PRELIMINARY INDUSTRY CHARACTERIZATION

FOR THE

LARGE APPLIANCE SURFACE COATING SOURCE CATEGORY

Coatings and Consumer Products Group
Emission Standards Division
Office of Air Quality Planning and Standards

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PRELIMINARY INDUSTRY CHARACTERIZATION:
Large Appliances

I. OVERVIEW OF INITIAL PHASE AND NEXT STEPS FOR MACT DEVELOPMENT

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 Large Appliances surface coating source category. The EPA is required to publish final emission standards for the Large Appliances source category by November 15, 2000. For this category, national volatile organic compound (VOC) rules or control techniques guidelines under Section 183(e) are also 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 EPA has emissions information). The NESHAP are commonly known as maximum achievable control technology (MACT) standards.

The MACT standards development for the Large Appliances 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] During the first phase, 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
- Identify the range(s) of emission reduction techniques and their effectiveness
- 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 members that participated in the stakeholder process were representatives

[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.

and members of the National Paint and Coatings Association (NPCA), the Gas Appliance Manufacturers Association (GAMA), the Air-Conditioning and Refrigeration Institute (ARI), and the Association of Home Appliance Manufacturers (AHAM). The States that participated in the process were Alabama, Arizona, Florida, Georgia, Illinois, Missouri, Ohio, Oklahoma, Pennsylvania, Texas, and Wisconsin. U.S. EPA was represented in the process by the EPA Office of Air Quality Planning and Standards (EPA/OAQPS). Attachment 2 contains a list of individuals who either attended the April 1997 Workshop or have been active in the stakeholder process.

The information summarized in this document can be used by States that may have to make case-by-case MACT determinations under Section 112(g) or 112(j) of the Act. The initial phase of the regulatory development focused primarily on characterizing the Large Appliance industry and collecting preliminary emissions information from the categories of products manufactured under Large Appliances. This document represents the conclusion of that phase of rule development.

This document includes a description of the emission control technologies EPA identified 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 January 1998. Additional information will be collected and considered before the Large Appliances 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 analysis. 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 rulemaking and enlist the help of the stakeholders in resolving those issues.

Questions or comments on this memorandum should be directed to Mohamed Serageldin (EPA/OAQPS) at 919-541-2379 or at serageldin.mohamed@epa.gov.

II. SUMMARY OF PRELIMINARY INDUSTRY CHARACTERIZATION PROCESS

This Section provides an overview of the results of EPA's efforts as part of the MACT or Best Available Control (BAC) development process for the large appliances manufacturing source category. Included in the Section is an overview of the information gathering efforts, roundtable and Regulatory Subgroup meetings, and a summary of the results of the data gathering efforts.

Definitions

Definitions for common terms used in this document are included in Attachment 1.

Information Gathering

Data were collected from the following sources in the development of a database of emissions information for the large appliances manufacturing source category: (1) the Toxic Release Inventory System (TRIS), (2) the Aerometric Information Retrieval System (AIRS), (3) State and local agencies, (4) Federal and State rules and guidance documents, (5) Section 114 questionnaires, and (6) site visits. Since some information collected by the questionnaires and site visits is considered confidential business information (CBI), pending a final decision by EPA, the presentation of data has been constructed to include the CBI data without compromising its identity or integrity. The results of each of these data collection efforts are presented in the following pages.

In order to begin the task of characterizing the industry and to provide a basis from which data could be requested from States, a list of product descriptions was developed. The Standard Industrial Classification (SIC) codes, wherever available, and corresponding North American Industry Classification System (NAICS) codes relevant to the large appliance industry were also used to identify these products. This information is presented in Table II-1 below.

TABLE II-1. PRODUCT DESCRIPTION, SIC CODES AND CORRESPONDING NAICS CODES

Product Description	SIC Code	Corresponding NAICS Product Description	Corresponding NAICS Code
Household Cooking Equipment	3631	Household Cooking Appliance Manufacturing	335221
Household Refrigerators and Home and Farm Freezers	3632	Household Refrigerator and Home Freezer Manufacturing	335222
Household Laundry Equipment	3633	Household Laundry Equipment Manufacturing	335224
Household Appliances; not elsewhere classified	3639		

TABLE II-1 (Concluded)

Product Description	SIC Code	Corresponding NAICS Product Description	Corresponding NAICS Code
Floor Waxing and Floor Polishing Machines	3639	Household Vacuum Cleaners Manufacturing	335212
Household Sewing Machines	3639	All Other Industrial Machinery Manufacturing	333298
Other Household Appliances	3639	Other Major Household Appliance Manufacturing	335228
Air Conditioning and Warm Air Heating Equipment and Commercial Industrial Refrigeration Equipment	3585		
Motor Vehicle Air Conditioning	3585	Motor Vehicle Air Conditioning Manufacturer	336391
Except Motor Vehicle Air Conditioning	3585	Air Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing	333415
Service Industry Machinery; not elsewhere classified	3589	Other Commercial and Service Industry Machinery Manufacturing	333319

Data Requested from States

The State and local air pollution control agencies in each State received a request from EPA for available information (i.e., permits or emissions inventory data) pertinent to the 9 industrial surface coating source categories. A query of the States with the most large appliance manufacturing facilities was generated through the use of the TRIS and AIRS databases. Using the SIC codes listed in Table II-1, the number of facilities in each of the product categories was found and presented in Table II-2.

In addition to the questionnaire and site visit data, the EPA has collected some air quality permit data. The permits provided information useful to this rule development on coating usage, coating HAP and VOC content, facility configuration, production technologies, implemented emission reduction techniques, and add-on emission controls. The facilities for which permit data have been collected are listed in Table II-3.

TABLE II-2. NUMBER OF FACILITIES BY SIC CODE [1]

Product Category	SIC Code	Number of Facilities
Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment	3585	38
Service Industry Machinery, not elsewhere classified	3589	3
Household Cooking Equipment	3631	5
Household Refrigerators and Home and Farm Freezers	3632	6
Household Laundry Equipment	3633	6
Household Appliances, not elsewhere classified	3639	6

TABLE II-3. FACILITIES FOR WHICH AIR PERMIT DATA HAVE BEEN COLLECTED

Facility	Products Manufactured	SIC Code
Maytag, Herrin, Illinois	Washers & Dryers	3633
Frigidaire, Kinston, North Carolina	Dishwashers	3639
A.O. Smith Water Products, McBee, South Carolina	Water Heaters	3639
Maytag, Galesburg, Illinois	Refrigerators	3632

Federal and State Rules and Guidance Documents

A Control Techniques Guideline (CTG) for the large appliance industry, *Control of Volatile Organic Emissions from Existing Stationary Sources Volume V: Surface Coating of Large Appliances* (EPA-450/2-77-034), was published in December 1977. This guidance document recommended a limitation of 0.34 kilogram of organic solvent emitted per liter of coating (minus water and exempt solvents) [2.8 pounds of organic solvent emitted per gallon of coating (minus water and exempt solvents)] for reduction of VOC from existing stationary sources [2].

Another reference addressing a different VOC emission limit was published. In the October 1982 New Source Performance Standards (NSPS) for the large appliance industry (40 CFR Part 60 Subpart SS--*Standards of Performance for New Stationary Sources; Industrial*

Surface Coating: Appliances), VOC emissions are limited to 0.90 kilogram of VOC per liter of coating solids applied [7.5 pounds of VOC per gallon of coating solids applied] [3].

The Bureau of National Affairs (BNA) Environmental Library was searched for State regulations pertaining to surface coating of large appliances. Most States generally follow the guidelines or requirements established in the CTG and/or NSPS as described above. Some States have different limits for individual coating type and curing method (e.g., specialty coatings, air-dried general coatings, baked general coatings, enamels, etc.). Several State/local agencies have established guidance for determining BACT and Reasonable Available Control Technology (RACT) for surface coating of large appliance facilities. A tabular summary of these regulations is included in Attachment 3 [4].

Questionnaires

In order to obtain the most up-to-date data from the industry, EPA mailed Section 114 questionnaires to selected industry stakeholders in June 1997. Nine companies were selected to receive questionnaires under the authority of Section 114 of the Clean Air Act. The purpose was to compile detailed information on quantities of HAP and VOC emissions and on current emission control techniques. In addition, the environmental, energy, and economic impacts associated with installing and operating feasible emission control techniques would need to be analyzed.

The selection process for facilities to receive Section 114 questionnaires was intended to obtain information from the major manufacturers of each of the product groups under consideration for the large appliances rulemaking effort detailed in Attachment 4. Information obtained from these product groups is described in the Information Gathering and Data Anaylsis sections. The companies were selected for identifying the major technologies in use and for quantifying emissions from these manufacturing systems.

The questionnaire requested information on the general facility, unit operations, control measures, applicable regulations, and collocated sources. Furthermore, the facilities were asked to provide a flow diagram of the manufacturing process, which identifies the different unit operations. They were also asked to describe the coating specifications, type of parts and substrate material coated, and waste handling procedures.

As a means of identifying and quantifying the possible sources of pollution, information was collected on the basis of the Unit Operation System (UOS). A plant (or facility) consists of several levels of production activity, which are divided into work areas that are composed of one or more UOSs. The term UOS refers to a formalized concept for performing a material balance. A UOS system is the ensemble on which the material balance is performed. A UOS includes all sources that contribute to emissions [5]. The Section 114 questionnaire used the UOS as the basis for data reporting.

As illustrated in Figures II-1 and II-2, the boundary defines the UOS in which the HAP content of coating equals the HAP content of coating waste plus emissions. Facilities do not need

to measure emissions from each of the UOS operations (Coating Application, Flashoff, and Oven) in order to calculate the total emissions within the boundary. This information can be determined if the HAP contents in the coating and in the coating waste are known. The percentage of total emissions from each of the UOS operations will vary depending on the type of coating applied, the application method, the length of the flashoff area, and other factors that are specific to each facility.

In the Powder System, as illustrated in Figure II-2, some coating material is recirculated into the Coating Application, and there is no flashoff area. For powder coating operations, no HAP or VOC emissions were reported. However, based on information from the coating manufacturers, it was estimated that up to 4 percent by mass of the powder may be transformed into volatile emissions during the cure cycle (the Oven unit operation). The project team assumed that these volatile emissions could in some instances be composed entirely of either HAP or VOC. For this analysis, a 5 percent powder waste was assumed based on past experiences and discussions with powder coating facilities. Powder waste is the powder wasted or not used in the coating application process, such as spills onto floor or oversprayed in paint booth (excluding powder that was recaptured and reused), and does not include powder sprayed onto racks or hangers. Powder sprayed onto racks or hangers, though not being used to coat parts, undergoes the curing process, where it is believed to generate emissions. If a 5 percent powder waste was assumed, the emission level of the powder application and curing UOS is calculated to be 67.4 g HAP per liter of solids.

In June 1998, EPA sent out an Information Collection Request (ICR) designed using information learned from the June 1997 questionnaire. The design of the ICR was a joint effort with the nine surface coating MACT groups. The ICR focuses on more specific information about the unit operations within a facility, and contains sections concerned with general facility information, material data, add-on control devices, coating application, surface preparation, storage, mixing operations, cleaning operations, and waste and wastewater. The ICR also includes components that relate data back to the UOS.

Site Visits

The EPA made site visits to four large appliances manufacturing facilities in June and July of 1997. These facilities are shown in Table II-4. The types of information requested during site visits included:

- Description of the plant: size, hours of operation, layout of the production processes, types and market position of products coated, and production rate.
- Detailed descriptions of the surface coating operations, including the application equipment and methods used (e.g., dip coating, flow coating, electrostatic spray, powder coating), spray booth or application area, oven, and/or other machine parameters.

- Information regarding each material containing any HAP or VOC that is used in or emitted by any operation at the facility (e.g., coatings, parts cleaners, etc.).

- Descriptions of any control measures or add-on devices used to reduce HAP or VOC emissions from surface coating processes or any emitting source.

- Available cost information concerning the materials and equipment used in the surface coating operation, and costs of any HAP or VOC control strategies in place or planned.

TABLE II-4. SITE VISIT FACILITIES

Facility	Products Manufactured	SIC Code
Amana Refrigeration, Inc. Florence, SC	Residential Ranges, Cook Tops, Wall Ovens	3631
Lennox Industries Marshalltown, IA	Residential Heating (Furnaces & Combination Furnace/Water Heater) and Cooling (Air Conditioners, Heat Pumps, Coil Boilers) Products	3585
Amana Refrigeration, Inc. Amana, IA	Residential Freezers, Refrigerators, Microwaves, Commercial & Industrial Ovens and Microwaves	3632 (3631 & 3585)
Maytag Appliances Newton, IA	Residential Washers and Dryers	3633

Information Gathering Summary

The information gathering efforts described above resulted in the compilation of several types of data collected from the air permit data, site visits, and Section 114 questionnaires. Data were collected on general facility information, the current application methods used in the industry, and emissions data based on coating HAP and VOC content. Table II-5 contains pertinent facility data including corporate contacts, major products, and SIC codes.

Based on the data set collected, there are only four application methods in operation for applying a primer or base coat at the 27 facilities, and five application methods utilized for applying a topcoat. There were four facilities that purchase pre-coated blanks. Of those four, one facility processes 100 percent pre-coated blanks and only uses manual spray or brushes to reinforce or touch up the original coating. Tables II-6 and II-7 list the various application methods and the number of facilities using these methods.

Tables II-8 and II-9 present the emissions data from all the sources. Further discussion of these data is presented in the data analysis section of this document.

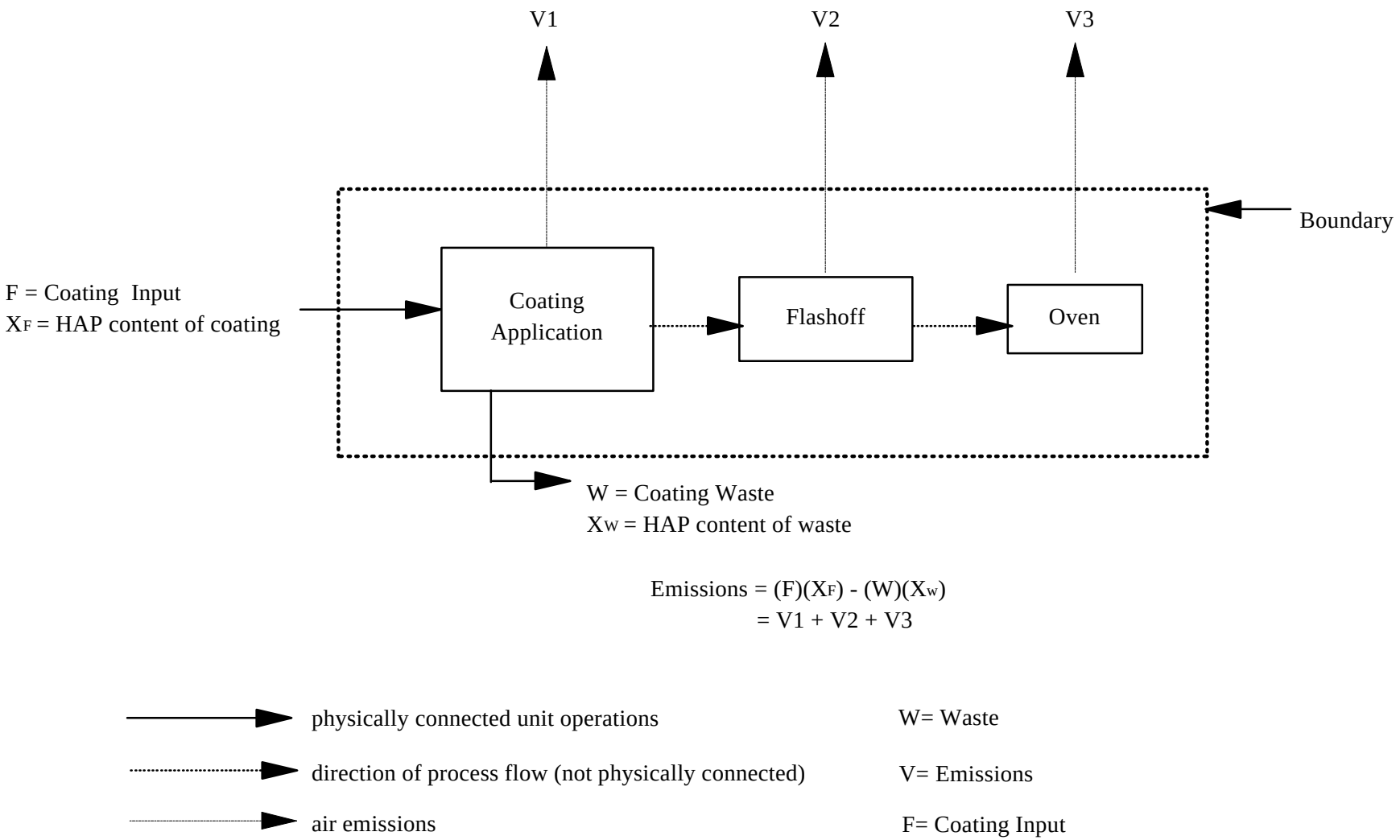

FIGURE II-1. Primer Coating Application/Curing Unit Operation System (HAP Emissions using Electrodeposition)

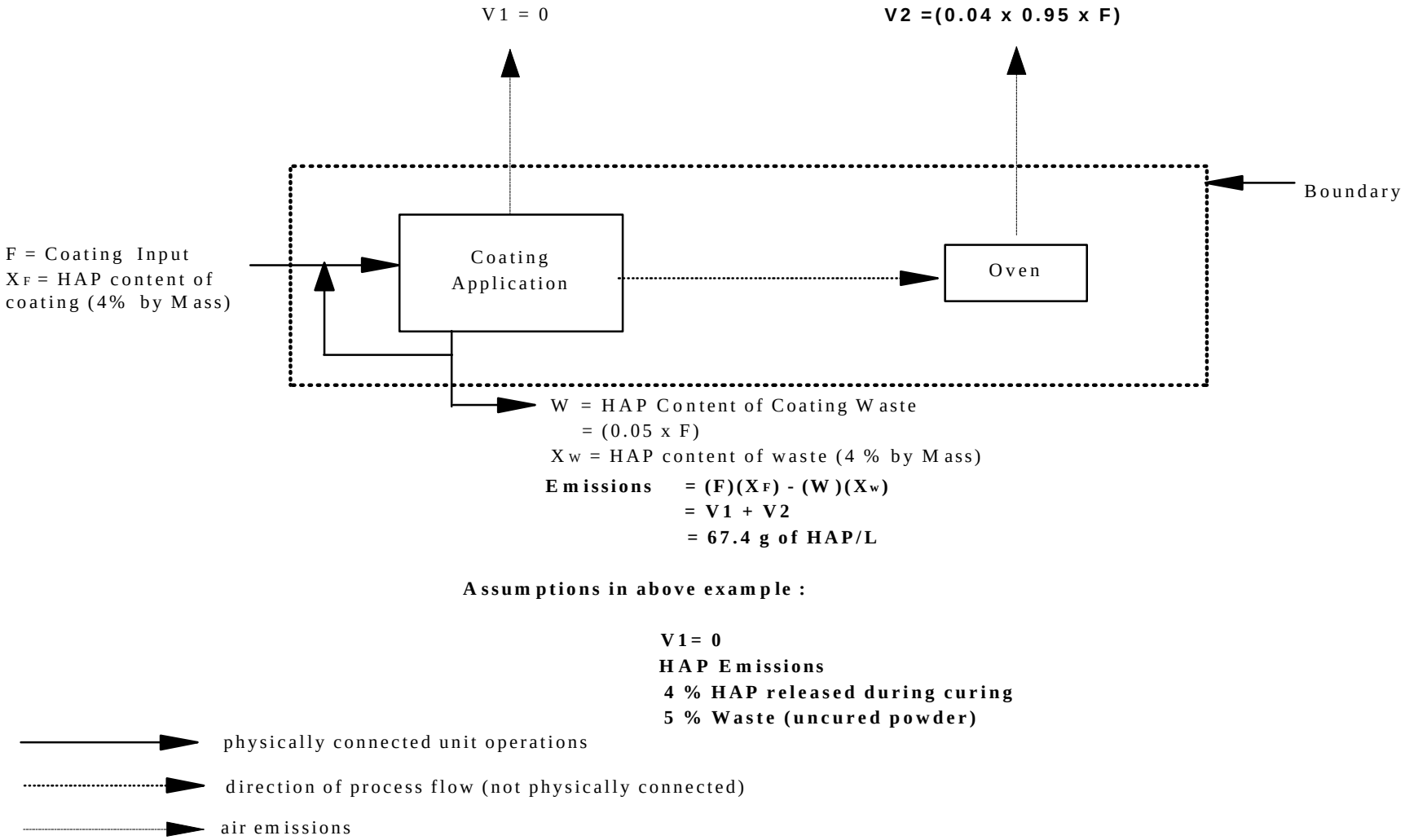

FIGURE II-2. Powder Coating Application/Curing Unit Operation System (HAP Emissions using a Powder System)

TABLE II-5. FACILITY DATA

Facility Name	State	Products Manufactured	SIC Code(s)
A.O. Smith Water Products-McBee	SC	Water Heaters	3639
Amana Refrigeration-Amana	IA	Refrigerators & Freezers, Microwave Ovens (household/commercial)	3632
Amana-Florence	SC	Cooking Products	3631
Carrier-Syracuse	NY	HVAC	3585
Frigidaire-Kinston	NC	Dishwashers	3639
Frigidaire-Webster City	IA	Washers & Dryers	3632
General Electric-Decatur	AL	Refrigerators	3632
General Electric-Lafayette	GA	Ranges & Ovens	3631
General Electric-Bloomington	IN	Refrigerators	3632
Lennox Industries-Marshalltown	IA	HVAC	3585
Marathon Equipment Company-Vernon	AL	Industrial Waste Compactors & Recycling Equipment	3589
Marathon Equipment Company-Yerington	NV	Industrial Waste Compactors & Recycling Equipment	3589
Marathon Equipment Company-Clearfield	PA	Industrial Waste Compactors & Recycling Equipment	3589
Maytag-Cleveland Cooking Products	TN	Gas & Electric Ranges	3631
Maytag-Galesburg	IL	Refrigerators	3632
Maytag-Herrin Laundry Products	IL	Washers & Dryers	3633
Maytag-Newton Laundry Products-Plant 2	IA	Washers & Dryers	3633
Rheem-Fort Smith	AR	Heating and Air Conditioning Equipment	3585
Rheem-Milledgeville	GA	Heating and Air Conditioning Equipment	3585
Rheem-Montgomery	AL	Residential and Commercial Water Heaters	3639
Trane-Macon, Plant Two	GA	Commercial Air Conditioning Units	3585
Trane-Macon, Plant One	GA	HVAC	3585
Trane-New Jersey	NJ	HVAC (furnaces, coils, air handlers)	3633
Trane-South Lacrosse	WI	Commercial Chillers & Refrigerant Compressors	3585
Whirlpool Corporation- Findlay	OH	Dishwashers	3639
Whirlpool Corporation-Marion	OH	Clothes Dryers	3633
Whirlpool Corporation-Fort Smith	AR	Side by Side Refrigerators, Trash Compactors & Ice Makers	3632

TABLE II-8. (Continued)

TABLE II-6. PRIMER OR BASE COAT APPLICATION METHODS

Surface Coating Application Method (Primer or Base Coat)	Number of Facilities Utilizing this Method
Flow Coat	2
Electrodeposition	8
HVLP Spray (Manual)	4
Electrostatic Spray (Bell or Disk)	1

TABLE II-7. TOPCOAT APPLICATION METHODS

Surface Coating Application Method (Topcoat)	Number of Facilities Utilizing this Method
Powder Application (Electrostatic Spray)	15
Powder Application (Fluidized Bed Dip)	2
Electrostatic Spray (Bell or Disk)	7
Electrodeposition	2
HVLP Spray (Manual)	6

TABLE II-8. HAP EMISSIONS REPORTED IN RESPONSE TO THE JUNE 1997 SECTION 114 QUESTIONNAIRE, SITE VISITS, AND FACILITY AIR PERMITS

Application Method	Special Note	A1 HAP Emissions (g/liter coating minus water and exempt compounds)	A2 HAP Emissions (g/liter solids)	A3 HAP Emissions (g/m^2)
Primer				
Electrodeposition		A	A	A
Electrodeposition		0.995	12.4	.110
Electrodeposition		A	A	A
Electrodeposition		A	A	A
Electrodeposition		A	A	A
Electrodeposition		0.995	12.4	D
Electrodeposition		664	5540	A

TABLE II-8. (Continued)

Application Method	Special Note	A1 HAP Emissions (g/liter coating minus water and exempt compounds)	A2 HAP Emissions (g/liter solids)	A3 HAP Emissions (g/m^2)
Electrodeposition		A	A	A
Electrostatic Spray	Rotational, See note C	507	1220	D
Flow Coating	See note C	0.0	0.0	D
Flow Coating		A	A	A
HVLP Spray Coating	Manual Spray	313	A	A
HVLP Spray Coating	Manual Spray	168	A	A
HVLP Spray Coating	Manual Spray	216	A	A
Manual Spray		A	A	A
Topcoat				
Electrodeposition		27.6	77.6	A
Electrodeposition		325	524	A
Electrostatic Spray	Rotational	A	A	A
Electrostatic Spray	Rotational	142	218	A
Electrostatic Spray	Rotational,See note C	507	1220	A
Electrostatic Spray	Rotational	A	A	A
Electrostatic Spray	Rotational	322	481	A
HVLP Spray Coating	Manual Spray	420	A	A
HVLP Spray Coating	Manual Spray	264	A	A
HVLP Spray Coating	Manual Spray	A	A	A
HVLP Spray Coating	Manual Spray	A	A	A
HVLP Spray Coating	Manual Spray	A	A	A
HVLP Spray Coating	Manual Spray	144	A	A
Manual Spray		A	A	A

TABLE II-8. (Continued)

Application Method	Special Note	A1 HAP Emissions (g/liter coating minus water and exempt compounds)	A2 HAP Emissions (g/liter solids)	A3 HAP Emissions (g/m^2)
Manual Spray	Touch-up	A	A	A
Manual Spray	Touch-up	A	203	A
Manual Spray	Touch-up	A	170	A
Manual Spray	Touch-up	A	A	A
Powder Application	Fluidized Bed Dip	A	A	A
Powder Application	Fluidized Bed Dip	A	A	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A

- Columns A1 and A2 assume that all HAP contained in the coating is emitted during the coating application/drying system.
- Column A1: Where not provided explicitly by questionnaire response, g HAP per liter coating = (%HAP by mass from MSDS) x (total coating density from MSDS)
- Column A2: Where not provided explicitly by questionnaire response, g HAP per liter solids = (HAP emissions (g/L)) / (1-(% Volatiles by Volume / 100)) [from MSDS]
- Column A3: Rates taken from questionnaire responses, (g HAP emissions per m^2 coated) = (g HAP emissions by coating) / (m^2 coated)

TABLE II-8. (Concluded)

Conversion for converting emissions from g/L to lb/gal = (g/L) x $(8.34)x10^{-3}$

A. Not provided in questionnaire response.
B. Powder coatings were assumed to be 100% solids, and it was assumed that powder releases 4% by mass HAP upon curing.
C. Responses or MSDS are unclear.
D. Some information was provided in response, but further details are required to quantify emissions.
E. Resin/paste HAP numbers were calculated using weighted averages based on the resin and paste usage ratio.
NA = Not Applicable
-- = Unable to calculate value based on available data.

TABLE II-9. VOC EMISSIONS REPORTED IN RESPONSES TO THE JUNE 1997 SECTION 114 QUESTIONNAIRE, SITE VISITS, AND FACILITY PERMITS

Application Method	Special Note	B1 VOC Emissions (g/liter coating minus water and exempt compounds)	B2 VOC Emissions (g/liter solids)	B3 VOC Emissions (g/m^2)
Primer				
Electrodeposition		55.6	163	A
Electrodeposition		306	460	9.91
Electrodeposition		208	57.3	3.33
Electrodeposition		355	A	A
Electrodeposition		652	1860	5.6
Electrodeposition		291	3460	2.07
Electrodeposition		755	6290	A
Electrodeposition		351	567	A
Electrostatic Spray	Rotational, See note C	507	1220	D
Flow Coating	See note C	696	2350	D
Flow Coating		A	A	A
HVLP Spray Coating	Manual Spray	A	A	A
HVLP Spray Coating	Manual Spray	A	A	A
HVLP Spray Coating	Manual Spray	A	A	A
Manual Spray		126	257	A
Topcoat				
Electrodeposition		84.7	239	3.72
Electrodeposition		330	524	A
Electrostatic Spray	Rotational	243	A	13.4
Electrostatic Spray	Rotational	303	460	29.3
Electrostatic Spray	Rotational	300	459	56.8
Electrostatic Spray	Rotational,See note C	507	1220	A
Electrostatic Spray	Rotational	288	437	A
Electrostatic Spray	Rotational	300	A	A
Electrostatic Spray	Rotational	322	481	A
Electrostatic Spray	Rotational	452	675	A

TABLE II-9. (Continued)

Application Method	Special Note	B1 VOC Emissions (g/liter coating minus water and exempt compounds)	B2 VOC Emissions (g/liter solids)	B3 VOC Emissions (g/m^2)
HVLP Spray Coating	Manual Spray	A	A	A
HVLP Spray Coating	Manual Spray	A	A	A
HVLP Spray Coating	Waterborne	145	A	A
HVLP Spray Coating	Manual Spray	184	D	A
HVLP Spray Coating	Manual Spray	236	A	A
HVLP Spray Coating	Manual Spray	316	A	A
HVLP Spray Coating	Manual Spray	A	A	A
Manual Spray		103	203	A
Manual Spray	Touch-up	A	227	A
Manual Spray	Touch-up, See note E	665	1800	A
Manual Spray	Touch-up, See note E	665	1800	A
Manual Spray	Touch-up	A	194	A
Manual Spray	Touch-up(avg. of 4)	627	1680	A
Manual Spray	Touch-up	160	201	A
Manual Spray	Touch-up	177	229	A
Powder Application	Fluidized Bed Dip	A	A	A
Powder Application	Fluidized Bed Dip	A	A	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A

TABLE II-9. (Concluded)

Application Method	Special Note	B1 VOC Emissions (g/liter coating minus water and exempt compounds)	B2 VOC Emissions (g/liter solids)	B3 VOC Emissions (g/m^2)
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A
Powder Application	See note B	64	67.4	A

- Columns B1 and B2 assume that all VOC contained in the coating is emitted during the coating application/drying system.
- Column B1: Where not provided explicitly by questionnaire response, g VOC per liter coating = (%VOC by mass from MSDS) x (total coating density from MSDS)
- Column B2: Where not provided explicitly by questionnaire response, g VOC per liter solids = (VOC emissions (g/L)) / (1-(% Volatiles by Volume / 100)) [from MSDS]
- Column B3: Rates taken from questionnaire responses, (g VOC emissions per m^2 coated) = (g VOC emissions by coating) / (m^2 coated)

Conversion for converting emissions from g/L to lb/gal = (g/L) x $(8.34)x10^{-3}$

A. Not provided in questionnaire response.
B. Powder coatings were assumed to be 100% solids, and it was assumed that powder releases 4% by mass VOC upon curing.
C. Responses or MSDS are unclear as to whether they are giving VOC content or total volatiles content.
D. Some information was provided in response, but further details are required to quantify emissions.
E. Resin/paste VOC numbers were calculated using weighted averages based on the resin and paste usage ratio.
NA = Not Applicable.
-- = Unable to calculate value based on available data.

Roundtable Meetings

Roundtable meetings were held with stakeholders to assist the EPA in the collection of emissions data and to solicit comment from the industry on regulatory options.

A kickoff meeting for the MACT/BAC phase of the development of regulations for the surface coating of large appliances was held on April 9, 1997, at the U.S. EPA Coating Regulations Workshop Metal Furniture/Large Appliance Breakout Session. This meeting addressed the standards development process and identified preliminary concerns of the workshop participants.

The first stakeholder roundtable meeting for Large Appliances was attended by State, EPA, and industry representatives on May 19, 1997. Meeting activities included identifying data sources for the collection of information about the industry, reviewing the regulatory development process with industry, voicing concerns applicable to all parties, coordinating regulatory development efforts with industry representatives, exploring potential data sources, and discussing action items for participants.

The Section 114 questionnaire results were summarized at the second roundtable meeting on July 30, 1997. A discussion of the data and possible formats for the collection and evaluation of data took place. The major topics of discussion included: 1) the inclusion of two new SIC codes for the Large Appliances rulemaking, and 2) the details of the MACT process and its use.

The third Large Appliances roundtable meeting was held on April 7, 1998. The purpose of the meeting was to discuss the draft Information Collection Request. Topics of discussion included the questionnaire construction and scope, as well as industry concerns over available data.

Regulatory Subgroup

The "Regulatory Subgroup" consisting of the EPA project team and EPA Regional and State/local agency representatives was formed to promote communication between regulatory groups. The subgroup participated in a teleconference on July 30, 1997, to discuss the June 1997 Section 114 questionnaire data. The subgroup also discussed the process of and potential approaches to the MACT/BAC.

Data Analysis

The initial intent of the data collection and calculation process was to utilize data that would normalize emissions to a common unit of manufacturing. The unit first considered was mass emissions per unit area of substrate coated (i.e., g HAP per m^2 of product coated). However, this turned out to be infeasible because there were not sufficient responses that correlated coating use to area coated to construct a coherent database with a reasonable amount of data. Other methods of comparison considered included actual emissions per volume of coating used, applicable add-on control devices, and emissions per volume of solids (non

volatiles) applied. Emissions per volume of coating used was not selected as a basis because the total coating volume has a variable relationship to emissions due to the potential addition of thinning solvents during application. It was also not possible to construct a database of add-on control devices because of limited information on the use of add-on control devices.

Because of these limitations, the method of comparison chosen was emissions per volume of solids used in the process. The information used to calculate this was most readily available. It was presented in units of grams (HAP or VOC) per liter of solids used, which was based on the assumption that all the VOC or organic HAP contained in the coating will be emitted during the coating operation (including the curing step). The data from questionnaire responses used to calculate the grams per liter solids values included the percent volatiles or solids by weight, percent volatiles or solids by volume, and the total density of the coating used.

The lowest HAP and VOC emission levels shown in Table II-8 for any of the primer operations are achieved by an electrodeposition application system. The greatest percentage of the primer coatings represented in the data collected thus far are those used in the electrodeposition application methods.

For topcoat operations, the lowest emitting systems shown in Tables II-8 and II-9 for both HAP and VOC were the powder systems. No HAP or VOC emissions were reported prior to the cure cycle, where up to 4 percent by mass of the powder may be emitted as volatile compounds. It was assumed that these volatile emissions could in some instances be composed entirely of either HAP or VOC. When assuming 5 percent powder waste (see discussions on page II-5 regarding this assumption), the emission level of the powder application and curing UOS is calculated to be 67.4 g HAP per liter of solids used in the coating operation.

Data Limitations

One of the principal limitations of the data received in response to the Section 114 questionnaire was that several respondents did not provide data to determine emissions at the operational level as was requested. This made it difficult to compare operations among the reporting facilities.

Material safety data sheets (MSDS) were the main source for identifying coating HAP and VOC content, as well as for calculating the volume solids used to estimate emissions. MSDS's are not an appropriate source of VOC data, but they were used when there was no other source of available data. The MSDS presented general information, often in ranges, and did not specify coating HAP and VOC content or possible emissions. However, in many responses these were the only data available.

Another limitation is related to the facility types for which data are available. Although an attempt was made to cover the range of product types represented in the source category, a questionnaire was sent to only nine companies. This limited the facility types for which data were received. Further, the facilities that responded to the questionnaire were major sources and represented approximately 24 percent of all the major sources in the large appliance industry (23 out of 95 from AIRS) [5].

In addition to the questionnaire responses, EPA received permit information for a facility that manufactures dishwashers. This facility utilizes a catalytic incinerator to control emissions from a priming operation. The EPA is planning to obtain more permit information in an effort to characterize more of the large appliance surface coating industry.

The collected data came from 27 facilities. They consist of responses from companies to EPA's Section 114 questionnaire, air permits data collected from the facilities, site visits, and State agencies. Based on the products manufactured, there was an approximately 2:1 ratio representation of products based on the NSPS definition to the two additional SIC codes. Responses were received from 17 facilities that manufacture products under SIC's 3631, 3632, 3633, and 3639, and from 10 facilities representing the products cited under SIC's 3585 and 3589. Based on these limited data, many product types are not represented, especially under the 3585 and 3589 SIC codes. From the list of products manufactured, a very small percentage of the service industry machinery and air-conditioning and warm air heating equipment, both industrial and commercial, are represented. These activities would be cited under SIC codes 3585 and 3589. In the absence of questionnaire responses representing these products, the EPA team has begun a permit data gathering phase along with the ICR to obtain additional information about the variety of products displayed under the large appliances surface coating industry.

Other Data Limitations and Issues for MACT and BAC Development

- A complete data analysis has not been performed because of data inconsistencies and gaps in available data.

- If the mass VOC per volume was not provided for a particular coating and operation, it was calculated from the percent solids or percent volatiles by mass. MSDS sheets were used as the primary basis for HAP and VOC information. The MSDS were generally an inconsistent and imprecise data source. For example, one HAP content was listed to range from 21 to 45 percent.

- There were outlying data points for some facilities indicating that the volatile content given by MSDS data may have included volatiles other than VOC (See the Data Needs section for further explanation of the role of MSDS sheets).

- For three of the facilities, the HAP content was given but not the VOC content. The number supplied by the majority of the respondents was the VOC content number. There is some uncertainty as to how much overlap there is between the HAP and VOC contents of the coatings used in this industry.

- Reliable data concerning flow coating were not collected. The VOC contents calculated for the flow coats in the questionnaire responses seemed inconsistent when compared to other responses. They appear to correlate with the operations for which there is ambiguity in the volatiles content.

- Data for electrocoats are not necessarily listed "as applied." They may be thinned with water or other exempt solvents prior to application.

Data Needs

Because of the limitations outlined in the above sections, the EPA will continue to gather data. The EPA prefers to collect data from the most reliable source available. It is not requiring facilities to perform source testing in order to respond to their information collection efforts; however, any available source testing data would be preferred. Manufacturer's specifications, product data sheets, and air quality permits are considered to be the next most reliable sources of data.

Less reliable sources of data are from MSDSs, which should be used as a last resort for HAP emissions information. MSDSs were prepared to meet Occupational Safety and Health Administration (OSHA) requirements. According to representatives of the coating industry, the information and format required by OSHA are not as detailed or accurate as would be desired for regulation development. For instance, the hazardous materials addressed on MSDSs are different from the HAP listed in Section 112(b) of the Act. Specific values may also be lacking since hazardous material concentrations can be given in ranges on the MSDSs. In addition, some entries on the MSDSs are generic petroleum solvents, which may contain HAP though not listed as such.

III. SURFACE COATING OF LARGE APPLIANCES

This section presents a profile of the large appliances manufacturing industry and identifies types of facilities that would potentially be subject to future Federal regulation. Also included in this section is a summary of current facility operations and industry practices that contribute to the emission of HAP and VOC pollutants.

Industry Profile

To allow data gathering and analysis for the Large Appliances NESHAP and Section 183 requirements for controlling VOC emissions under the EPA's Integrated Rule Development, the large appliances surface coating industry can be divided into market categories described by SIC codes. One major category is the household cooking equipment market. Another segment of the industry is represented by household refrigerators and home and farm freezers. Household laundry equipment occupies another significant segment of the market. The remainder of the traditional large appliance market is made up of other household appliances such as dishwashers, floor waxers and polishers, garbage disposal units, trash compactors, and water heaters.

Several new manufacturing activities have been added to the original categories discussed above. These include the manufacture of air conditioners, furnaces, heat pumps, compressors, and other commercial and industrial cooling equipment. Additional product manufacturing areas being considered in the present analysis include machines and equipment used in service industries, such as floor sanding machines, scrubbing machines, commercial cooking and food warming equipment, and commercial dishwashing machines [7].

The products identified for the Large Appliances NESHAP data gathering effort are listed in Table II-1 with their corresponding SIC codes. Current TRIS data indicate that the product manufacturing activities under SIC 3585 represent the largest number of major source large appliances facilities. Those facilities carrying out activities under SIC 3589 represent the smallest number of facilities. The numbers of facilities manufacturing products within each of the SIC codes 3631, 3632, 3633, and 3639 are essentially equal and fall between the numbers of facilities in SIC codes 3585 and 3589 [1].

Appliance® published a summary of the appliance industry, including its division into nine segments. They are:

- Business Appliances
- Comfort Conditioning
- Commercial Appliances
- Consumer Electronics
- Electric Housewares
- Floor Care Appliances
- Major Appliances
- Outdoor Appliances
- Personal Care Appliances

Of these segments, comfort conditioning, floor care appliances, and major appliances are part of the large appliances category [7]. Comfort conditioning includes many of the products that would be manufactured under SIC codes 3585 and 3589.

Number of Sources

The 1995 database in the EPA's TRIS contains approximately 128 facilities (64 major sources based on total facility HAP emissions) for manufacturing large appliances in the continental United States, distributed across 28 States [1]. Illinois, Indiana, Minnesota, Ohio, Tennessee, Wisconsin, Texas, and Missouri have the largest numbers of large appliances manufacturing facilities based on data from the 1995 TRIS, 1994 County Business Patterns, and 1995-1996 Dun and Bradsheet [1, 9, 10]. However, the AIRS database shows different information regarding facility locations. According to AIRS, there are approximately 95 major sources for manufacturing large appliances, distributed across 16 States. Of the 16 States, Colorado, Illinois, Virginia, Indiana, and Maryland have the largest numbers of facilities [6]. However, the TRIS data may be more complete and accurate due to the fact that industry must report the TRIS data, and there is no requirement to report AIRS data. The size of the facilities and the number of employees vary. Based on responses to the EPA's Section 114 questionnaire, an average plant employs about 1,600 people. The responses indicated that facilities under SIC 3585 and 3589 employ on average of 700 people, while facilities under SIC 3631, 3632, 3633, and 3639 employ an average of 2,100.

Applicability

The EPA's CTG for large appliance coating defined the large appliance source category by product, without referring to the applicable SIC codes. For the purpose of the CTG document, "large appliances" includes doors, cases, lids, panels, and interior support parts of residential and commercial washers, dryers, ranges, refrigerators, freezers, water heaters, dishwashers, trash compactors, air conditioners, and other similar products [2].

The NSPS for large appliances (40 CFR Part 60, subpart SS, promulgated October 27, 1982 at 47 FR 47778) regulates VOC emissions from the manufacture of the following large appliance products: ranges, ovens, microwave ovens, refrigerators, freezers, washers, dryers, dishwashers, water heaters, and trash compactors manufactured for household, commercial, or recreational use [3].

Existing rules and guidance applicable to the large appliance source category were used as the starting point for defining the industry for NESHAP development. The list of products considered to be large appliances was expanded somewhat for the data gathering phase to ensure that all segments of the industry were investigated. The applicability of the NESHAP will be finalized after the data analysis has been completed.

Facility Operations And Current Industry Practices

The following is a discussion of typical surface coating application equipment and methods used at large appliance manufacturing facilities. The facilities may use one method or a combination of several of these methods.

Air and Airless Spray Gun

The processes of air spraying and airless spraying of coatings involve the atomization of a liquid coating in order to apply it to a substrate. Air spraying achieves atomization by the use of compressed air. Airless spraying uses an airless pump system to force a coating through a nozzle designed to atomize the coating [11].

Air spraying offers good coating quality at a rapid rate with a wide range of coating options. Air spray guns can coat irregular shapes with recessed areas effectively. They provide transfer efficiencies of up to 40 percent. Excessive overspray is the major drawback of an air spray system. Overspray results in high material waste and high cleanup costs [12].

Airless spray systems offer comparable spray characteristics to air spray systems. However, the airless spray system typically has a higher transfer efficiency (50-60 percent) than air spray system (30-40 percent) [13]. Airless systems can also atomize coatings at high flow rates. However, with airless spray the spray nozzles are prone to clogging and wear. Also, stiff high pressure fluid hoses are required with airless systems. Problems with high pressures have been alleviated through the use of the air-assisted airless spray gun. This system uses some air to help atomize the coating and therefore allows for lowering of the pumping pressure [11].

One newer system, the high-volume low-pressure (HVLP) system, further reduces overspray because it propels the atomized coating at a lower velocity than the air or airless system. However, there are some difficulties with applying coatings with low solvent content and waterborne coatings using an HVLP system. These systems also have problems achieving proper atomization at high flow rates. HVLP systems are becoming more important and more popular where air quality regulations are especially stringent [12].

Dip Coating

The dip coating process involves the immersion of a part to be coated into a tank containing the coating. Typical transfer efficiencies are near 85 percent for dip coating [14]. The high transfer efficiency is due to the fact that there is no atomization and excess coating can be returned to the dip tank as it drips off [15].

Dip coating is advantageous because it is simple and provides a quick and inexpensive way to coat large numbers of articles. Potential problems with dip coating involve the large amounts of coating required and fire risk in large installations. The fire risk can be eliminated by using waterborne coatings [15].

Dip coating is feasible using solvent-borne or waterborne coatings. However, with either coating type extensive attention must be given to maintaining proper mix characteristics (coating viscosity) in the tank because of evaporative losses [15].

Electrodeposition

Electrodeposition is a dip coating method in which an electric field is used to facilitate the deposition of the coating on the substrate. The substrate to be coated acts as an electrode that is oppositely charged from the coating particles in the dip tank [11]. Electrodeposition has the same advantages as dip coating. The transfer efficiency for an electrostatic dip coat operation is closer to 95 percent [14]. Many types of polymers can be used in the electrodepositon process if they are used with solubilizers, which charge the polymer electrically. Early electrodeposition processes were anodic, but due to problems with electrolysis, cathodic systems are now preferred [16].

Like dip coating, electrodeposition requires close monitoring and recirculation of the coating in the tank [16]. One problem with electrodeposition is that the use of waterborne coatings requires the system to be electrically isolated [17].

Electrostatic Spraying

An electrostatic spray can be generated using an air or an airless gun system. In such systems the transfer efficiency is improved because electrostatic principles are used to attract the coating to the substrate (85 percent transfer efficiency) [11, 14]. Coating droplets are injected into an electrostatic field set up by several electrodes that impart a charge to the coating. Negatively charged atomized coating droplets are propelled to the substrate to be coated and deposit themselves through electrostatic attraction [15].

A unique advantage of applying coatings in the form of an electrostatic spray is the "wraparound effect." Due to the wraparound effect an entire product can be coated from one side. This is a result of the electrostatic attraction of the coating to the substrate [15]. The advantages of using an electrostatic spray include high transfer efficiencies (90 percent for automatic systems and 60 percent for manual systems), as well as applicability to coatings containing a high amount of nonvolatiles (solids). If waterborne coatings are to be used the system must be electrically isolated to avoid electric shocks [12].

Electrostatic Bell and Disk Gun Systems.

The electrostatic bell and disk systems are similar in many respects. They use the rapid rotation of either a bell or disk shaped applicator to mist the coating. The use of oppositely charged substrate and coating allows for higher transfer efficiencies and better coating uniformity [11]. The transfer efficiency of the bell or disk system is close to 90 percent [14].

Electrostatic bell and disk systems can also be used with almost any liquid coating from the thinnest up to 80 percent nonvolatiles [16]. The electrostatic system helps carry the coating to the substrate and causes it to adhere to the surface of the substrate. Hence, the result is a

coating of good quality and finish characteristics. The major disadvantage of bell application systems is their inability to coat hard-to-reach areas sufficiently. The major disadvantage of disk coating systems is that they work better when coating large numbers of parts that have similar characteristics (size, shape, and material) [12].

Powder Coating

Powder coating is a method that involves the application of a dry powder coating to the substrate. The powder is applied through some form of electrostatic spray. In many cases the part is grounded to a rack or conveyor, and the paint particles are charged as they leave the tip of the powder spray gun. The powder-coated part is then cured in an oven where the powder fuses to form a continuous, uniform coating [11].

Powder coating has some distinct advantages over conventional coating operations. First, there is no organic solvent used in the powder coating process, so there are negligible HAP and VOC emissions from powder coating. The transfer efficiencies for powder coat operations may be as high as 99 percent. One major advantage of powder coating is the fact that the overspray can be retrieved and most of it reused, whereas with most liquid coating systems the overspray becomes waste [17].

However, the powder coating process is not without its limitations. A certain amount of powder is lost due to contamination and simple waste. A loss factor of 5 percent was assumed for calculating powder coating emission levels in the NESHAP analyses. Some concerns with the powder coating process include control of the coating film thickness, long color change times, and the powder coating process is impractical for very large objects [17]. Other concerns associated with powder coating include the logistics of dealing with powder. Temperature and humidity must be monitored closely. Moisture in the powder must be kept at a reasonably low level to prevent cohesion problems (clumping of powder particles). Also, the air delivery system to the powder spray guns must not deliver significant amounts of water or oil [12].

Flow Coating

Flow coating is a method that involves the pouring of the coating directly onto the substrate [11]. The typical transfer efficiency for flow coating is 85 percent [14]. Flow coating does not require the large coating volumes that dip coating does. However, the maintenance of mix characteristics is equally important. Flow coating also allows for low ventilation rates and a variety of substrate shapes [16].

For many applications, electrostatic de-tearing is required to control droplet formation in flow coating operations. De-tearing uses electrostatic currents to remove excess paint droplets from the part. Also, if the coating cures too quickly the coating will skim (the surface of the coating will dry before the rest of the coating). Therefore, it is sometimes necessary to place the coated substrate in a solvent-rich environment to slow the curing process and prevent skimming. While flow coating allows for reduced solvent emission, if a solvent rich environment is maintained emissions rise considerably [16].

Final Touch-up/Reinforcement of Coated Pieces

The majority of touch-up operations are performed by using manual air spray guns and a lacquer based coating. This is because the lacquer coating has good drying characteristics that allow for shorter dry times. In some cases, touch-up might include recoating a product entirely, but the majority of touch-up lines consist of manual coating application [2].

Coating Type & Composition

Several types of coatings were represented in the responses to EPA's industry questionnaire, including powder coatings, organic solvent-borne coatings, and waterborne coatings. Organic solvent-borne coatings are considered to be the more traditional coatings. High nonvolatiles, medium nonvolatiles, and low nonvolatiles coatings fall into this coating category [14]. All three are comprised of some amount of paint nonvolatiles including the pigments, with the balance of their composition being some type of organic solvent. High nonvolatiles formulations of paints appear to be a principal method of choice for controlling HAP and VOC emissions in the large appliance surface coating industry. High nonvolatiles formulations simply have a higher nonvolatiles to volatiles ratio than conventional coatings, typically greater than 60 percent nonvolatiles by volume. Medium nonvolatiles formulations typically have 50 to 60 percent nonvolatiles by volume, and low nonvolatiles formulations have less than 50 percent nonvolatiles by volume [11].

Powder coatings are comprised primarily of some type of plastic resin. These coatings produce very low organic emissions relative to solvent-borne coatings. However, in some cases they can emit up to 6 percent by mass E-caprolactam. This substance is not a HAP, and may or may not be a VOC [11,18].

Waterborne coatings contain at least 5 percent water by mass in the volatile (liquid) fraction. These coatings offer some advantages over conventional solvent-borne coatings because they contain significantly less organic solvent, and waterborne coatings represent less of a fire risk than solvent-borne coatings. However, waterborne coatings have longer drying times because water evaporates more slowly than the organic solvents (which can have production impacts), and the water content may present a corrosion problem for the application equipment [11,14].

IV. SUMMARY OF COMMENTS AND EPA RESPONSES (LA: 9/30/98)

A draft copy of the PIC document was uploaded to EPA's technology transfer network (http://www.epa.gov/ttnuatw1/coat/lgapp/large_app.html). Comments from industry and the Regulatory Subgroup were requested by late August 1998. Only one commenter responded. The EPA team appreciates the commenter for his comments.

The following comments (in quotations) are provided by Mr. Ray Rusek of Maytag Appliances. An EPA response follows each comment.

Maytag: "On Page I-2 at the end of the first paragraph, it is stated...that the list of participants of the Coating Regulation Workshop (April 1997) is in Attachment 2. This is not true...since my name is listed, and I was not present at that meeting. Perhaps a better statement would be that Attachment 2 contains the names of individuals that either attended the April 1997 workshop or have been active in the stakeholder roundtable meetings."

EPA: This section has been revised as suggested by Mr. Rusek.

Maytag: "On page II-5, it is stated that the project team assumed a 5 percent level for waste powder. In our case, most of our systems capture and reuse of any overspray, so the level of waste powder from this perspective is significantly less than 5 percent. On the other hand, if you also consider waste powder to include powder that is 'lost' or cured on any hangers used to support the parts to be coated, 5 percent waste may be a low figure overall for our operations. We have found that the amount of powder that we lose (due to its) being cured on hangers varies from 1 to almost 20 percent. Actual loss to the hangers depends greatly on the configuration of the parts, coating requirements (i.e., if both sides of the part must be coated), and configuration of the hanger."

EPA: The EPA's assumption of a 5 percent powder waste in powder coating operations was made based on previous experiences and discussions with powder painting facilities. Based on the limited information available at the time this document was developed, it was assumed that powder waste is the powder not utilized in the Application-Curing UOS (see Figure II-2) and therefore, not cured in the oven. The 5 percent powder waste corresponds to a powder utilization rate of 95 percent, where the 95 percent represents powder that is cured in the oven (including oversprayed powder that is captured and reused). When using this approach, we are not distinguishing between how much of the powder is applied on the manufactured parts and how much on the hangers or racks. Both are counted in the 95 percent utilization rate because both get cured in the oven. Facilities may consider the powder on hangers or racks a loss in terms of transfer efficiency; however, that portion is considered to generate emissions because the powder is believed to emit volatiles when cured. In other words, powder undergoing the curing oven, whether on manufactured parts or on racks, is assumed to contribute to emissions. Therefore, in the data presented in this document, the total emissions from an Application-Curing UOS were based on 95 percent of powder utilized when assuming a 5 percent powder waste.

There are many factors which may affect the percentage of powder waste, such as the effort or lack of effort made by the facility to recover and reuse powder in the coating application unit operation, and the efficiency of the paint booth in capturing and reusing powder. Since facilities may use different equipment in a powder operation, it would be very difficult to assess the true powder waste percentage without doing an extensive study of each facility. Of course, some facilities may have a significantly lower percentage and others may have a higher percentage. The 5 percent powder waste was an assumed average based on limited information. The paragraph on page II-5 has been revised to clarify this issue. In addition, on Figure II-2, the word "racks" was removed as an outlet for the 5 percent powder waste because, as stated in the above paragraph, powder on racks and hangers was included in the 95 percent powder utilization rate instead.

Maytag: "On page II-18, in the first paragraph, it is stated that the method of comparison chosen to evaluate/compare emissions from various processes was 'emissions per volume of solids used in the process.' If this was decided by EPA Work Team in June, 1997, why did the Information Collection Request (ICR) ask for other information that is irrelevant if this is the approach to be used? By asking the extraneous information, not only did this slow down the response to the EPA, but it also consumed more time and resources on the regulated community to complete the questionnaire than otherwise would have been necessary."

EPA: This method of comparison chosen to estimate emissions from the facilities was the best method the EPA team determined among all the possible options, given the limited data during the early phases of the study. Since this decision was made based on the initial information gathered, it is not a final decision. The EPA team needs to keep the other options open and to request from the ICR other information which may not be directly related to this approach. Only when enough data are presented can a sound decision be made regarding emission comparison methods. Unfortunately, the ICR has to be extensive because it applies to many types and sizes of facilities in the large appliances industry. To determine the true air emissions of a facility, information regarding the facility's material usage, equipment, operations, and processes all need to be gathered and analyzed.

V. REFERENCES

Information on the EPA's activities and progress on the integrated rule development for Large Appliance Surface Coating can be obtained through the EPA's Technology Transfer Network (TTN) or the EPA's website on the Internet. The address is:

- **http://www.epa.gov/ttn/uatw/coat/lgapp/large_app.html**

Future updates will be on the TTN at the same location.

References and background information for this document are listed below:

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14. Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition (AP-42), U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Office of Air and Radiation, Research Triangle Park, NC. January 1995.

15. Outlines of Paint Technology, Third Edition, W. M. Morgans, Halsted Press, 1990.

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17. Industrial Surface Coating: Large Appliances - Background Information for Proposed Standards, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, EPA-450/3-80-037a. November 1980.

18. Technology Brief. VOC's in Powder Coatings, Morton, Powder Coatings Group Technology Brief #8. Not dated.

In addition to the materials listed above, the following materials were consulted for the construction of this memo.

- Responses to U. S. Environmental Protection Agency's P-MACT/P-BAC Section 114 Facility Questionnaire, June 10, 1997.

- "Initial List of Categories of Sources Under Section 112(c)(1) of the Clean Air Act Amendments of 1990", Federal Register. U. S. Environmental Protection Agency (EPA), Volume 57, Number 137, pages 31576-592. July 1992.

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- The Powder Coating Institute, Powder Coating, The Complete Finisher's Handbook, First Edition, C. J. Krehbiel Company, Cincinnati, OH, 1997.

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- Munger, Charles G., Corrosion Prevention by Protective Coatings, National Association of Corrosion Engineers, Houston, TX, December 1986.

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

- Facsimile and VOC data sheets. Facsimile from Joe Verdone, Ferro Corporation, to Karen Holmes, EC/R, Inc. August 11, 1997.

- Letter with Enclosures. Letter from Stevens Pendleton, VAC-U-MAX, to Judy Lee, PES, Inc. October 16, 1997.

- Letter. Letter from Lawrence Wethje, Air-Conditioning and Refrigeration Institute (ARI), to Dr. Mohamed Serageldin, U. S. Environmental Protection Agency. August 22, 1997.

- Letter. Letter from Mark Yohman, Lennox International, Inc., to Lawrence Wethje, ARI and Joseph Mattingly, Gas Appliance Manufacturers Association (GAMA). August 21, 1997.

- Letter. Letter from Robert Mulliner, The Trane Company to Lawrence Wethje, ARI. August 22, 1997.

- Letter. Letter from Joseph Mattingly, GAMA, to Dr. Mohamed Serageldin, U. S. Environmental Protection Agency. August 22, 1997.

- Air Permit and Air Permit Applications for Frigidaire Company, Kinston, North Carolina.

- Air Permit for A. O. Smith Water Products Company, McBee, South Carolina.

- Air Permit for Maytag, Herrin, Illinois.

- Air Permit for Maytag, Galesburg, Illinois.

ATTACHMENT 1: DEFINITIONS

Attachment 1

Definitions of Terms for the Large Appliance Industry

Add-on control device--An air pollution control device installed at the end of a process vent exhaust stack or stacks that reduces the quantity of a pollutant that is emitted to the air. The device may destroy or secure the pollutant for subsequent recovery. Examples are incinerators, condensers, carbon adsorbers, and bioreactor units which reduce the pollution in an exhaust gas. Transfer equipment and ductwork are not considered in and of themselves add-on air pollution control devices. The control device usually does not affect the process being controlled and thus is "add-on" technology as opposed to a scheme to control pollution through making some alteration to the basic process.

BAC--Best Available Control.

Clean Air Act--The Clean Air Act, as amended in November 1990, provides the foundation for EPA's efforts to improve air quality. The Clean Air Act, building on earlier legislation, was passed in 1970.

Coating--A protective, decorative, or functional layer of a material applied to a substrate or surface. The applied coating cures to form (for most materials) a continuous solid film. This term often applies to paints such as lacquers or enamels, but also applies to other coatings that do not have a resin. Adhesives and caulks are being treated as coatings**.**

Coating application--Process by which the coating mix is applied to the base substrate.

Coating operation--Any coater, flash off area, and drying oven located between a base substrate unwind station and a base substrate rewind station that coats a continuous base substrate.

Coating solids--The part of the coating which remains after the coating is dried or cured; solids (nonvolatile) content is reported based on test data or formulation data.

Construct a Major Source--(1) to fabricate, erect, or install at any greenfield site a stationary source or group of stationary sources which is located within a contiguous area and under common control and which emits or has the potential to emit 10 tons per year of any HAP's or 25 tons per year of any combination of HAP, or (2) to fabricate, erect, or install at any developed site a new process or production unit which in and of itself emits or has the potential to emit 10 tons per year of any HAP or 25 tons per year of any combination of HAP. . .

Control--In the air pollution field, this means the abatement of pollutants which might be exhausted into the atmosphere. It often refers to the collection or destruction efficiency using various technologies, including incinerators or carbon adsorbers as opposed to capture of the pollutants into the device.

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CTG--Control Techniques Guidelines. A series of documents prepared by EPA to assist States in defining reasonable available control technology (RACT) for major sources of volatile organic compounds (VOC) material. The documents provide information on the economic and technological feasibility of available techniques; and, in some cases, suggest limits on VOC emissions.

Cure volatiles--Reaction products which are emitted during the chemical reaction which takes place in some coating films at the cure temperature. These emissions are other than those from the solvents in the coating and may, in some cases, comprise a significant portion of total VOC and/or volatile HAP emissions.

Dip coating--A method of applying a coating in which the substrate is dipped into a tank of coating and then withdrawn.

Electrodeposition--A dip coating method in which an electric field is used to promote the deposition of the coating onto the part. The part being painted acts as the electrode which is oppositely charged from the coating particles in the dip tank.

Electrostatic spray--This is produced when opposite electrical charges are applied to the substrate and the coating. The coating is attracted to the object by the electrostatic potential between them. The coating may be applied by either a spray gun (nonrotational method) or a gun with a rotating bell or disk applicator (rotational method).

Existing source--Any stationary source of air pollution other than a new source.

Faraday Cage Effect--A condition that may exist on a substrate due to its geometric configuration that may inhibit the electrostatic application of powder particles at that specific localized area, such as cavities or recesses.

Facility--All contiguous or adjoining property under a common ownership or control, including properties that are separated only by a road or other public right-of-way.

Flashoff area--The portion of a coating operation between the coater and the drying oven where solvent begins to evaporate from the coated base substrate.

Flow coating--A method of applying coating where the coating is poured onto the part.

Hazardous air pollutant--Any air pollutant listed in or pursuant to Section 112(b) of the Clean Air Act.

Higher-nonvolatiles (solids) coating-- Solvent-borne coatings that contain greater than 50 percent solids by volume or greater than 62 percent (69 percent for baked coatings) solids by mass.

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High volume-low pressure (HVLP) spray--Spray equipment that is used to apply coating by means of a spray gun that operates at 69.0 kPa (10.0 psig) or less of atomizing air pressure at the air cap.

Large appliance--Any product, or part thereof, that is listed under Standard Industrial Classification (SIC) code 3631, 3632, 3633, 3639, 3585, or 3589.

Major source--Any source that emits or has the potential to emit, in the aggregate, 9.1 megagrams (10 tons) per year of more of any HAP or 22.7 megagrams (25 tons) per year or more of any combination of HAP material.

Mass percent solids--The portion of a coating which remains as part of the cured film expressed as percent by weight. This contrasts to another convention of expressing content by volume percent.

Material balance--A calculation based on conservation of mass, i.e., the mass of material going into an operation is equal to the mass of material which leaves the operation. This calculation is often used to estimate volatile emissions.

New source--Any stationary source the construction or reconstruction of which commences after a specified date, usually the proposal or promulgation of an applicable standard of performance.

Nonvolatiles (or volume solids)--This term refers to the film-forming material of a coating; also termed solids.

NSPS--New source performance standards, i.e., standards for emission of air pollutants from new, modified or reconstructed stationary emission sources which reflects the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction) the administrator determines has been adequately demonstrated. The Clean Air Act usually refers to these as standards of performance for new stationary sources.

Pollution prevention--Practices of process changes that decrease or eliminate the creation of emissions (or waste) at the source of pollution (e.g., a paint spray booth). Such prevention techniques include use of new materials, modification of equipment, and changes in work practices that result in emission reductions at the source.

Powder coating-- Any coating applied as a dry (without solvent or other carrier), finely divided solid which adheres to the substrate as a continuous film when melted and fused. Powder coatings may emit VOC/HAP cure volatiles.

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Primer--The first layer or layers of identically formulated coating applied to a surface, usually prior to the subsequent application of a topcoat.

Process (Process Line)--The aggregate of unit operations necessary for producing a product. The emissions from a process includes all sources of air emissions (e.g., storage, transfer, handling, painting, and packaging).

RACT--Reasonably Available Control Technology, i.e., the lowest emission limit that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility. RACT is usually applied to existing sources in nonattainment areas and in most cases is less stringent than new source performance standards.

Reconstructed Major Sources--the replacement of components at an existing process or production unit that in and of itself emits or has the potential to emit 10 tons per year of any HAP or 25 tons per year of any combination of HAP, whenever: (1) the fixed capital costs of the new components exceed 50 percent of the fixed capital cost that would be required to construct a comparable process or production unit; and (2) it is technically and economically feasible for the reconstructed major source to meet the applicable maximum achievable control technology emission limitation for new sources established under this subpart.

Recycle--Used, reused, or reclaimed (40 CFR 261.1(b)(7)). A material is "used or reused" if it is employed as an ingredient (including its use as an intermediate) to make a product. For example, when solvent recovered by distillation is reused in the plant.

SIC/NAICS Codes--These refer to the Standard Industrial Classification codes (1987) and their rreplacements, the North American Industrial Classification System codes. For more information on SIC and NAICS codes, visit the following Internet site: http://www.census.gov/epcd/www/naics.html

Solids--See nonvolatiles or coating solids.

Solvent--The liquid or blend of liquids used to dissolve or disperse the film-forming particles in a coating and which evaporate during drying. A true solvent is a single liquid that can dissolve the coating. Solvent is often used to describe terpenes, hydrocarbons, oxygentated compounds, furans, nitroparaffins, and chlorinated solvents.

Solvent borne coating--Coatings in which volatile organic compounds are the major solvent or dispersant.

Attachment 1

Surface preparation--The removal of contaminants from the surface of a substrate or component or the activation or reactivation of the surface in preparation for the application of a coating.

Surface coating operation--The application of a coating which covers the surface of an object. Painting and varnishing are common surface coating operations as are coatings applied to large appliance, metal furniture, fabric, paper, plastic film and metallic foil.

Thermal incinerator--A device for oxidizing waste material via flame and heat. This contrasts with a catalytic incinerator which incorporates a catalyst to aid the combustion.

Thinning solvent--A solvent added to thin a coating for the purpose of lowering the coating's viscosity and that evaporates before or during the cure of a film.

Topcoat--A coating that is applied over a primer on a part, product, or component for appearance or protection. It is typically the last coat applied in a coating system.

Touch-up and repair operation--That portion of the coating operation that is the incidental application of coating used to cover minor imperfections in the coating finish or to achieve complete coverage. This definition includes out-of-sequence or out-of-cycle coating.

Transfer efficiency--The ratio of the amount of coating solids (nonvolatiles) deposited onto the surface of the coated part to the total amount of coating solids used.

Unit operation--An industrial operation, classified or grouped according to its function in an operating environment (i.e., a paint mixing vessel, a spray booth, etc.).

Unit operation system--The ensemble on which the material balance is performed.

Volatile organic compound (VOC)--Any compound defined as VOC in 40 CFR 51.100. This includes any organic compound other than those determined by the EPA to be an "exempt" compound.

Volume percent solids--The portion of a coating which remains as part of the cured film expressed as percent by volume. This contrasts to the convention of expressing solids content by mass percent. Often a percentage is given without specifying volume or mass, which is confusing and leads to errors in coating calculations.

Waterborne coating--A coating that contains more than 5 percent by mass water in its volatile fraction.

ATTACHMENT 2: LIST OF PARTICIPANTS

ATTACHMENT 2: PARTICIPANT LIST

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ATTACHMENT 3: REGULATORY SUMMARY

ATTACHMENT 3. SUMMARY OF REGULATIONS BY STATE

State	Regulation	Applicability	Requirements	Recordkeeping
California - Bay Area	Regulation 8 Rule 14 Surface coating of large appliances and metal furniture.	Not applicable to any facility which applies coatings in volumes of less than 20 gallons per year. Not applicable to coating operations employing hand-held aerosol cans. Not applicable to the use of powder coatings provided the emission of VOC does not exceed that which is equivalent to the use of complying coatings.	The method of coating application must have a transfer efficiency of 65% or greater. Emission limits for: •baked coatings 2.3 lbs./gal •air-dried coatings 2.8 lbs./gal Specialty coating limits (lbs/gal): Baked / Air •high-gloss 3.0 / 3.5 •heat-resistant 3.0 / 3.5 •metallic topcoat 3.0 / 3.5 •pretreatment 3.5 / 3.5 •solar absorbent 3.0 / 3.5	Facilities shall maintain a current list of coatings in use which includes the following information: •coating, catalyst and reducer used. •quantity of each coating. •VOC of coatings used. •mix ratios of coatings. •type and amount of solvent. Records shall be kept on a daily basis and retained for a period of two years.
California - Sacramento	District incorporates 40 CFR 60 Subpart SS - Industrial Surface Coating: Large Appliances. The 30-day emissions averaging periods specified in the federal standard are deleted and replaced with 24-hour maximum emission averaging periods for affected sources.			
Connecticut	22a-174-32 RACT for VOCs.	Any facility located in a serious nonattainment area for ozone that emits 50 tons of VOCs or more is applicable. Any facility located in a severe nonattainment area for ozone that emits 25 tons of VOCs or more per year is applicable.	Any facility which installs and operates a system of capture and control shall: •reduce VOC emissions by at least 85% of uncontrolled emissions. •oxidize in carbon dioxide and water at least 95% of the non-methane VOCs. •operate so that the VOC emission rate leaving the outlet does not exceed 10% of the VOC mass emission rate entering the system.	Facilities shall retain records for a period of at least three years. Records should include, but are not limited to: •purchase records for all material which contain VOCs. •the name of each coating, the coating density in pounds per unit, the VOC content of each coating by weight, the amount of each coating used, and the total amount of diluent used for each coating. •the results of any VOC testing.

ATTACHMENT 3. SUMMARY OF REGULATIONS BY STATE (CONTINUED)

State	Regulation	Applicability	Requirements	Recordkeeping
Florida	62-296.506 Surface coating of large appliances.	Does not apply to quick-drying lacquers for repair during assembly provided the volume of coating does not exceed one quart in any 8-hour period.	Emission limits shall be achieved by: •the application of low solvent content coating technology; or •incineration, provided that 90% of the VOCs which enter the incinerator are oxidized.	Daily records of operations shall include, but are not limited to: •the application method and substrate type. •the amount and type of coating and solvent used. •the VOC content as applied in each coating and solvent. •oven temperature where applicable.
Louisiana	Part III Chapter 1 Subchapter SS: Standards of performance for industrial surface coating: large appliances.	State follows Federal CTG applicability standards.	Transfer efficiency requirements: •air-atomized spray 0.40 •airless spray 0.45 •manual electrostatic 0.60 •flow coat 0.85 •dip coat 0.85 •nonrotational auto. 0.85 •rotating head auto. 0.90 •electrodeposition 0.95	Records must be retained for a period of at least two years. State follows Federal CTG recordkeeping requirements.
Maine	Chapter 134 RACT for facilities that emit VOCs.	Any facility which has the potential to emit 40 tons of VOC per year or more is applicable.	A facility must comply with one of the following emission standards options: •A VOC capture and control system in which emissions do not exceed 15% of the daily uncontrolled emissions. •A VOC emission reduction program. •An approved VOC alternative reduction program. A facility must comply with one of the VOC emission reduction plans of Section 3(B).	State follows the Federal CTG recordkeeping requirements.

ATTACHMENT 3. SUMMARY OF REGULATIONS BY STATE (CONTINUED)

State	Regulation	Applicability	Requirements	Recordkeeping
New Hampshire	Chapter 1200 Part 1204 - Stationary sources of VOCs Section 1204.27 - Applicability criteria and compliance options for miscellaneous and multi category stationary sources of VOC sources.	Facilities that emit 50 tons or more of VOCs per year are applicable. Sources that meet or exceed RACT criteria are exempt.	Control options: •Installation and operation of capture and control systems that result in reduction of at least 81% of VOC emissions. •Limiting the daily weighted average nonexempt VOC emission rate to 0.40 kg VOC per volume of coating. •Implementation of a division and EPA-approvable plan.	Copies of all records shall be retained for a minimum of four years. Records shall include: •VOC emissions in tons per year. •VOC emissions during high ozone seasons in pounds per day. •coating and diluent formulation and analytical data. •method of application. •drying method. •substrate type and form.
New Jersey	7:27-16.7 Surface coating and graphic arts operations.	Facilities in which the total surface coatings containing VOCs are applied at rates less than one half gallon per hour AND two and one half gallons per day are exempt.	Facilities may apply for an alternative maximum allowable VOC content provided a transfer efficiency of 60% or greater is demonstrated.	Maintenance records shall be kept of: •the VOC content of coatings applied. •the percent weight of any exempt organics in coatings. •the daily volume of surface coatings applied.

ATTACHMENT 3. SUMMARY OF REGULATIONS BY STATE (CONTINUED)

State	Regulation	Applicability	Requirements	Recordkeeping
New York	Subchapter A Part 288 Surface coating processes.	Does not apply to coatings that are applied manually by brush, roller, or aerosol spray can. Facilities which emit less than 5 tons of VOCs annually are exempt.	If a coating system is utilized as a control strategy it must comply with the provisions of 228.3(d). A facility may be allowed to operate with a lesser degree of control than required if in compliance with the following provisions: •utilizing compliant coatings. •utilizing proven emission control technologies which achieve overall removal efficiency less than or equal to those required. •utilizing proven production modification methods which result in documented reductions in VOC emissions.	Records must be maintained at the facility for a period of five years. State follows Federal CTG recordkeeping requirements.
North Carolina	Chapter 2D Section .0900 Volatile organic compounds. .0923 Surface coating of large appliances.	Does not apply to the use of quick-drying lacquers provided the volume of coating does not exceed one quart in any eight-hour period.	Modeling shall be used to determine process operational and air pollution control parameters and emission rates for toxic air pollutants.	Copies of all records shall be retained for a period of two years. Records shall include, but are not limited to: •details of all malfunctions. •details of all testing that is conducted. •details of all monitoring conducted. •any information necessary to determine compliance.

ATTACHMENT 3. SUMMARY OF REGULATIONS BY STATE (CONTINUED)

State	Regulation	Applicability	Requirements	Recordkeeping
Ohio	3745-21-09 (K) Surface coating of large appliances.	Not applicable to: •coating at the "Whirlpool Corporation" facility in Findlay, OH. •coating at the "Whirlpool Corporation" facility in Marion, OH. •quick-drying lacquers used for repair during assembly provided the volume of coating does not exceed one quart in any eight-hour period. •large appliance coatings which are subject to in-use temperatures in excess of 250°F	Emission limits: •2.8 lbs. of VOC per gallon of coating; or •4.5 lbs. of VOC per gallon of nonvolatiles if a control system is employed.	A facility which complies with the applicable emission limits by use of complying coatings shall collect and record data on a monthly basis and retain such records for a period of three years.
Rhode Island	Air Pollution Control Regulation # 19 Control of VOCs from surface coating operations.	Applicable to facilities listed under SIC Code 363. Does not include quick drying lacquers used for repair, provided the volume of coating used does not exceed 0.25 gallons in any 8-hour period. A facility that emits less than 1,666 lbs. of VOCs per month is exempt. Any facility for which emissions are greater than 15 lbs. of VOCs per day is applicable.	Compliance shall be achieved as per subsection 19.3.2. Alternative VOC emission standards (bubble concept) may be approved by the director if requested by the facility. Compliance by use of Daily-Weighted Average according to subsection 19.5.2. Compliance by use of Complying Coatings according to subsection 19.5.3. Compliance by use of Control Devices according to subsection 19.5.4.	Monthly records of the following shall be kept for a period of five years: •the name and identification number of each coating. •the mass of VOCs per volume of coating. •the type and amounts of solvents used.

ATTACHMENT 3. SUMMARY OF REGULATIONS BY STATE (CONTINUED)

State	Regulation	Applicability	Requirements	Recordkeeping
South Carolina	Appendix C Standard No. 5 Part D - Surface coating of metal furniture and large appliances.	State follows Federal CTG standards.	The emission limit does not apply to the use of quick-drying lacquers used for repairs during assembly provided the volume of coating does not exceed one quart in any one 8-hour period. Emission limitations can be achieved by: •the application of low solvent coating technology •incineration, provided that 90% of the nonmethane VOCs which enter the incinerator are oxidized •carbon bed solvent recovery system •alternative controls allowed under Section 1 •a capture system used in conjunction with emission control equipment systems.	State follows Federal CTG standards.
Tennessee	1200-3-16-.36 Industrial Surface Coating: Large appliances.	State follows Federal CTG standards.	No facility shall discharge VOC emissions that exceed 0.90 kg of VOCs per liter.	Daily records shall be maintained for a period of at least two years. Facility must maintain records of each instance in which the volume-weighted average of the total mass of VOCs emitted per volume of coating nonvolatiles is greater than 0.90 kg per liter.

ATTACHMENT 3. SUMMARY OF REGULATIONS BY STATE (Concluded)

State	Regulation	Applicability	Requirements	Recordkeeping
Vermont	5-253.20 Other sources that emit VOCs.	Any facility which has annual VOC emissions of 50 tons or more is applicable.	The facility will install and operate emissions capture and control techniques or use complying coatings that have overall VOC reductions of at least 81 weight percent. The daily weighted average VOC for all applicable facilities is 3.5 lbs. of VOC per gallon or less. Facilities must comply with an alternative control plan approved by the Air Pollution Control Officer. A facility may be required to use and maintain air monitoring equipment and records. A facility may be required to conduct diffusion or other air quality modeling.	Facility will maintain records to demonstrate continuing compliance as required by the Air Pollution Control Officer.
Washington - Spokane	Section 6.13 General surface coating.	Not applicable to: •facilities using less than 10 gallons per year of surface coatings. •infrequent outdoor surface coating of large objects where the control officer determines that it is impractical to totally enclose the object. •any coating or other agent from pre-packaged aerosol cans. •application of coatings with VOC content less than 2.1 lbs./gal.	A spraying technique must exhibit a transfer efficiency of at least 65%.	Facilities shall maintain the following records for a period of two years: •the most current MSDS or other data sheets which clearly indicate the VOC content of the product. •records of purchases and usage. •annual usage of coatings, coating additives, wipe-down agents, reducers and other materials containing VOCs or volatile toxic air pollutants.
The following states follow the guidelines set forth in 40 CFR 60, Subpart SS: Alaska, Arizona, Arkansas, Hawaii, Idaho, Illinois, Kansas, Minnesota, Mississippi, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Washington, and Wyoming.				
The following states follow the guidelines set forth in the Federal CTG standards, but they have unique recordkeeping or applicability regulations: Alabama, Colorado, Delaware, Georgia, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Michigan, Missouri, Pennsylvania, Utah, Virginia, West Virginia, and Wisconsin.				

ATTACHMENT 4: LIST OF APPLICABLE LARGE APPLIANCE PRODUCTS

Attachment 4

LARGE APPLIANCE SURFACE COATING PRODUCTS AND CORRESPONDING STANDARD INDUSTRIAL CLASSIFICATION (SIC) CODES

Household Cooking Equipment (3631)

Establishments primarily engaged in manufacturing household electric and nonelectric cooking equipment, such as stoves, ranges, and ovens, except portable electric appliances. This industry includes establishments primarily engaged in manufacturing microwave and convection ovens, including portable. Establishments primarily engaged in manufacturing other electric household cooking appliances, such as portable ovens, hot plates, grills, percolators, and toasters, are classified in Industry 3634. Establishments primarily engaged in manufacturing commercial cooking equipment are classified in Industry 3589.

- Barbecues, grills, and braziers for outdoor cooking
- Convection ovens, household: including portable
- Microwave ovens, household: including portable
- Ovens, household: excluding portable appliances other than microwave and convection
- Ranges, household cooking: electric and gas
- Stoves, disk

Household Refrigerators and Home and Farm Freezers (**3632)**

Establishments primarily engaged in manufacturing household refrigerators and home and farm freezers. Establishments primarily engaged in manufacturing commercial and industrial refrigeration equipment, packaged room coolers, and all refrigeration compressor and condenser units are classified in Industry 3585, and those manufacturing portable room dehumidifiers are classified in Industry 3634.

- Freezers, home and farm
- Ice boxes, household
- Refrigerator cabinets, household
- Refrigerators, mechanical and absorption: household

Household Laundry Equipment (**3633)**

Establishments primarily engaged in manufacturing laundry equipment, such as washing machines, dryers, and ironers, for household use, including coin-operated. Establishments primarily engaged in manufacturing commercial laundry equipment are classified in Industry 3582, and those manufacturing portable electric irons are classified in Industry 3634.

- Drycleaning and laundry machines, household: including coin-operated
- Dryers, laundry: household, including coin-operated
- Ironers and mangles, household, except portable irons
- Laundry machinery, household, including coin-operated
- Washing machines, household: including coin-operated
- Wringers, domestic laundry

Household Appliances, Not Elsewhere Classified (3639)

Establishments primarily engaged in manufacturing household appliances, not elsewhere classified, such as water heaters, dishwashers, food waste disposal units, and household sewing machines.

- Buttonhole and eyelet machines and attachments, household
- Dishwashing machines, household
- Floor waxers and polishers, household: electric
- Garbage disposal units, household
- Sewing machines and attachments, household
- Trash compactors, household
- Water heaters, household: including nonelectric

Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment (3585)

Establishments primarily engaged in manufacturing refrigeration equipment and systems and similar equipment for commercial and industrial use; complete air-conditioning units for domestic, commercial, and industrial use; and warm air furnaces. Establishments primarily engaged in manufacturing soda fountains and beer dispensing equipment and humidifiers and dehumidifiers, except portable, are also classified in this industry. Establishments primarily engaged in manufacturing household refrigerators and home and farm freezers are classified in Industry 3632, and those manufacturing electric air-space heaters and portable humidifiers and dehumidifiers are classified in Industry 3634.

- Air-conditioners, motor vehicle
- Air-conditioning and heating combination units
- Air-conditioning compressors
- Air-conditioning condensers and condensing units
- Air-conditioning units, complete: domestic and industrial
- Beer dispensing equipment
- Cabinets, show and display: refrigerated
- Cases, show and display: refrigerated
- Cold drink dispensing equipment, except coin-operated
- Compressors for refrigeration and air-conditioning

- Condensers and condensing units: refrigeration and air-conditioning
- Coolers, milk and water: electric
- Counters and counter display cases, refrigerated
- Dehumidifiers, except portable: electric
- Electric warm air furnaces
- Evaporative condensers (heat transfer equipment)
- Fountains, drinking: mechanically refrigerated
- Furnaces: gravity air flow
- Heat pumps, electric
- Humidifying equipment, except portable
- Ice boxes, industrial
- Ice making machinery
- Lockers, refrigerated
- Refrigeration compressors
- Refrigeration machinery and equipment, industrial
- Room coolers, portable
- Showcases, refrigerated
- Siphons, soda water
- Snow making machinery
- Soda fountains, parts, and accessories
- Tanks, soda water

Service Industry Machinery, Not Elsewhere Classified (3589)

Establishments primarily engaged in manufacturing machines and equipment, not elsewhere classified, for use in service industries, such as floor sanding machines, industrial vacuum cleaners, scrubbing machines, commercial cooking and food warming equipment, and commercial dishwashing machines. Establishments primarily engaged in manufacturing household electrical appliances are classified in Industry Group 363.

- Cafeteria food warming equipment
- Carpet sweepers, except household electric vacuum sweepers
- Carwashing machinery, including coin-operated
- Cookers, steam: restaurant type
- Cooking equipment, commercial
- Corn popping machines, commercial type
- Dirt sweeping units, industrial
- Dishwashing machines, commercial
- Floor sanding, washing, and polishing machines: commercial type
- Food warming equipment, commercial
- Fryers, commercial
- Garbage disposers, commercial
- Janitors' carts
- Mop wringers
- Ovens, cafeteria food warming: portable
- Ovens, microwave (cooking equipment): commercial
- Pressure cookers, steam: commercial
- Sanding machines, floor
- Scrubbing machines
- Servicing machines, coin-operated: except drycleaning and laundry
- Sewage treatment equipment

Attachment 4

- Sewer cleaning equipment, power
- Sludge processing equipment
- Vacuum cleaners and sweepers, electric: industrial and commercial
- Water conditioners, for swimming pools
- Water filters and softeners, household type
- Water purification equipment, household type
- Water treatment equipment, industrial