PRELIMINARY INDUSTRY CHARACTERIZATION

METAL COIL SURFACE COATING INDUSTRY

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Durham, North Carolina

September 30, 1998

PRELIMINARY INDUSTRY CHARACTERIZATION:
Metal Coil Surface Coating

I. INTRODUCTION

This document presents a preliminary industry characterization for the metal coil surface coating industry. The information was collected by the EPA with stakeholder input from Federal, State, and local environmental agencies and industry representatives. This characterization is based on readily available information, and as such has limitations. The preliminary characterization is intended to provide a brief summary of readily available information regarding current emissions and current industry practices in the metal coil surface coating industry. This initial characterization will assist the Agency in identifying areas which require further investigation during the development of the MACT standard.

II. SUMMARY OF INITIAL PHASE AND NEXT STEPS FOR MACT DEVELOPMENT

Background

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 metal coil surface coating source category. The EPA is required to publish final emission standards for the metal coil surface coating source category by November 15, 2000.

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

The MACT standards development for the metal coil surface coating industry began with a Coating Regulations Workshop for representatives of EPA and interested stakeholders in April 1997 and continues as a coordinated effort to promote consistency and joint resolution of issues common across nine coating source categories.[1] The first phase was one in which EPA gathers 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 included members of the National Coil Coaters Association (NCCA), members of the Aluminum Association (AA), representatives of individual companies in the regulated industry, and representatives of companies that supply coatings to the industry. States that participated in the process included Florida, Illinois, and Pennsylvania. In addition, data were obtained from several other States including Georgia, Michigan, California, West Virginia, Indiana, and Ohio. The U.S. EPA was

[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.

represented by EPA Region 5, the EPA Office of Air Quality Planning and Standards (EPA/OAQPS), the EPA Office of Enforcement and Compliance Assurance (OECA), the EPA Office of Pollution Prevention and Toxic Substances (OPPTS), and an EPA Small Business Ombudsman.

Information presented in this document was collected from a variety of sources. Data collection began with a review of information collected by the Agency during development of the New Source Performance Standard (NSPS). A total of four meetings were held involving representatives of all stakeholders for the purpose of information exchange and the identification of potential data sources. Information was also collected during site visits to four metal coil surface coating facilities that operate coil coating lines with a wide range of production rates. A teleconference meeting was also held with the regulatory subgroup which is made up of EPA and State representatives. A list of participants in the data collection effort is presented in Appendix A of this document.

The information summarized in this document can be used by States that may have to make case-by-case MACT determinations under Sections 112(g) or 112(j) of the Act. The initial phase of the regulatory development focused primarily on familiarizing the project team with metal coil surface coating operations, identifying plants that make up the industry, and investigating the emission control technologies in use by plants in the industry. 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 July, 1998. Additional information will be collected and considered before the metal coil surface coating standards are promulgated.

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

III. INDUSTRY CHARACTERIZATION

<u>Summary of Existing Federal Requirement/State Requirements</u>

<u>Federal Regulations</u>. Federal regulations that apply to metal coil surface coating include a New Source Performance Standard (NSPS) under 40 CFR Part 60, Subpart TT, "Standards of Performance for Metal Coil Surface Coating", which is applicable to each prime coat operation, each finish coat operation, and each prime and finish coat operation combined when the finish coat is applied wet on wet over the prime coat and both coatings are cured simultaneously. The coil coating NSPS regulates emissions of volatile organic compounds (VOC) and contains emission limits in several forms. If an emission control device is used on a continuous basis, VOC emissions are limited to 0.14 kilograms per liter (kg/*l*) of coatings solids applied or the owner or operator must reduce emissions by 90 percent for each affected facility for each calendar month. If an emission control device is not used, VOC emissions are limited to 0.28 kg/*l* for each affected facility for each calendar month. If an emission control device is used intermittently, VOC emissions are limited to a value between 0.14 kg/*l* (or a 90 percent reduction) and 0.28 kg/*l*. The NSPS was proposed on January 5, 1981 and promulgated on April 26, 1982. All coil coating lines that were modified or began construction or reconstruction after January 5, 1981 must be in compliance with the NSPS. At least eleven plants are subject to this NSPS.

In addition to the NSPS, EPA also published a Control Techniques Guideline (CTG) document that covers metal coil surface coating operations. That document, entitled "Control of Volatile Organic Emissions from Existing Stationary Sources - Volume II: Surface Coating of Cans, Coils, Paper, Fabrics, Automobiles, and Light-Duty Trucks", was published in May, 1977, and was intended as guidance for States in the development of State Implementation Plans (SIP). The CTG defined a model of reasonably available control technology (RACT) for coil coating operations, consisting of the coating application station, the curing oven, and the quench area as 0.31 kg/*l* of applied coating (minus water). This limit is based on the use of waterborne coatings or the use of coatings that contain 25 volume percent solids and an emission control system in which at least 90 percent of the emissions are captured and routed to a control device (incinerator) which achieves at least a 90 percent emission reduction.

<u>State Regulations</u>. The emission control requirements that the States impose on coil coating operations vary substantially among the different State Implementation Plans (SIPs). The SIPs for 24 States include the CTG RACT limit of 0.31 kg/*l* of coating excluding water and exempt solvents. In nine other States, the SIP requires reductions equal to that required by the NSPS. California has separate emission limits for each of its Air Quality Management Districts. Most districts impose an emission limit of 0.20 kg/*l* of coatings (less water and exempt solvents). One district requires an overall reduction of 85 percent. Two States have emission limits of 0.48 kg/*l* of coating solids and one other State has a limit of 0.20 kg/*l* of coating excluding water and exempt solvents. The remaining States do not have rules targeted specifically for coil coating operations. In addition to emission limits on coil coating operations, several States also have restrictions on clean-up and surface preparation solvents and the handling of cleanup rags. Examples include restrictions on the quantity of cleaning solvent used, limits on the VOC content and/or vapor pressure of cleaning solvents, requirements for cleaning in enclosed areas, and storage of clean-up rags in closed containers. Table III-1 presents a listing of State requirements for metal coil surface coating operations.

Table III-1. Summary of State Regulations for Metal Coil Surface Coating

State/Area	Numerical limit	Alternate or Additional guidance
Alabama	0.31 kg/l, excluding water and/or exempt solvents	
Alaska	None	
Arizona	40 CFR 60 Subpart TT	
Arkansas	None	
California	No statewide standard found	
Bay Area	0.20 kg/l, excluding water and/or exempt solids OR 0.12 kg/l if a 90% efficient control device being used	Surface preparation and clean up solvent also regulated: e.g., solvent must have < 0.20 kg/l for surface prep; closed containers for disposal of rags

State/Area	Numerical limit	Alternate or Additional guidance
Mojave District	Shown by coating type, 85% reduction required	
Placer County	0.20 kg/liter OR controlled by system with 85% overall efficiency AND cleanup material must not exceed 0.200 kg VOC/l or 45 mm HG vapor pressure or cleanup area totally enclosed; cleaning/surface prep material and cleanup rags stored in closed containers	Coating must be applied with one of the following: Electrostatic application operated in accordance with the manufacturer's recommendations.; Flow coat; Roll coat; Dip coat; Squeegee pad; High-volume low-pressure (HVLP) spray gun operated in accordance with the manufacturer's recommendations.
San Diego	0.20 kg/liter for letterpress coatings and other coatings to be achieved with compliant coatings or controls with 85% overall efficiency	Cleaning restrictions: (i) cleaning material must contain <0.20 kg VOC/l material; or (ii) material has an initial boiling point of > 190 °C; or (iii) solvent has total VOC vapor pressure < 20 mm Hg ; or (iv) cleaning material is flushed/ rinsed through application equipment in a contained manner that will minimize evaporation into the atmosphere; or (v) application equipment/parts are cleaned in a closed container and the cleaned equipment or equipment parts are drained to the container until dripping ceases; or (vi) system totally enclosed; or (vii) The combined usage of cleaning materials is less than 10 gallons each calendar month

State/Area		Numerical limit	Alternate or Additional guidance
	San Joaquin	0.20 kg/l, to be achieved by low-VOC technology or by a 90% overall control OR VOC emissions to atmosphere <0.12 kg/l coating as applied	Alternative: any coating with atmospheric VOC emissions equivalent to using a coating containing <0.23 g VOC per gram of nonvolatile coating applied in sheet base coating operation; < the VOC emissions resulting from compliant coatings exclusive of sheet base coating;
	South Coast Air Quality District	0.20 kg/l achieved with compliant coating or 90% efficient collection system and a 95% efficient control device Restrictions on solvent cleaning also apply	Coating must be applied with (A) electrostatic application; or (B) flow coat; or (C) roll coat; or (D) dip coat; or (E) high-volume, low-pressure (HVLP) spray; or (F) hand application methods; or (G) such other coating application methods as are demonstrated to the Executive Officer to be capable of achieving at least 65 percent transfer efficiency and for which written approval of the Executive Officer has been obtained.
Colorado		0.31 kg/l, excluding water and/or exempt solvents	
Connecticut		0.31 kg/l, excluding water and/or exempt solvents	

State/Area	Numerical limit	Alternate or Additional guidance
Delaware	0.31 kg/l, excluding water and/or exempt solvents	As an alternative to compliance with the emission limit, an owner or operator of a coil coating unit may meet a daily-weighted average coating VOC content limitation. Compliance may also be established by one of the following: i) installing and operating a capture system; or ii) installing and operating a control device; or iii) determining for each day the overall emission reduction efficiency needed to demonstrate compliance where the overall emission reduction needed for a day is the lesser of a calculated value for that day or 95%; or iv) demonstrating each day that the overall emission reduction efficiency achieved for that day is greater than or equal to the overall emission reduction efficiency required for that day.
Florida	0.31 kg/l, excluding water and/or exempt solvents	
Georgia	0.31 kg/l, excluding water and/or exempt solvents	
Hawaii	None	
Idaho	Sets emission limits for a specific list of HAP	
Illinois	0.20 kg/l, excluding water and/or exempt solvents	
Indiana	0.31 kg/l, excluding water and/or exempt solvents	
Iowa	40 CFR 60 Subpart TT	
Kansas	None	

State/Area	**Numerical limit**	**Alternate or Additional guidance**
Kentucky	40 CFR 60 Subpart TT	Under 401 KAR 61:130, no discharge into the atmosphere of more than 15% by weight of the VOCs net input into the affected facility
Louisiana	0.31 kg/l, excluding water and/or exempt solvents	
Maine	None	
Maryland	0.31 kg/l, excluding water and/or exempt solvents	
Massachusetts	0.48 kg/l of coating solids	
Michigan	0.31 kg/l, excluding water and/or exempt solvents	
Minnesota	40 CFR 60 Subpart TT	
Missouri	0.31 kg/l, excluding water and/or exempt solvents	
Mississippi	None	
Montana	None	
Nebraska	40 CFR 60 Subpart TT	
Nevada	40 CFR 60 Subpart TT	
New Hampshire	0.31 kg/l, excluding water and/or exempt solvents	
New Jersey	0.31 kg/l, excluding water and/or exempt solvents	
New Mexico	None	
New York	0.31 kg/l, excluding water and/or exempt solvents	
North Carolina	0.48 kg/l of coating solids	0.31 kg/l excluding water and exempt compounds if air pollution equipment is installed
North Dakota	40 CFR 60 Subpart TT	

State/Area	Numerical limit	Alternate or Additional guidance
Ohio	0.31 kg/l, excluding water and/or exempt solvents	0.48 kg/l of coating solids if a control system is employed
Oklahoma	Limitations are placed on pounds of organic solvent per gallon of paint (less water) based on paint chemistry. Other limitations on pounds of organic solvent per gallon of paint (less water) are based on whether the paint is air or forced air dry, clear coat, extreme performance, powder, or other.	
Oregon	40 CFR 60, Subpart TT, as adopted under OAR 340-25-535	
Pennsylvania	0.31 kg/l, excluding water and/or exempt solvents	
Rhode Island	0.31 kg/l, excluding water and/or exempt solvents	
South Carolina	0.31 kg/l, excluding water and/or exempt solvents	Specifies ways to meet this limit: 1) low solvent technology; 2) incineration with 90% destruction; 3) carbon bed solvent recovery; 4) others approved case by case.
South Dakota	None	
Tennessee	0.31 kg/l, excluding water and/or exempt solvents	Alternative standard: Installation of capture and control device with 95% destruction OR alternative calculation measures prescribed by regulation
Texas	0.31 kg/l, excluding water and/or exempt solvents	
Utah	None	
Vermont	None	

State/Area	Numerical limit	Alternate or Additional guidance
Virginia	0.31 kg/l, excluding water and/or exempt solvents	Requires "reasonable precautions" such as 1. The use of capture or control devices; 2. The use of non-volatile cleaning methods; 3. The minimization of the quantity of volatile organic compounds used to clean lines of equipment; and 4. The adjustment of production schedules to minimize coating changes. Control technology should consist of one of the following: 1. Use of electrodeposited waterborne coatings; 2. Use of other waterborne coatings; 3. Use of high-solids coatings; 4. Incineration; or 5. Any technology of equal or greater control efficiency compared to the use of a coating complying with the stated emission limit, provided such technology is approved.
Washington	0.31 kg/l, excluding water and/or exempt solvents	
West Virginia	0.31 kg/l, excluding water and/or exempt solvents	
Wisconsin	0.31 kg/l, excluding water and/or exempt solvents	
Wyoming	40 CFR 60 Subpart TT	

Note: The information in this table represents the primary emission limits that apply to metal coil surface coating operations and other major requirements specific to metal coil surface coating. It is not intended to convey all regulatory provisions that might be applicable to metal coil surface coating and some States may allow alternative methods for demonstrating compliance.

Industry Profile

General Process Description

The metal coil surface coating source category includes any facility engaged in the surface coating of metal coil. In this process, a coil or roll of uncoated sheet metal is coated on one or both sides and repackaged as a coil or otherwise handled. Although the physical configuration of the equipment used in coil coating lines varies from one installation to another, the individual operations generally follow a set pattern. The coil coating process begins with a coil (or roll) of bare sheet metal and, in most cases, terminates with a coil of metal with a dried and cured coating on one or both sides. The metal strip is unrolled from the coil at the entry to the coil coating line and first passes through a wet section, where the metal is cleaned and may be given a chemical treatment to inhibit rust and promote adhesion of the coating to the metal surface. In some installations, the wet section may also contain an electrogalvanizing operation in which zinc is applied through an electroplating process to a steel substrate. After the metal strip leaves the wet section, it is squeegeed and air dried and then passes to a coating applicator station.

Coating application stations may be used to apply a variety of coatings. In addition to protective or decorative coatings, adhesives and printed patterns using ink may also be applied. The most prevalent operation includes the application of protective and decorative coatings to one or both sides of the metal strip using rollers. Following the coating application, the strip passes through an oven where the temperature is increased to the desired curing temperature of the coating. The strip is then cooled by a water spray, air spray, or combination of the two. If the line is a tandem line, the first coating application is a prime coat and the metal strip next enters another coating applicator station where a top or finish coating is applied by rollers to one or both sides of the metal. The strip then enters a second oven for drying and curing of the top or finish coat. This is followed by another cooling or quench station. The finished metal strip is then normally rewound into a coil and packaged for shipment or further processing. In some cases, the coated metal strip may be cut rather than rerolled into a coil. Most metal coil surface coating lines have accumulators at the entry and exit that permit the strip to move continuously through the coating process while a new coil is mounted at the entry or a full coil removed at the exit. Figure 1 is a schematic diagram of a typical, tandem coil coating line.

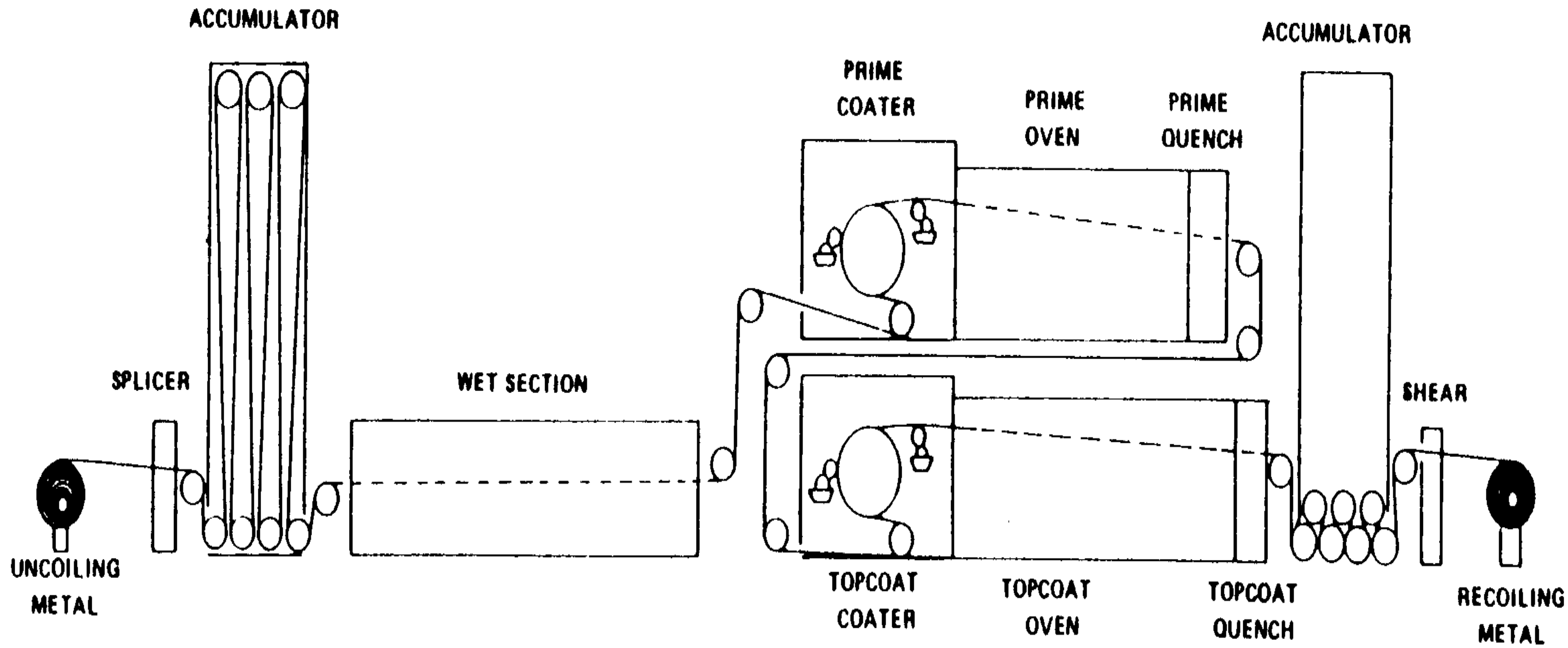

Figure 1. Typical Tandem Coil Coating Line

For existing coil coating lines, processing speed varies considerably, with some lines having processing speeds as high as 1,000 feet per minute. The widths of the metal strip vary from a few inches up to 6 feet, and thickness may vary from about 0.006 inch to more than 0.15 inch. The lower thickness of 0.006 inch has been considered to be the line of distinction between metal coil and foil. However, a few plants have been identified that process coiled metal with a thickness both above and below 0.006 inch. The processing of foil is considered to be part of the paper and other web surface coating source category. Thus, there is a potential overlap between coil coating processes and foil coating processes. After the Agency collects more data, it will consider the need and approaches for addressing this potential overlap.

Industry Make-up and Markets

The EPA has identified more than 150 plants believed to be operating about 200 metal coil surface coating lines. The plant data base was developed using information from several sources beginning with the list of plants developed during the NSPS background study. That list was distributed to the National Coil Coaters Association (NCCA) who passed it to a number of member companies for review. Many plants submitted verification to the existing data or provided updated information related to plants on the original list. In some cases, plants were found to be no longer in operation or operating under a new name. Additional information, including the presence of control devices, estimates or measurements of annual HAP emissions, was obtained from the industry, EPA's Toxic Release Inventory (TRI), from a survey of secondary aluminum plants, and from State agencies. Plant identification data have also been obtained from the open literature. Appendix B of this document shows this information. Note that the information in Appendix B is preliminary, and that more detailed information is being collected currently.

The emissions information shown in Appendix B does not specify which facilities are major sources of HAP emission and which are not. For example, the estimates are of actual emissions, rather than potential emissions. Furthermore, the TRI data are limited in that emissions may be reported in ranges and may also be conservative estimates. However, despite the limitations of the available emissions data, it appears that there will be a number of coil coating plants that are major sources of HAP emissions and others that are synthetic area sources.

Major markets for coil coated metal include the transportation industry, building products industry, large appliance industry, can industry, and packaging industry. The industry has maintained a positive growth rate for a number of years as new end uses for precoated metal have continued to emerge.

Although coil coated metal is used in a wide variety of products, metal coil surface coating is typically not a product specific operation but rather is a distinct process. The Agency notes here that many of the other source categories being examined for surface coating MACT standards are product specific, such as the metal can and large appliances source categories. For the purposes of standard development, the Agency is considering any coil coating process, regardless of the end product, as part of the metal coil source category. Product-specific source categories would examine surface coating operations that are not coil coating processes.

Types of metal processed by the coil coating industry are mainly cold-rolled steel, galvanized steel, and aluminum. Small quantities of other metals including brass are also coated. Coil coated metal is fabricated into end products after it is coated, thus eliminating the need for post-assembly painting. Toll and captive coaters represent the two basic industry divisions. Toll coaters produce metal that is coated in accordance with specifications of their customers. Captive coaters both coat the metal and fabricate it into end products within the same company. Examples are can manufacturers who have dedicated coil coating lines for metal used in the can manufacturing process, and housing products manufacturers who coat the material for their products using company owned and operated coil coating lines. Some plants perform both toll and captive operations.

Coatings

The types of coatings applied in coil coating operations include a wide variety of formulations. Among the more prevalent types are polyesters, acrylics, fluorocarbons, alkyds, vinyls, epoxies, plastisols, and organosols. Table III-2 lists the coatings commonly used in the industry and gives the approximate range of organic solvent content of each. In addition to these traditional coatings, adhesives, bondable backers, strippable protective coatings, and other non-traditional coatings are also used by the industry. The majority of the coatings, estimated at about 85 percent, are organic solvent based and have solvent contents ranging up to 80 percent by volume with most being in the range from 30 to 70 percent. The remaining 15 percent of coatings are mostly of the waterborne type which also contain some organic solvents ranging from about 2 to 15 percent by volume. While waterborne coatings are in use at a number of coil coating facilities, they are not available in formulations that are suitable for all end product applications. The choice of waterborne versus solvent borne coatings usually depends on the end use of the coated metal and the type of metal used. The most prevalent use of waterborne coatings is on aluminum used for siding in the construction industry.

High-solids coatings in the form of plastisols, organosols, and powder are also used to some extent by the coil coating industry. Because these coatings have a lower organic solvent content, potential organic emissions are lower than from the other, more commonly used coatings. However, these coatings also have limited applicability and are not available in

Table III-2. Typical Coatings Used in Metal Coil Surface Coating

Coatings	Volatile Content (Weight %)
Acrylics	40-45
Adhesives	70-80
Alkyds	50-70
Epoxies	45-70
Fluorocarbons	55-60
Organosols	15-45
Phenolics	50-75
Plastisols	5-30
Polyesters	45-50
Silicone Acrylics & Polyesters	35-60
Urethanes	60-75
Inks	50-65
Solution Vinyls	75-85
Vinyls	60-75

formulations suitable for use on all end products. Typical uses for these coatings are residential siding, drapery hardware, and other products.

Little data have been identified that represent the HAP content of coatings used in the metal coil surface coating industry. Information provided by one of the coating suppliers for three typical coatings showed HAP contents ranging from about 5 to 28 percent by weight. The EPA recognizes that the scope of this information is quite limited and thus may not be representative of the entire range of coating formulations used in the metal coil surface coating industry. Thus the HAP content range reported here is only seen as a preliminary indication of the potential range over all coatings. The EPA is in the process of conducting a nationwide survey of coil coating plants. Data from that survey, which includes questions related to coating usage and the HAP content of coatings, will provide a more complete indication of the range of HAP content in coatings used by the coil coating industry.

Process Descriptions, Current Industry Practices, and Emission Sources

Although specific steps in a coil coating operation differ between plants, most have a common series of steps that include storage and handling of raw materials and a coating line that includes a wet section and one or more coating operations consisting of a coating application station, a curing oven, and a quench area. Most plants also generate wastewater and have some type of wastewater treatment system. The following paragraphs provide brief descriptions of the common operations found on coil coating lines and provides general information regarding potential HAP emissions.

Storage and Handling of Coatings and Other Materials Many of the coatings, solvents, and wet section chemicals are delivered and stored in 55 gallon drums but may also be delivered and stored in totes, which are transportable containers with a capacity generally in the range of about 200 to 500 gallons. Some plants also receive raw materials in bulk by tank trucks or rail cars and store the materials in bulk storage tanks. These tanks may be located inside a building or may be outdoors either above ground or underground. For raw materials delivered and stored in drums or totes, no emissions should occur during normal storage provided that they typically are kept sealed and generally do not leak. Emissions would only occur when the drums or totes are opened.

Where coatings are delivered by tank truck or rail car, working loss emissions occur when the coatings are pumped from the delivery vehicle to bulk storage tanks. During storage, daily temperature fluctuations generate breathing loss emissions. Breathing losses would be expected to be low for tanks that are underground or enclosed in controlled temperature environments relative to tanks that are outdoors, above ground and exposed to diurnal temperature cycles.

Before application of the coatings to the coil, the coatings are typically stirred. They may also be thinned with solvent to adjust the viscosity. In some cases, coatings are mixed together. One example is mixing to achieve a particular color. Another example is the blending of excess coatings together to use as a backer.

Wet Section Pretreatment The wet section of a metal coil surface coating line includes cleaning steps that may use water, caustic cleaners, brushing, or acid treatment. The wet section may also include chemical treatments such as dried in place. Processes may include spray applications of materials or may include submersion of the metal strip. Specific processes included in the wet section depend on the type of metal substrate, characteristics of the coatings to be applied, and other parameters. The chemical treatments used in the wet section may contain HAP. One example is chromium compounds such as chromic acid. The EPA currently has little information regarding the levels of HAP emissions from the wet section. They are expected to be small relative to potential HAP emissions from coating application and curing.

Coating Application Stations. At the coating application stations, coatings are applied by rollers to one or both surfaces of the metal strip as it passes through the station. Emissions of HAP occur when HAP-containing solvents contained in the applied coatings evaporate. It is estimated that between 0 and 15 percent of the coating solvent evaporates at the coating station with an average of about 8 percent. If HAP-containing cleaning solvents are used, emissions of HAP also occur during cleaning of the paint rollers and other parts of the application station between coating sessions or when a color change is made. Cleaning may be carried out in place using solvent and rags, or portions of the coaters may be removed for cleaning.

At many plants, the coating application stations are enclosed in rooms. Because air is drawn into the ovens from these rooms, it is generally believed that a large fraction, and in some cases all, of the solvent that evaporates in this area is captured by the ovens. Hoods or "snouts" may be used to increase the fraction of solvent emissions captured by the ovens. Plants may also use smaller coating station enclosures, which require less ventilation air, and are not occupied by workers except when the enclosure is opened for maintenance or inspection. On lines that do not have coating rooms or smaller enclosures, an exhaust hood is frequently installed directly over the roll coaters to exhaust the solvent that evaporates in that area. In these cases, the hoods may be exhausted to the ovens, a control device, or to the atmosphere. Some plants do not use hoods or enclosures around the coating application stations; therefore, the majority of the solvent evaporated at the coating station would be emitted to the atmosphere.

Curing ovens. After coatings are applied to the surface of the metal strip, the strip enters an oven where heat is applied to evaporate the organic solvent and water contained in the applied coatings. An estimated 85 to 100 percent of the organic solvent content of applied coatings evaporate inside the curing ovens with an average estimated at about 90 percent. Most curing ovens used in coil coating operations are direct fired and use natural gas as fuel. Many ovens are designed to use propane as a backup fuel in case of natural gas curtailments. Ovens heated by fuel oil or electricity are used in some plants, but to a much lesser extent than those heated by natural gas. The heat input to the ovens must be sufficient to evaporate the solvent in the coatings, to bring the metal and coatings up to the design temperature, usually in the range of 375 to 500 °F, to replace the heat lost from the ovens by radiation and conduction, and to heat dilution air to oven operating temperature. Oven ventilating air (or dilution air) is normally the largest single factor in the total oven heat load.

Solvent borne coatings, if uncontrolled, would result in higher organic emissions from the oven than either waterborne coatings or high solids coatings. Emissions of HAP compared to organic emissions will depend on the proportion of HAP as compared with non-HAP solvents in the coatings.

Quench Area. When the metal strip exits the curing oven, it is cooled, usually by a water spray, an air spray, or a combination of the two before being repackaged as a coil or passing to another coating station. An estimated 0 to 2 percent of the organic solvent in the applied coatings is released in the quench area. The quench area is normally an enclosed area adjacent to the exit from the curing oven and a large fraction of the emissions released in this area are estimated to be captured by the oven ventilation system. However, at some plants, the quench area is vented directly to the atmosphere.

Wastewater Handling and Treatment. Most plants generate wastewater from wet section operations, quenching operations, or both. Based on the EPA's current information, organic solvents are not typically used in the wet section. Therefore, the EPA does not expect much organic solvent to get into plant wastewater; thus, organic HAP air emissions from wastewater handling and treatment are expected to be low or nonexistent. Coil coating wastewater may contain chromium compounds but the potential for air emissions of these compounds is expected to be small. Wastewater may also be generated by clean up activities at plants that use waterborne coatings.

IV. EMISSION REDUCTION TECHNIQUES IDENTIFIED

Discussion

The emission reduction techniques in use by the coil coating industry that have been identified to date primarily are related to coating application and curing ovens. Therefore, these are the emission points that are discussed here.

For coil coating lines that use solvent borne coatings, oven emissions are typically controlled by the use of thermal or catalytic incinerators which may be located inside or outside the ovens. From the information gathered to date, the EPA knows of at least 65 plants that use incineration systems to control organic emissions from the ovens. No other types of add-on control devices have been identified for emissions from coating application and ovens. Most plants employ some form of heat recovery to improve the overall energy efficiency of the coil coating operation. Incinerator exhaust gases may be used to preheat the oven exhaust before it enters the incinerator or a portion of the heat from the incinerator may be used for oven heating or to produce steam in a waste heat boiler. The steam can be used to supply heat to wet section operations or other operations in the facility.

Little information has been collected to date on the overall emission reduction achieved by existing incineration systems at existing coil coating facilities. In general, incinerator efficiencies are in the range of 80 to 99 percent depending on the type of incinerator (i.e., thermal or catalytic) and the incinerator operating parameters. Five plants are reported to use catalytic incineration systems and 23 to use thermal incinerator systems. Thermal incinerators are capable of being designed and operated to achieve a destruction efficiency in the range of 98 to 99+ percent for organic compounds entering the incinerator. One regenerative thermal oxidizer was reported in a trade journal to consistently achieve an emission reduction efficiency of at least 99 percent over a wide range of solvent loadings. Additional evidence is shown in the operating permit for a recently constructed coil coating line, which specifies that the incinerator be operated at a destruction efficiency of 98.5 percent.

To determine the overall efficiency of an add-on control system, it is also important to consider the efficiency with which the emissions are captured to be routed to the control device. As discussed earlier in the section about coating application, there is a variety of capture systems currently in use in the industry with a range of efficiencies. Data obtained from State agencies indicate that at least fourteen plants have installed permanent total enclosures around the coating application stations. These enclosures have a capture efficiency that approaches 100 percent.

The Agency is in the process of completing a national survey of coil coating plants to collect data describing current operating practices, air emissions, and the types and effectiveness of emission controls. Survey data will be a primary source of information for existing coil coating plants.

Pollution Prevention Considerations:

As noted in an earlier discussion, some coatings have lower potential for producing emissions than others. Two plants were identified so far in the data gathering process that use lower emitting coatings without an add-on emission control device. One of these exclusively uses waterborne coatings and the other uses powder coatings.

V. STAKEHOLDER COMMENTS

The following is a presentation of comments received from stakeholders on the draft of this document that was distributed for stakeholder review. The EPA response to the comments is also presented. Comments were submitted by one individual attorney and the NCCA.

The following comments were received from the NCCA:

Comment 1 - The commenter suggests that the document clarify that the information presented is applicable only for case-by-case MACT determinations for new major sources only.

Response. The EPA's current schedule for completing the MACT standard development process calls for promulgation of the MACT standard well within the statutory deadline. Thus, it is unlikely that case-by-case MACT determinations will be required for existing facilities. However, the information presented in this document is quite general in nature and includes information collected by the Agency to date related to existing facilities as well as new ones.

Comment 2 - The commenter suggested that the Agency review State rules to more fully represent information in the State rules described in Table III-1. The commenter noted that some

States that have specific emission limits also allow alternative compliance options. It was suggested that these alternatives be included in the table.

Response. The information in Table III-1 was obtained directly from existing State regulations. Because it is not practical to try to include all provisions of a State regulation in such a table, the information is intended to represent only the major requirements of each State rule. In response to the comment, a footnote has been added to the table denoting that fact.

Comment 3 - The commenter points out that a potential overlap between coil coating and foil coating is identified but no plan is presented to deal with the potential overlap.

Response. The Agency believes that it is premature to devise a plan for handling this issue before identifying the extent and full nature of the overlap. Language was added to this document to note that after additional data collection, the EPA will consider the need and approaches for addressing this potential overlap.

Comment 4 - The commenter states that TRI data are usually reported conservatively and may not be appropriate for determining major source status.

Response. The document has been revised to address this point.

Comment 5 - The commenter indicates that the listing of major markets for coil coated metal is an unresolved, overlapping area.

Response. Additional language was added to clarify that the coil coating source category addresses the coil coating process without regard to the subsequent use of the coated metal.

Comment 6 - The commenter suggests modifications to references to relative organic emissions from waterborne and solvent borne coatings.

Response. This paragraph presents a discussion of the various types of coatings used in the coil coating industry. In response to this comment, the EPA has chosen to remove all references to emissions from this paragraph. A discussion of emissions is already presented in another section of the document.

Comment 7 - The commenter suggests several additional types of coatings for inclusion in Table III-2.

Response. The changes were made as suggested.

Comment 8 - The commenter suggests removing information related to the HAP content of coatings because it represents a single source of information.
Response. Additional language was added to this paragraph to recognize the limited nature of the data.
Comment 9 - The commenter suggested modifications to the listing of operations in the wet section of a coil coating line.
Response. The changes were incorporated.
Comment 10 - The commenter suggested that Section IV be identified as applying only to new major sources and also suggested adding language related to vendor guarantees for incinerator efficiency. The commenter suggested that vendors do not typically guarantee anything over 99 percent reduction and claim that efficiencies deteriorate over time and suggests that 99 percent is the highest destruction efficiency that could be used for regulatory purposes.
Response. In response to the comment, the section was edited to clarify the limited amount of data available for existing facilities and remove statements that could have been interpreted as meaning the highest control efficiencies are readily achievable by existing coil coating facilities. Additional data are currently being collected from the coil coating industry that will help identify emission reduction efficiencies achievable by existing facilities in the industry.
Comment 11 - The commenter offered corrections to the Tabular listing of coil coating plants in the table.
Response. The majority of the changes were made. Where the commenter noted that a facility or company was not a coil coater, the change was made only if the EPA had additional information from the industry surveys to confirm the comment. In addition, notes were added to the table indicating the preliminary nature of the information presented.

The following comment was received from the McNair Law Firm:

Comment 1 - The commenter suggested that the discussion of metal coil surface coating in this document is too broad because it includes sources that, after coating the coil, cut the coil into sheets without recoiling the metal into a package or a roll. The commenter interpreted this as being a broader definition than for the new source performance standard for coil coating and believed that the difference would be confusing to the regulated community. The commenter also noted that the emission rate is linked to the speed of the line. The commenter believes that, where the process speed is limited by forming, cutting and packing steps, instead of by the speed of the recoil, the emissions are substantially reduced.

Response: The Agency believes that it is appropriate to examine such coating as described by the commenter under the category of metal coil coating because of the similarity in the coating process. The survey of the industry being carried out by the Agency should provide information related to the various speeds of coil coating lines and other operating parameters from which the Agency can determine if there are any important variations that might warrant subcategorization for purposes of regulation.

Appendix A

Participants in Development of the Preliminary Industry Characterization

Name	Affiliation
Glen Anderson	National Coil Coaters Association
Tom Ashy	Metal Prep
Mark Bahner	Research Triangle Institute
Kevin Bald	Reynolds Metals
Kevin Barnett	Alcoa
Jim Bercaw	Technical Coatings
Sam Bruntz	Commonwealth Aluminum
Stephen Byrne	Cytec Industries
Dennis Carson	PPG Industries
Roy Carwile	Alcoa
Dwight Cohagan	The Sherwin Williams Company
Jim Dodson	Roll Coater
Steven Dubois	Alcan
Jack Farmer	Research Triangle Institute
Bob Fegley	EPA/ORD
Barbara Francis	Chemical Manufacturers Association
David Friedland	Beveridge and Diamond - Representing NCCA
Kelly Garbin	National Coil Coaters Association
Steve Gross	Pennsylvania Bureau of Air Quality
Susan Hoyle	Pennsylvania Bureau of Air Quality
Jesse Hackenberg	Chromographic Processing
Madelyn Harding	The Sherwin Williams Company
Gary Hayden	MSC Pre Finish Metals
Linda Herring	EPA/OAQPS
Thomas Himmelmann	Chesapeake Finished Metals

Name	Affiliation
William Jelf	AKZO Nobel Coatings
Matt Johnston	Worthington Industries
Joseph Junker	ARCO Chemical Co.
Mike Kosuko	EPA/ORD
Gail Lacy	EPA/OAQPS
David Leligdon	Precoat Metals
William Madigan	Metropolitan Metal Sales
Brent Marable	EPA Region V
Joseph McCloskey	Benjamin Moore & Co.
Tom McElven	AmeriMark, Inc.
Arnold Medberry	EPA Small Business Ombudsman
Hank Nauer	Illinois Environmental Protection Agency
Carol Neimi	Representing CMA Solvent's Council
Bob Nelson	National Paint and Coatings Association
Dave Ozawa	Mostardi-Platt Associates
Venkata Panchakaria	Florida Dept. of Environmental Protection
Alton Peters	Research Triangle Institute
Jack Peterson	Allegheny County Health Dept.
Alexander Ross	Rad Tech International, NA
Norbert Saatkoski	Roll Coater
Jason Schnepp	Illinois Environmental Protection Agency
Gary Stimpson	Nichols Aluminum
Robert P. Strieter	Aluminum Association
Scott Throwe	EPA/OECA
William Vallier	Gentek Building Products

Name	**Affiliation**
Bill Vinzant	Kaiser Aluminum
Milton Wright	Research Triangle Institute
Tom Young	MSC Pre Finish Metals

Appendix B

Plant List for the Metal Coil Surface Coating Industry

Table B-1. Coil Coating Plant List

This table contains a preliminary list of plants that have been potentially identified as have metal coil surface coating operations. Some of the plants may no longer be in operation. The table does not include information collected as part of a nationwide survey of metal coil surface coating facilities. Data from that survey will provide more specific information.

Abbreviations: ICR - tons HAP emissions reported in Information Collection Request responses
TRI - tons HAP emissions reported in EPA's Toxic Release Inventory (1996 data)

Company	**Plant Location**		**No. of Lines**	**Control Device**	**Total Annual HAP Emissions (tons)**
	City	**State**			
Alcan Aluminum Ltd.	Cleveland	OH	1	thermal incinerator for coat curing ovens	unknown from incinerator, 74 (ICR estimate for uncontrolled organic HAP emissions from painting process)
ALCOA	Newburgh	IN	3		
ALCOA	Lebanon	PA	6		
ALCOA Bldg. Prod.	Sidney	OH	2		
Alumax Mill Products	Lancaster	PA		incinerator for oven exhaust	10.5 (per plant)
Alumax Mill Products	Texarkana	TX		Incinerator for oven exhaust	2.5 (per plant)
ALUMET (formerly Gentek) Bldg. Products	Mesquite	TX			
Alusuisse Composites	Benton	KY	1	regenerative thermal incineration of oven/coater exhaust	
American Metals Corporation	Westlake	OH	1		
American Nickeloid	Peru	IL	1		
American Nickeloid	Walnutport	PA	1		

Company	Plant Location		No. of Lines	Control Device	Total Annual HAP Emissions (tons)
	City	State			
AmeriMark, Inc.	Roxboro	NC	2	catalytic incinerators for coating room & oven emissions	34.4 (TRI)
AmeriMark, Inc.	Lincoln Park	MI	3	regenerative thermal oxidizer for coating room & oven	58.4 (TRI)
AmeriMark, Inc.	Ashville	OH	1	thermal incinerator for coater room & oven emissions	40.58 (TRI)
Appollo Metals	Bethlehem	PA	2		
Armco Advanced Material Corporation	Zanesville	OH			
Arrow Group	Haskell	NJ	2	thermal incineration of coater room and curing oven exhaust	1.1 (plant estimate)
Berridge	San Antonio	TX			
BHP Coated Steel Corp.	Rancho Cucamonga	CA			1 (TRI)
BHP Coated Steel Corp.	Kalama	WA			
Centria	Cambridge	OH	1		
Champion Parts - Western Division	Fresno	CA			40.6 (Cal EPA)
Chesapeake Finished Metals	Baltimore	MD	1	regenerative thermal oxidizer for oven exhaust	10.4 (TRI)
Chicago Finished Metals	Bridgeview	IL	2	one line has a regenerative thermal oxidizer for oven & coating room exhaust; other line has a recuperative thermal oxidizer for oven & coating area exhaust	13 (TRI)
Chromagraphic Processing Co.	Williamsport	PA	6	catalytic oxidizers	3.8 (TRI)

Company	**Plant Location**		**No. of Lines**	**Control Device**	**Total Annual HAP Emissions (tons)**
	City	**State**			
Coil Coaters of America	Mableton	GA	1	thermal incinerator	5.3 (TRI)
Coilplus Alabama	Athens	AL			
Coilplus Illinois	Plainfield	IL			
Coilplus Ohio	Springfield	OH			
Col Met Inc,	Tampa	FL			
Commonwealth Aluminum Corp.	Torrance	CA	1	thermal oxidizer	0.10 (ICR 1996 data)
Commonwealth Aluminum Corp.	Lewisport	KY	1	thermal incineration of oven & coater house emissions	14.71 (ICR 1997 data)
Commonwealth Aluminum Corp.	Bedford	OH		thermal incineration of oven and coater house emissions	13.53 (ICR 1997 data)
Consolidated Metal Products (formerly Southeastern Coated Prod.)	Columbia	SC	1		
Cooper Coil Coating Inc.	Clearwater	FL	2	Incinerator	0.282
Crown Cork & Seal	Fort Lupton	CO	1	Incinerator	
Crown Cork & Seal	Toledo	OH			
Custom Metals	Chicago	IL	1		
Decatur Aluminum Corporation	Decatur	AL	1	None	119 (ADEM)
Doublecote	Jackson	MS	1	afterburner for oven exhaust	250
Eagle-Picher	Lisbon	FL	1	Incinerator	62 (VOC)
Edco Products	Hopkins	MN	2		
Englert Inc.	Perth Amboy	NJ			4.3 (TRI)
Epic Metals Corp.	Braddock	PA	1		
Finished Metals Inc.	Chicago	IL	1		

Company	Plant Location		No. of Lines	Control Device	Total Annual HAP Emissions (tons)
	City	State			
Gentek Bldg. Products	Woodbridge	NJ	1	catalytic afterburner on oven emissions	28 (TRI)
Hanna Steel Corporation	Fairfield	AL			
Hexcel Corporation	Casa Grande	AZ	1		
Hexcel Corporation	Graham	TX	1		
Homeshield Fabricated Products	Chatsworth	IL	1	oven emissions to an afterburner	1.5 (TRI)
Hunter-Douglas	Tupelo	MS	1		
Jupiter Coil Coating Division	Fairfield	TN	1		
K.B.P. Coil Coaters Inc.	Denver	CO	1	thermal oxidizer	1.3 (per plant) per 1997 Coil World, plant conducted stack testing. "state-of-art-plant"
Kaiser Aluminum	Spokane	WA	1	coating line afterburner	0.8 (measured at afterburner outlet per ICR)
Kirsch Company	Sturgis	MI	1		
Logan Aluminum Inc.	Russellville	KY	1	incineration of oven emissions	
LSIT Electrogalvanizing	Columbus	OH			
Luster Cote, Inc.	Montclair	CA			
Marwais Steel - owned by MSC Pre Finish (PP)	Richmond	CA	1	Recuperative thermal oxidizer	
McCord Payer, Inc.	Athens	AL	2	Incinerator and Recuperative Thermal oxidizer	8.63 (VOC)
Metal Coaters of California	Rancho Cucamonga	CA	1	Regenerative oxidizer for ovens and coating rooms	6.75 (Cal EPA)

Company	Plant Location		No. of Lines	Control Device	Total Annual HAP Emissions (tons)
	City	State			
Metal Coaters of Georgia Inc.	Marietta	GA	1	Smith direct fired thermal incinerator	29 (TRI)
Metal Prep	Memphis	TN	1	Direct fired thermal incinerator	16 (TRI)
Metal Prep	Houston	TX		Direct Fired Thermal Incinerator	23 (TRI)
Midwest Metal Coatings	Granite City	IL	online end 1998	oxidizer/oven combination	35 (Construction permit application)
Mitsubishi Chemical America, Inc.	Chesapeake	VA			
NAPCO Inc.	Valencia	PA	1	Thermal Incinerator	54.2 (TRI)
Napp Systems (USA), Inc.	San Marcos	CA	1		54.9 ROG (Cal EPA)
Nichols Aluminum-Davenport	Davenport	IA	1	oven emissions to an afterburner	12.2 (per plant)
Norandal USA Inc.	Scottsboro	AL	1	Afterburner for oven and coating stations	6 to 8
Norandex	Bedford	OH	1		
ORMET Aluminum Mill Products Corp.	Jackson	TN			
Pacesetter Steel Service - IL	Sauk Village	IL			
Pacesetter Steel Service - TX	Houston	TX			
Pittsburg-Canfield	Canfield	OH	1		5.9 (TRI)
Polychrome Corp.	Columbus	GA	3	hoods & scrubbers on pretreatment dip tanks; coating lines vented to two thermal incinerators (line 1 vented to one incinerator & lines 2&3 vented to the other)	

Company	Plant Location		No. of Lines	Control Device	Total Annual HAP Emissions (tons)
	City	State			
Polymer Coil Coaters	Fairfield	AL	1	two thermal incinerators	35 (ICR 1996)
Pre Finish Metals, Inc.	Elk Grove Village	IL	1	thermal oxidizers for prime & finish exhaust	16* (TRI. major for MEK) *TBD per plant
Pre Finish Metals, Inc. Plant 7 (new)	Elk Grove Village	IL	1	thermal oxidizers for prime & finish exhaust	30* (TRI) *TBD per plant
Pre Finish Metals, Inc.	Middletown	OH	1	recuperative thermal oxidizer	113* (TRI) *TBD per plant
Pre Finish Metals, Inc.	Morrisville	PA	1	recuperative thermal oxidizer	59 (State of PA 1996 data)
Precoat Metals	Chicago	IL	1	Recuperative thermal oxidizer for prime & finish	69 (TRI)
Precoat Metals	Granite City	IL	1	Thermal oxidizer for prime & finish	44 (TRI)
Precoat Metals	Portage	IN	1	Recuperative for prime, regenerative for finish	59 (TRI)
Precoat Metals	St. Louis	MO	2	Thermal oxidizer for both lines	84 (TRI)
Precoat Metals	Jackson	MS	1	One thermal oxidizer for both ovens	9.2
Precoat Metals	McKeesport	PA	2	Thermal oxidizers for both lines	52 (TRI)
Precoat Metals	Houston	TX	1	Recuperative oxidizer for prime & finish	56
Prior Coated Metals, Inc.	Allentown	PA	1	Hirt Thermal incinerator for oven	20 (TRI)
Pro-Tec Coating Co.	Leipsic	OH			

Company	Plant Location		No. of Lines	Control Device	Total Annual HAP Emissions (tons)
	City	State			
Reynolds Metals	Sheffield	AL	2	two curing ovens exhaust (or 1 oven and 1 coater head exhaust) to thermal incinerator	547 (TRI)
Reynolds Metals Co. Alloys Plant	Muscle Shoals	AL	1	oven/coater/paint mix room exhaust two thermal incineration	
Reynolds Metals	Harrison	OH			
Reynolds Metals	Richmond	VA			
Roll Coater	Greenfield	IN	2	thermal oxidizers	106.7
Roll Coater	Kingsbury	IN	1	thermal oxidizers	114 (TRI)
Roll Coater	Weirton	WV	1	thermal oxidizer	230 VOC (State Estimate)
Rollex Corporation	Ixonia	WI	2	Regenerative Thermal Oxidizer	
Signode Eastern Operations	Sparrows Point	MD	2	Thermal incinerator	
Smith Steelite	Cambridge	OH			
Southwestern Ohio Steel	Hamilton	OH			
Springs Window Fashions	Montgomery	PA	9		
Springs Window Fashions	Middleton	WI	1		
Stanley Works	New Britain	CT	6		
Teleldyne Rodney Metals	New Bedford	MA	2		
United Coaters	Ambridge	PA	1	Oven incineration	10.78 (TRI)
Vulcraft	Fort Payne	AL	1		36.3 VOC (ADEM)
Walbridge Coatings	Walbridge	OH		Oven incineration	6.5 (TRI)
Western Metal Decorating	Rancho Cucamonga	CA			

Company	Plant Location		No. of Lines	Control Device	Total Annual HAP Emissions (tons)
	City	State			
Wismarq Corp.	Oconomowoc	WI			
Worldsource Coil Coating Inc.	Hawesville	KY			0.7 (TRI)
Worthington Steel	Malvern	PA	1		27.9 (TRI)