishments primarily engaged in drawing, drawing and insulating, and insulating wire and cable of nonferrous metals from purchased wire bars, rods, or wire and includes establishments primarily engaged in manufacturing insulated fiber optic cable [2]. SCCs identify facilities involved in the coating of magnet wire with the six-digit SCC 4-02-015 covering the industrial processes associated with the surface coating of magnet wire.

Magnet wire is produced predominantly in large facilities which both draw and insulate the wire and sell it for use in electrical and electronic products. The AIRS database indicates that there are approximately 30 magnet wire manufacturing facilities in the US [3]. These facilities are located in Arkansas, California, Connecticut, Georgia, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Missouri, New Hampshire, New York, North Carolina, Pennsylvania, Tennessee, Texas, Vermont, and West Virginia. Fort Wayne, Indiana is home to the largest concentration of magnet wire manufacturers.

In magnet wire fabrication, a coating of electrically insulating enamel or varnish is applied to bare wire, usually made of copper or aluminum. The term "magnet" is used to describe this wire because it is usually formed into coils for the purpose of creating an electromagnetic field when an electrical current is applied. Magnet wire is used in electrical equipment such as clocks, telephones, electric motors, generators, and transformers [16]. It is usually classified by gauge which indicates the thickness/diameter of the wire, with greater gauge numbers indicative of increasingly finer wire. Wire of 20 gauge or less is called heavy wire; medium wire ranges from 21 to 32 gauge; fine wire ranges from 33 to 39 gauge; and extra fine wire is greater than 40 gauge.

Trade Associations. The following trade association has been identified for this industry sector:

- National Electrical Manufacturers Association (NEMA)

Process Description. Most magnet wire manufacturing facilities draw wire from bare metal rod in addition to insulating the wire with coating. The drawing of wire from bare rod is a process of elongating the rod and decreasing its diameter, using a series of dies, until wire of a desired thickness or gauge is achieved. Many processes require wire to incur several drawings before it reaches the specified gauge.

Once wire has been drawn to the desired gauge, it is passed several times through an annealing oven. This process softens the wire, making it more pliable, and cleans the wire of oil and dirt [16]. The wire is then ready for coating application. Two methods are used in the magnet wire coating application process dependent upon the gauge of the wire. Typically, wire coating is applied using a die applicator for lower gauge (thicker) wire. In this process, wire passes through a bath where it picks up a thick layer of coating. The wire is then drawn through a coating die which removes excess coating and leaves a thin film of desired thickness. Die applicators typically coat wire of 30 gauge or lower (larger diameter wire). For fine wire of 30 gauge or more, a felt applicator may be used. In the felt application process, felt swabs, saturated with enamel, are used to transfer coating to the wire [17]. After the wire is coated, it is routed through a two-zone recirculating oven where the coating is dried and cured. The size of the oven is generally larger for lower gauge wire. Wire may be subjected to as many as 20 passes through the coating, baking, and curing processes before it is sufficiently coated. Finally, the insulated wire is passed through a cooling zone and is wound onto a spool where it awaits packaging. In many facilities, magnet wire is coated with a lubricant just after it is cooled and before it is wound onto a spool. This lubricant coatings helps to keep the wire in place as it is wound onto the spool. It is also used to lubricate wire as it is removed from the spool at the same or another manufacturing facility for use in high speed coil winding. HAP and VOC emissions are expected from the coating application (including the curing ovens).

Coatings. The materials used to coat magnet wire must meet rigid electrical insulating, thermal and abrasion specifications. Nyleze is a common insulator made from nylon and polyester. Other coatings include armored poly amide, polyester with a nylon overcoat, and solderable polyester. A bondable material may also be used to coat 40 to 46 gauge wire [17].

Insulation for magnet wire must be tough and flexible. The coating must be capable of elongating from 15 to 40 percent. The coating must stretch at the same rate as the wire which it coats to ensure its insulating properties when the wire is wound to its final form (e.g., in electrical motors). It must also be resistant to high temperatures and have a high thermal conductivity. The base coat, which is typically 6 to 9 layers, provides most of the electrical insulating properties of the wire. The top coat, which may have as few as 1 to 3 layers, provides durability for winding, toughness, and chemical and/or heat resistance. In some specialized applications, a single-layered bond coat may be used as a final coat. This heat-activated coat is frequently used in the automotive industry and serves to bond each winding of the coated wire in a coil to other windings, forming a bonded coil [17].

Organic solvent-borne enamels are the principal coatings used in the magnet wire industry. The solvents in these enamels must not poison the catalyst used in oven operations, and must be compatible with the application method. Different coating formulations are used for felt and die applications. Low-solvent coatings have not yet been developed with properties that meet all wire coating requirements. The organic solvent content of wire coatings typically range from 67 to 85 percent by weight. Solvents used in enamels are selected because they are compatible with the polymer used to insulate the wire and with the oven catalyst. Phenol, cresol, xylene, and cumene are common solvents used in magnet wire coatings. Fine wire coatings have a higher solvent content than medium or heavy wire. Other solvents that may be used to thin magnet wire coatings are cresylic acid, diacetone alcohol, toluene, hiflash naptha, methyl ethyl ketone, n-methyl pyrrolidine, and ortho cresol [16,17].

The solids content of a coating is a function of the type of enamel needed for insulation and the capabilities of the oven used for baking and curing. Base coats tend to have higher solids contents than top coats. Newer ovens are likely to process higher solids more efficiently than older models. Common resins used in magnet wire coatings are polyester amine imide, polyester, polyurethane, epoxy, polyvinyl formal, and polyimide [16].

In the magnet wire coating process, separate ovens are used for annealing, and for baking and curing the coated product. Most drying ovens consist of two zones. The drying zone is held at about 200°C and the curing zone at about 430°C. Many ovens are equipped with an in-line system that draws wire just before it is annealed. The number and type of ovens selected for a facility depends on the production needs of that facility. Over 140 coated wires can be processed in a single oven. Production in an oven may be limited to a specified range of wire gauges.

An oven's line speed capability may be expressed as a product of the diameter of the wire and its velocity through the oven (DV). The capacity of an oven is often characterized by its DV number. The DV range of an oven tends to decrease as the size of the wire increases. Heavy wire must move through an oven at a slower speed than fine wire because as wire travels through the oven, it must maintain a temperature that will insure a consistent cure of the enamel. Heavier wire takes longer to reach the set temperature throughout the wire [17].

The magnitude of emissions from wire coating operations depends on composition of the coating, thickness of the coat, and efficiency of the application [18]. The exhaust from the oven is the most important source of solvent emissions in the wire coating plant. Organic solvent emissions vary from line to line, by size and speed of wire, by number of wires per oven, and by number of passes through the oven. The exhaust from typical ovens range from 11 dry standard cubic meters (dscm) per minute to 42 dscm per minute, with the average being around 28 dscm per minute. The solvent concentration in exhaust normally ranges from 10 to 25 percent of the lower explosive limit (LEL) for that solvent. This is equivalent to about 12 kg of solvent per hour in a typical process. In addition to solvent, 10 to 25 percent of the coating resins may be volatilized in the drying oven, and emitted with oven exhaust. Most of the volatilized resin condenses in the atmosphere to form particles but some breaks down to form VOC [16].

One of three different types of solvent-based, VOC-containing coatings may be used to lubricate magnet wire. A waxy material is commonly used for this application. The lubricated magnet wire does not pass through the catalytic or thermal incineration systems used to control VOC emissions in magnet wire processing. Emissions from this coating process are limited by restricting the VOC content of the lubricant material [19].

Emission Control Techniques. Incineration is the most common add-on control technique used to control emissions from wire coating ovens. The high temperatures at which magnet wire coating ovens operate and the moderate to high solvent loads of these ovens create a suitable environment for incineration. During thermal incineration, solvent-laden gas is passed through an oxidizer where the solvent is combusted. Heated exhaust from the thermal incinerator is then recirculated to the drying oven. This process typically yields a ninety-eight percent solvent destruction efficiency [16].

Magnet wire manufacturers often include catalytic incineration as an integral part of their baking ovens to minimize the cost of oven operation, with the added benefit of reducing the emissions of VOCs and HAPs in the solvent prior to any add-on controls. The heat generated by the catalyst is recirculated to the oven reducing or eliminating the need for fuel after reaching operational temperatures. During internal catalytic combustion, hot solvent-laden air from the oven circulates past a catalyst causing combustion of the solvent to take place. If air exits the drying oven at 260 to 320°C, the oven may be self sustaining. However, a supplementary burner may be used to heat the solvent-laden gases if they do not reach these temperatures. Exhaust gases leave the catalyst at about 450°C and are recirculated to the curing zone. Energy is conserved because less low-temperature makeup air is required due to recirculation, and less fuel is needed to heat the oven or to reach the solvent combustion temperature in the catalyst. Also, internal catalysts yield a 75 to 90 percent solvent destruction efficiency. Air that is not recirculated to the baking oven passes through a control device (if present) for additional solvent reduction.

Metal Shipping Containers Industry

General. Metal shipping containers are classified by the NAICS code 332439 (Other Metal Container Manufacturing) and the SIC code 3412 (Metal Shipping Barrels, Drums, Kegs, and Pails). Under SIC 3412, the Metal Shipping Containers Industry consists of establishments primarily engaged in manufacturing metal shipping barrels, drums, kegs, and pails, and includes the following products [2]:

- Containers, shipping: barrels, kegs, drums, packages - liquid tight (metal)
- Drums, shipping: metal
- Milk (fluid) shipping containers, metal
- Pails, shipping: metal - except tinned

This industry also includes the reconditioning of shipping containers which is classified by the NAICS code 81131 (Commercial and Industry Machinery and Equipment {except Automotive and Electronic} Repair and Maintenance) and the SIC code 7699 (Repair Shops and Related Services, Not Elsewhere Classified). The six-digit SCC 4-02-026 identifies the surface coating of steel drums. This grouping has the potential to overlap with the Metal Can and Metal Coil surface coating categories.

AIRS data indicates that there are approximately 71 metal shipping container manufacturing facilities nationwide. Of those, only 29 facilities are equipped with the capability to coat both the interior and exterior of products [3].

Metal shipping containers can be grouped according to size into two major categories: drums, which include barrels and kegs and are 13 to 110 gallons (49 - 416 L); and pails, which are 1 to 12 gallons (4 - 45 L) [20]. They consist of a cylindrical body with a welded side seam and top and bottom heads. The thickness of pails and small drums usually range from 0.0115 in (0.3 mm) to 0.0269 in (0.7 mm). Larger drums are usually 0.030 in (0.8 mm) to 0.0533 in (1.4 mm) in thickness. Drums and pails are generally fabricated from commercial grade cold-rolled sheet steel; however, stainless steel, nickel, and other alloys are used for special applications.

Drums are used to transport and store liquids, viscous materials, and dry products. About seventy-five percent of all new drums are used for liquids. Pails are used to transport and store liquids, viscous products, powders, and solids. Currently, about 73 million new steel pails are produced in the United States each year. Almost eighty percent of all pails manufactured annually are the popular 5-gallon pail.

All steel pails and drums used in the United States for the transport of hazardous materials must comply with the Department of Transportation's (DOT) Hazardous Materials Regulations. For non-hazardous products, these containers usually comply with the minimum requirements of the specifications set forth by the railroads Uniform Classification Committee and the highway carriers

National Classification Committee. Packagers must now provide their drum and pail suppliers with the following information: Packing Group, product vapor pressure (if liquid), net mass (if solid), and specific gravity (if liquid). The steel drum and pail manufacturer marks the container, after having performed the following tests: drop, leakproofness, stacking, and hydrostatic pressure (if liquid). Steel drums to be reconditioned and reused to transport hazardous materials must meet DOT specifications for minimum and nominal thickness. Each year over 40 million drums are reconditioned [20].

Trade Associations. The following trade associations have been identified for this industry sector:

- Association of Container Reconditioners
- Steel Shipping Container Institute

Process Description. HAP and VOC emissions are expected from pretreatment processes (when organic solvents are involved in the pretreatment process), and in coating application (including flash-off areas and curing ovens).

Surface Preparation. During new metal shipping container fabrication, parts are pretreated to protect against flash rust and to remove oil and dirt from the surfaces prior to surface coating. This is generally achieved using a spray washer and zinc or iron phosphate solution. A pretreatment system may have as many as six or seven stages. The following is an example of a typical pretreatment process for new metal shipping containers:

1. Hot water or detergent, oil skimming
2. Rinse
3. Cleaner or phosphate
4. Rinse
5. Final rinse sealer (optional)

In some facilities, dry steel is used to manufacture new shipping containers. Dry steel is steel received from the mill with no rust inhibiting oil on the surface. In cases where dry steel is used, the surface preparation process may be eliminated [21].

Spray washing is also the initial step in preparation of the reconditioning process. Alkaline-sodium hydroxide solutions are generally used to remove residue of prior container contents. Shot blasting is also used during reconditioning operations to clean the exterior of tight head drums and the interior and exterior of open head drums. Other operations performed before surface coating may include acid washing, chaining, dedenting, leak testing, and corrosion inhibiting [22].

<u>Coating Application</u>. Metal shipping containers are coated using either roll coating or spray application methods. Roll coating is used mostly for the coating of coil. Spray coating is performed after metal has been formed into shells or parts. Shells and parts are coated in spray booths using HVLP, airless, or conventional coating apparatus. Drum and pail parts usually receive one or two coats and may be coated on both inside and outside surfaces. After coating, parts are given a brief flash-off period to allow separation of solvents in the coating. Parts are typically cured in natural-gas fired ovens. This curing takes place for 5 to 15 minutes at 300 to 500EF [21].

Coatings. Waterbased, high-solids, polyesters, alkyds, epoxy phenolics and phenolics are typically used to coat metal shipping containers. The selection of interior coatings is based on several factors. The most important considerations are the compatibility of a coating with the products to be shipped or stored within the container and the performance of a coating under various tests (i.e., reverse impact and rubbing). Though solvent-borne paints are still used for exterior coating, there is a trend in the industry toward low-VOC exterior coatings. The types of pigments used in exterior coatings affect the color consistency, application thickness, and surface adhesion of that coating. Thus, some colors may be more compatible with low-VOC coatings than others [21].

Emission Control Techniques. Low-VOC coatings, such as high-solids and waterborne coatings, are commonly used to minimize emissions from surface coating operations [21].

<u>Pipe and Foundry Industry</u>

General. The Pipe and Foundry Industry is covered by the NAICS code 33121 (Iron and Steel Pipe and Tube Manufacturing from Purchased Steel), and the NAICS code series 3315 (Foundries). This industry is also described using the SIC code 3317 (Steel Pipe and Tubes), and the SIC code series 332 (Iron and Steel Foundries) and 336 (Nonferrous Foundries {Castings}). SIC code 3317 covers establishments primarily engaged in the production of welded or seamless steel pipe and tubes and heavy riveted steel pipe from purchased materials. SIC code series 332 consists of establishments primarily engaged in manufacturing iron and steel castings. SIC code series 336 includes establishments primarily engaged in manufacturing castings and die-castings of aluminum, brass, bronze, and other nonferrous metals and alloys [2]. A list of the NAICS codes used to describe this industry and corresponding SIC codes is provided below [1].

33121	Iron and Steel Pipe and Tube Manufacturing from Purchased Steel [includes SIC 3317 (Steel Pipe and Tubes)]
331511	Iron Foundries [includes SIC 3321 (Gray and Ductile Iron Foundries) and 3322 (Malleable Iron Foundries)]
331512	Steel Investment Foundries [includes SIC 3324 (Steel Investment Foundries)]
331513	Steel Foundries (except Investment) [includes SIC 3325 (Steel Foundries, Not Elsewhere Classified)]
331521	Aluminum Die-Casting Foundries [includes SIC 3363 (Aluminum Die-Castings)]
331522	Nonferrous (except Aluminum) Die-Casting Foundries [includes SIC 3364 (Nonferrous Dies-Castings, except Aluminum)]
331524	Aluminum Foundries (except Die-Casting) [includes SIC 3365 (Aluminum Foundries)]
331525	Copper Foundries (except Die-Casting) [includes SIC 3366 (Copper Foundries)]
331528	Other Nonferrous Foundries (except Die-Casting) [includes SIC 3369 (Nonferrous Foundries, Except Aluminum and Copper)]

The AIRS database indicates that there are approximately 146 metal pipe and foundry facilities nationwide [3]. The largest concentration of these facilities is in the State of California.

Trade Associations. The following trade associations have been identified for this industry sector:

- American Foundrymens Society
- American Institute for International Steel
- American Iron and Steel Institute
- Iron and Steel Society
- Specialty Steel Industry of North America
- Steel Founders Society of America
- Steel Manufacturers Association
- Steel Tube Institute
- Tube and Pipe Association International

Process Description. HAP and VOC emissions are expected from pretreatment processes (when organic solvents are involved in the pretreatment process), and in coating application (including flash-off areas and curing ovens). Detailed information, however, is not available at this time.

Coatings. Detailed information is not available at this time.

Emission Control Techniques. Detailed information is not available at this time.

Rail Transportation Industry

General. The Rail Transportation Industry is covered by the NAICS code 33651 (Railroad Rolling Stock Manufacturing). This industry is also described using the SIC code 3743 (Railroad Equipment). Under SIC code 3743, the Rail Transportation Industry includes establishments primarily engaged in building and rebuilding locomotives (including frames and parts, not elsewhere classified) of any type or gauge; and railroad, street, and rapid transit cars and car equipment for operation on rails for freight and passenger service [2]. Locomotive fuel lubricating pumps and cooling medium pumps, also included in SIC code 3743, are covered by NAICS code 333911 (Pump and Pumping Equipment Manufacturing). In accordance with NAICS code 33651, this industry sector also includes railway truck maintenance equipment which is also covered by SIC code 3531 (Construction Machinery and Equipment). Approximately 38 rail transportation manufacturing facilities nationwide located in 18 States have been identified from queries of the AIRS database [3].

Trade Associations. The following trade association has been identified for this industry sector:

- American Railway Car Institute

Process Description. HAP and VOC emissions are expected from pretreatment processes (when organic solvents are involved in the pretreatment process), and in coating application (including flash-off areas and curing ovens).

Surface Preparation. Surface preparation for railcars and most railway equipment typically includes blasting of the surface using a non-metallic blast media, and/or grit [23]. This method may be used to prep the interior and exterior surfaces of railcars and other equipment. Surface preparation for locomotives may include blasting with glass and plastic bead media. Blast facilities usually contain filtering systems to capture waste [19]. Dust collectors may be used to control dust emissions and to recapture blast media. Felt floor coverings may also be used to recover paint and waste materials. Blast material may be recycled for future uses.

Coating Application. Railway transportation manufacturing facilities typically use airless spray apparatus for application of interior and exterior coatings. In some cases, surface coating is performed using HVLP spray systems [23]. Railcars and locomotives are painted in large enclosed paint booths. Coatings may be cured in thermal reacting drying ovens. In some facilities, coatings are allowed to dry in the paint booth at ambient temperature conditions, with the ventilation system in operation. Paint shops usually contain exhaust stacks with filtering systems to control particulate emissions. Stencils or decals are applied to railcars and locomotives using brush or roller apparatus. Facilities may also have smaller paint booths for coating of railcar and locomotive accessories and other rail transportation associated equipment such as sideframes and bolsters, sheet and aluminum blue flags, wood projects, steel lockers, racks, tables, logo panels, hopper outlets, air jacks, and for other miscellaneous coating projects. Some facilities coat motor coils with varnish on-site using a vacuum pressure impregnation process.

Coatings. The Rail Transportation Industry typically uses dual-component, waterborne paints for surface coating of railcars and equipment [23]. The dual component paint is usually mixed on-site, inside the paint booth. Once the paint is mixed the shelf life is very short. Locomotives are often coated with dual-component, solvent-based surface coatings [19].

Emission Control Techniques. No add-on control devices were observed in site visits or reviews of the Title V Permit application for the Union Pacific Railroad's DeSoto Car Shop in DeSoto, MO. In conversations with representatives of the American Railway Car Institute, it was also indicated that add-on controls are not common in railcar facilities.

Recreational Vehicle Industry

General. The Recreational Vehicle Industry is covered by the NAICS codes 336213 (Motor Home Manufacturing) and 336214 (Travel Trailer and Camper Manufacturing). This industry is also described using the SIC codes 3716 (Motor Homes) and 3792 (Travel Trailers and Campers). Under SIC code 3716, the industry includes establishments primarily engaged in manufacturing self-contained motor homes on purchased chassis. SIC code 3792 contains establishments primarily engaged in manufacturing travel trailers and campers for attachment to passenger cars or other vehicles, pickup coaches (campers) and caps (covers) for mounting on pickup trucks [2]. NAICS code 336214 also includes automobile, boat, utility, and light truck trailers, which are also covered by SIC code 3799 (Transportation Equipment, Not Elsewhere Classified). Approximately 37 recreational vehicle manufacturing facilities were located in 10 States from a query of the AIRS database.

Trade Associations. The following trade association has been identified for this industry sector:

- Recreational Vehicle Industry Association

Process Description. HAP and VOC emissions are expected from pretreatment processes (when organic solvents are involved in the pretreatment process), and in coating application (including flash-off areas and curing ovens). Detailed information, however, is not available at this time.

Coatings. Detailed information is not available at this time.

Emission Control Techniques. Detailed information is not available at this time.

Rubber-to-Metal Bonded Part Manufacturing Industry

General. The Rubber-to-Metal Bonded Parts Manufacturing Industry is covered by the

NAICS codes 326291 (Rubber Product Manufacturing for Mechanical Use) and 326299 (All Other Rubber Products Manufacturing). This industry is also described using the SIC codes 3061 (Molded, Extruded, and Lathe-Cut Mechanical Rubber Goods) and 3069 (Fabricated Rubber Products, Not Elsewhere Classified). SIC code 3061 includes establishments primarily engaged in manufacturing molded, extruded, and lathe-cut mechanical rubber goods, generally for machinery and equipment. SIC code 3069 consists of establishments primarily engaged in manufacturing industrial rubber goods, rubberized fabrics, and vulcanized rubber clothing, and miscellaneous rubber specialties and sundries, not elsewhere classified [2]. Many of the products manufactured in this industry are fabricated for use in the automotive industry. This grouping has the potential to overlap with the Automobile and Light-Duty Truck Surface Coating source category.

Trade Associations. The following trade association has been identified for this industry sector:

- Rubber Manufacturers Association

Process Description. HAP and VOC emissions are expected from pretreatment processes (when organic solvents are involved in the pretreatment process), and in coating application (including flash-off areas and curing ovens). Detailed information, however, is not available at this time.

Coatings. The main coatings associated with this industry are adhesives used to bond rubber to metal parts. More detailed information is not available at this time.

Emission Control Techniques. Detailed information is not available at this time.

<u>Structural Metal Industry</u>

General. The Structural Metal Industry is covered by the NAICS codes 332114 (Custom Roll Forming), 332311 (Prefabricated Metal Building and Component Manufacturing), 332312 (Fabricated Structural Metal Manufacturing), 332321 (Metal Window and Door Manufacturing), and 332323 (Ornamental and Architectural Metal Work Manufacturing). This industry is also described using the SIC codes 3441 (Fabricated Structural Metal), 3442 (Metal Doors, Sash, Frames, Molding, and Trim), 3446 (Architectural and Ornamental Metal Work), 3448 (Prefabricated Metal Building and Components), and 3449 (Miscellaneous Structural Metal Work). SIC code 3441 covers establishments primarily engaged in fabricating iron and steel or other metal for structural purposes, such as bridges, buildings, and sections for ships, boats, and barges [2]. SIC code 3442 includes establishments primarily engaged in manufacturing ferrous and nonferrous metal doors, sash, window and door frames and screens, molding, and trim. SIC code 3446 contains establishments primarily engaged in manufacturing architectural and ornamental metal work, such as stairs and staircases, open steel flooring (grating), fire escapes, grilles, railings, and fences and gates, except those made from wire. SIC code 3448 consists of establishments primarily engaged in manufacturing portable and other prefabricated metal buildings and parts and prefabricated exterior metal panels. SIC code 3449 is comprised of establishments primarily engaged in manufacturing miscellaneous structural metal work, such as metal plaster bases, fabricated bar joists, and concrete reinforcing bars. Also included in this SIC code are establishments primarily engaged in custom roll forming of metal. In accordance with NAICS code 332323, the structural metal industry also consists of metal corrals, stalls, and holding gates, which are covered by SIC code 3523 (Farm Machinery and Equipment).

Approximately 349 structural metal manufacturing facilities located in 31 States were identified from queries of the AIRS database [3]. However, information provided by the American Institute of Steel Construction (AISC) states that there are approximately 1,000 structural steel and bridge fabricators in the United States [24]. Of the 540 members of AISC, nearly 80 percent are small businesses and 90 percent produce less than 20,000 tons per year. A mid-sized AISC fabricator will process 2,500 tons of steel per year, and will make $3 million in sales annually. A survey was conducted by AISC of its members requesting paint usage for 1994. Of the 159 respondents, approximately 50 percent of them used less than 3,000 gallons of paint; approximately 78 percent used 7,000 gallons or less; and 90 percent used less than 10,000 gallons of paint.

Trade Associations. The following trade associations have been identified for this industry sector:

- American Institute of Steel Construction
- Metal Building Manufacturers Association
- Metal Construction Association
- National Association of Metal Finishers
- Specialty Steel Industry of North America
- Steel Deck Institute
- Steel Joists Institute

- Steel Structures Painting Council

Process Description. HAP and VOC emissions are expected from pretreatment processes (when organic solvents are involved in the pretreatment process), and in coating application (including flash-off areas and curing ovens). It is important to note that this industry covers several products with a wide variety of shapes and sizes. Parts may range from 8 inches to over 100 feet in any dimension (depth, width, or length); and weigh from less than 50 pounds to several tons. Therefore, some of the processes summarized in this industry description will not be feasible for all products covered by this industry [25,26].

<u>Surface Preparation</u>. Surface preparation of structural metal aids in the bonding of the substrate with adhesives or paints. Several methods are utilized to prepare structural metal parts for surface coating. Parts may be sanded to a mill finish. Hand or mechanical brushing or abrasive shot blasting may also be means of surface preparation [26]. Etching is another process used in preparing structural metal for coating. Etching is a chemical method that produces a silver-white surface, often referred to as frosted or matte. In this process, the substrate passes through a warm chemical solution (i.e. caustic soda) removing any natural oxidation. It is then rinsed and passed through a nitric acid bath to remove undissolved surface alloy constituents or impurities, and rinsed again. Some substrates may also require a chrome phosphate treatment. The following is an example of a chemical pretreatment process for structural metal:

1. Phosphate cleaner
2. Rinse
3. Sulfuric acid with small amounts of aluminum bichloride
4. Rinse
5. Nitric acid, which is used as a second cleaner due to the alloy leaving smut on the metal
6. Water rinse
7. Chromate conversion coat
8. City water rinse
9. Deionized water rinse with a small amount of chromic acid. The chromic acid is used to keep the system acidic. This allows the metal to retain a chrome/phosphate surface which is preferable for bonding.

Coating Application. After the pretreatment process, metal sheets or components are placed on racks and sent through a coating line, if feasible. A coating line may consists of a paint booth, a flash-off area, and a curing oven. Larger, heavier structures are not compatible with conveyor belt methods; and the use of an assembly line or line coating process is not practical [26]. Due to weight and size variability, most of these parts are processed in large open areas without enclosure. In these cases, flash-off areas and curing ovens are likewise not a part of the coating process. Coatings are applied using either HVLP or air atomized electrostatic spray application methods; or, for some larger parts, dip tank application methods also are utilized. Many steel joist manufacturers use large overhead cranes for the dip coating process [27]. Both manual and/or automated application systems can be used. Parts may receive up to 4 coats of paint depending on the type of paint used and the use of the substrate. Metallic or brightly colored parts may also require a clear coat. After coating, approximately 10 minutes is allowed for flash-off, and parts are sent to curing ovens, where applicable. Natural-gas fired ovens are used for curing in this industry. Ovens operate at between 400EF and 550EF.

Coatings. Multi-polymer, polyester, and acrylic based coatings are commonly used in the Structural Metal Industry. A large percentage of paint applied to structural steel for buildings is a single coat, red or grey oxide, alkyd primer [26]. A two-coat system, that may consist of a zinc rich paint or an epoxy, is typically used where greater protection is needed. In cases where a three-coat system is required, a polyurethane top-coat will be added. The main type of paint used in dip coating operations is a high-solids alkyd [27]. Xylene and toluene are the most common HAPs found in structural metal coatings.

Emission Control Techniques. Thermal oxidation (incineration) is the primary add-on control method used for controlling emissions from paint booths and curing ovens in the Structural Metal Industry. Thermal oxidizers can achieve up to ninety-nine percent destruction of VOC. Information provided by AISC indicates that most fabricators of larger, heavier steel structures do not operate any control devices in their facilities [26]. It is difficult to capture emissions generated from coating processes that take place in large open areas. Many structural metal manufacturing facilities operate systems to treat waste water from the pretreatment process. However, in facilities where hand or mechanical methods of surface preparation are utilized, no pretreatment waste waters are produced.

Resources

The MMPP Surface Coating source category is one of several source categories that will also be subject to VOC regulations under Section 183(e) of the CAA as amended in 1990. Two resources that will be used in that effort, and may prove useful in performing case-by-case MACT determinations under Section 112(g), at least for emissions of volatile HAPs, are the CTG documents for the MMPP and Magnet Wire source categories:

- *Control of Volatile Organic Emissions from Existing Stationary Sources - Volume VI: Surface Coating Of Miscellaneous Metal Parts and Products.* US Environmental Protection Agency. Office of Air Quality Planning and Standards. Research Triangle Park, NC. June 1978.

- *Control of Volatile Organic Emissions from Existing Stationary Sources - Volume IV: Surface Coating of Magnet Wire*. US EPA. Office of Air Quality Planning and Standards. Research Triangle Park, NC. December 1977.

In addition, NESHAP and NSPS developed for other surface coating operations may help to identify compliance options and/or control measures applicable to the MMPP Surface Coating industry. These regulations are as follows:

- Aerospace Manufacturing and Rework Facilities, 40 CFR Parts 9 and 63, Subpart GG - National Emission Standards for Aerospace Manufacturing and Rework Facilities. March 27, 1998.

- Ship Building and Repair Facilities, 40 CFR Part 63, Subpart II - National Emission Standards for Ship Building and Ship Repair (Surface Coating) Facilities. June 18, 1996.

Information on sources of emissions may be obtained from the EPA's *AIRS/AFS* database and can be accessed through the Internet (http://www.epa.gov/airsweb/sources.htm).

IV. SUMMARY OF COMMENTS AND EPA RESPONSES

This section presents the general comments submitted by MMPP stakeholders on the Draft Preliminary Industry Characterization document and the responses to these comments from EPA.

Comment: Industry groups SIC 352 and SIC 353 have not been represented in the document. A list of "unique considerations" for the groups was included with comment.

Response: Comments and information provided have been incorporated into the Final document under the "Agricultural and Construction Machinery Industry" description.

Comment: A process description of the cast wheels manufacturing process at Reynolds Wheels International was submitted for use in development of the Automotive Parts Industry description.

Response: Comments and information provided have been incorporated into the Automotive Parts Industry description in the Final document.

Comment: A MACT proposal discussed at a past Stakeholder Meeting was excluded from the draft document. The proposal was to allow facilities to maintain their current level of VOM pounds per gallon if they can demonstrate that their process as a whole reduces overall VOM emissions.

Response: The initial phase of the regulatory development has focused on describing the industries applicable to the Miscellaneous Metal Parts and Products source category, and does not investigate options for the yet-to-be-proposed rule.

Comment: The industry group referred to as "Steel Pipe and Foundry" in the PIC document would be better described as "Steel Pipe and Steel Foundry".

Response: Comment has been incorporated into the Final document as a change in the industry name to "Pipe and Foundry," and the segment has been expanded to include other metal pipe and foundry industries.

Comment: The potential overlap with the Iron and Steel Foundry MACT category should be cited.

Response: Comment provided has been incorporated into the Final document.

Comment: The process description provided for the Structural Steel Industry is not representative of the entire industry. A summary of processes used by the industry was included with comment.

Response: Comments and information provided have been incorporated into the process description of the Structural Metal Industry in the Final document.

Comment: The industry group referred to as "Large Trucks and Buses" in the PIC document would be better described as "Heavy-Duty Trucks and Buses".

Response: Comment provided has been incorporated into the Final document under the description of "Heavy-Duty Trucks and Buses".

Comment: The process description provided for the Heavy-Duty Trucks and Buses Industry is not representative of the entire industry. A summary of processes used by the industry was included with comment.

Response: Comments and information provided have been incorporated into the Final document under the process description of "Heavy-Duty Trucks and Buses."

Comment: Need clarification on the use of SIC and NAICS Codes. The document currently addresses groups as being "previously described using SIC Code 3417". Most industries still use the SIC Code system and the language may be confusing.

Response: The language describing the classification of industries by SIC or NAICS Codes has been modified to avoid this confusion.

Comment: The use of a VOC-containing lubricant commonly used in the Magnet Wire industry was omitted from the process description. Emissions from this process are typically not controlled by catalytic or thermal incinerators.

Response: The section on the Magnet Wire industry has been updated to include this information.

Comment: The description for Railroad Transportation does not include locomotives and locomotive parts.

Response: The section on the Rail Transportation Industry has been updated to include this information.

Comment: The term "Job Shops" needs to be clarified.

Response: For the purposes of this document, the term "Job Shops" refers to surface coating contract facilities. To avoid further confusion, we have changed the name of the industry segment to "Contract Coating Facilities".

Comment: In the description of the Metal Shipping Container Industry eliminate references to container thickness requirements. These requirements change frequently and are irrelevant to surface coating.

Response: References to container thickness requirements have been removed from the Metal Shipping Container Industry description in the Final document.

Comment: The Metal Shipping Container industry description includes a list of DOT tests for containers. The vibration test, included on the list, is not required of manufacturers.

Response: The list of DOT tests for Metal Shipping Containers has been modified to exclude the vibration test.

Comment: The Steel Shipping Container Institute was not included on the list of applicable associations.

Response: The Steel Shipping Container Institute has been added to the association list.

Comment: The process description provided for the Metal Shipping Container Industry is not representative of the entire industry. A summary of processes used by the industry was included with comment.

Response: Comments and information provided have been incorporated into the Final document under the process description of Metal Shipping Containers.

Comment: Metal container reconditioning operations have been classified as SIC 7699 (NAICS 81131) by the U.S. Department of Commerce.

Response: SIC code 7699 has been added to the table of applicable industries.

Comment: Metal container reconditioning does not require the use of pretreatment processes using organic solvents. Steel shot blasting or wire brushing are used to strip drums prior to painting or lining.

Response: The process description for Metal Shipping Containers has been updated to include this information in the Final document.

Comment: The Rubber Manufacturers Association was not included on the list of industry members participating in the stakeholder process.

Response: The Rubber Manufacturers Association has been added to the stakeholder list in the Final document.

Comment: Rubber Manufacturers Association member company operations are not reflected in the SIC codes listed. Rubber-to-metal bonding operations are classified under either SIC 3061 or SIC 3069.

Response: SIC codes 3061 and 3069 have been added to the table of applicable industries.

Comment: There is not a process description for the rubber-to-metal bonding industry.

Response: Information on this industry was not available for Final document, but has been collected through other efforts and will be included in the Background Information Document (BID).

Comment: The Steel Joist Institute was not included on the list of industry members participating in the stakeholder process.

Response: The Steel Joist Institute has been added to the stakeholder list in the Final document.

Comment: The steel joist facilities are usually classified under SIC 3441, however, in the PIC document they have been listed under SIC 3449.

Response: The 1987 Standard Industrial Classification Manual specifically lists “fabricated bar joists” as one of the products included in SIC 3449. However, the manual also specifically lists "Steel joists, open web: long-span series" as a product under SIC 3441. Therefore, both SIC codes have been used to describe the steel joist industry.

Comment: According to the industries listed in the PIC document, the EPA is proposing to characterize the Miscellaneous Metal Parts and Products category into 11 subcategories.

Response: There has not been any subcategorization of the MMPP category as of yet. The industry sector profiles included in the PIC document are only those sectors which have been individually studied thus far and in no way denote a subcategorization. Furthermore, the industry segments listed in this document are not a definitive listing of all industries covered within this source category.

Comment: The process description provided for the Structural Steel Industry is not representative of the entire industry. A summary of processes used by the steel joist industry was included with comment.

Response: Comments and information provided have been incorporated into the Final document under the process description of Structural Metal.

V. REFERENCES

1. U.S. Census Bureau Website, 1997 NAICS and 1987 SIC Correspondence Tables. 1998. http://www.census.gov/epcd/www/naicstab.htm.

2. Standard Industrial Classification Manual. Executive Office of the President, Office of Management and Budget. 1987.

3. U.S. EPA's Aerometric Information Retrieval System (AIRS).

4. The Shapemakers Buyers' Guide. Aluminum Extruders Council. 1997.

5. The Shapemakers Extrusion Showcase. Aluminum Extruders Council. 1993.

6. Aluminum Extruders Council Website. Aluminum Extruders Council. 1997. http://www.aec.org.

7. Extrusion Technology Website. Extrusion Technology. http://www.extrutech.com.

8. *Extrusion Industry Profile Survey 1995*. Aluminum Extruders Council. 1996.

9. The Shapemakers - Extrusion Coatings Spotlight. Aluminum Extruders Council. 1997.

10. Kirsch, F. William and Gwen P. Loobey. Waste Minimization Assessment for a Manufacturer of Aluminum Extrusions. U.S. EPA, Risk Reduction Engineering Laboratory. Cincinnati, Ohio. April 1992.

11. Coatings Alternatives Guide (CAGE) Website. Research Triangle Institute in cooperation with U.S. EPA, Air Pollution Prevention and Control Division. Research Triangle Park, North Carolina. 1996. http://www.cage.rti.org.

12. Products Finishing Magazine, *1998 Large Coating Job Shop Survey*.

13. Summary of the Site Visit to the Freightliner Facility in Cleveland, North Carolina. July 1997.

14. Summary of the Site Visit to the Freightliner Facility in Mt. Holly, North Carolina. July 1997.

15. Summary of the Site Visit to the Volvo Facility in Dublin, Virginia. June 1997.

16. Control of Volatile Organic Emissions from Existing Stationary Sources - Volume IV: Surface Coating of Magnet Wire. U.S. EPA, Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina. December 1977.

17. Summary of the Site Visit to the Phelps Dodge Magnet Wire Company. Laurinburg, North Carolina, August 1997.

18. Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources, (AP-42), 5th edition. U.S. EPA, Office of Air Quality Planning and Standards. January 1995.

19. Letter. Comments on MMPPSC Industry Characterization from Bob Schenker, General Electric Company. September 18, 1998.

20. Brody, Aaron and Kenneth Marsh (ed). The Wiley Encyclopedia of Packaging Technology, 2nd edition. Washington, DC. 1997.

21. Letter. SSCI Comments on PIC from David Core, Steel Shipping Container Institute, September 22, 1998.

22. Letter. Comments from Dana Worcester, The Association of Container Reconditioners. September 21, 1998.

23. Summary of the Site Visit to the Union Pacific Railroad Facility in DeSoto, Missouri, September 1997.

24. Summary of the Site Visit to the Cupples Products, Inc. Facility in Union, Missouri, September 1997.

25. Summary of the Site Visit to the Windsor Metal Specialties Facility in Kissimmee, Florida, September 1997.

26. Letter. Comments from Kenneth G. Lee, American Institute of Steel Construction, September 21, 1998.

27. Letter. Comments from R. Donald Murphy, Steel Joist Institute, September 16, 1998.

In addition to the materials cited above, the following references were consulted for information pertaining to this document.

- Almag Website. Almag Aluminum Inc. 1997. Http://www.almag.com.

- Alumax - Magnolia Division Website. Alumax. 1997. http://www.alumax.com.

- <u>Control Of Volatile Organic Emissions From Existing Stationary Sources - Volume VI: Surface Coating Of Miscellaneous Metal Parts and Products</u>. U.S. EPA, Office of Air Quality Planning and Standards. Research Triangle Park, NC. June 1978.

- McMinn ,Beth, C.R. Newman, Robert C. McCrillis and Michael Kosusko. <u>VOC Prevention Options for Surface Coating</u>. Alliance Technologies Corporation, Chapel Hill, NC. SAIC, Durham, NC. U.S. EPA, Air and Energy Engineering Research Laboratory. Research Triangle Park, NC. 1992.

- <u>Shapemakers - Aluminum Extrusions: Where Innovations Take Shape</u>. Aluminum Extruders Council. 1991.

- SAPA's WWW Server. SAPA Limited. Tibshelf, Alfreton, Derbyshire DE55 5NH, United Kingdom. http://www.sapa-uk.com.

- <u>The Shapemakers - Extrusion Design Spotlight</u>. Aluminum Extruders Council. 1997.

- <u>The Shapemakers Extrusion Showcase</u>. Aluminum Extruders Council. 1993.

- Steel Shipping Containers Institute Website. http://www.steelcontainers.com.
- Summary of the Site Visit to the Alumax Extrusions Facility in Plant City, Florida. September 1997.