
Source Category: Industrial Surface Coating

INTRODUCTION

The purpose of this document is to provide a forum for public review and comment on the evaluation of candidate control measures that may be considered by the States in the Midwest Regional Planning Organization (MRPO) to develop strategies for ozone, PM_{2.5}, and regional haze State Implementation Plans (SIPs). Additional emission reductions beyond those due to mandatory controls required by the Clean Air Act may be necessary to meet SIP requirements and to demonstrate attainment. This document provides background information on the mandatory control programs and on possible additional control measures.

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

The evaluation of candidate control measures is presented in a series of "Interim White Papers." Each paper includes a title, summary table, description of the source category, brief regulatory history, discussion of candidate control measures, expected emission reductions, cost effectiveness and basis, timing for implementation, rule development issues, other issues, and a list of supporting references. Tables 1a and 1b summarize this information for the industrial surface coating category.

SOURCE CATEGORY DESCRIPTION

The use of surface coatings by manufacturing industries and other sectors of the economy is pervasive. Applications include coatings that are applied during the manufacture of a wide variety of products by Original Equipment Manufacturers (OEMs) including furniture, cans, automobiles, other transportation equipment, machinery, appliances, metal coils, flat wood, wire, paper, plastic parts, and other miscellaneous products.

Surface coating is the process by which paints, inks, varnishes, adhesives, or other decorative or functional coatings are applied to a substrate (e.g., paper, metal, plastic) for decoration and/or protection. This can be accomplished by brushing, rolling, spraying, dipping, flow coating, electrocoating, or specialized combinations or variations of these methods. The process by which the coating is applied is determined in part by the product's intended end use, the substrate to which the coating is applied, and the composition of the coating itself.

After the coating has been applied, it is cured or dried either by conventional curing or radiation curing processes. Conventional curing is accomplished through the use of thermal ovens. The heat from these ovens causes the solvents and/or water trapped in the coating to be driven off into the atmosphere. Coatings can also be cured using radiation. The two types of radiation curing processes currently in use are ultraviolet (UV) curing and electron beam (EB) curing.

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**TABLE 1a – CONTROL MEASURE SUMMARY FOR
INDUSTRIAL SURFACE COATING – POINT SOURCES**

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
2002 existing measures: NSPS; RSD/NSR: State RACT rules in 1-hour ozone nonattainment counties; 2-, 4-, and 7-year MACT standards; results in 78% reduction from uncontrolled levels	Uncontrolled: 2002 Reduction: 2002 Base:	313,179 <u>-242,799</u> 70,380
2009 On-the Books measures: 10-year MACT surface coating standards, incremental reduction of 20% from 2002 actual levels	2002 Base: 2009 Reduction: 2009 Remaining:	70,380 <u>-13,790</u> 56,590
Candidate measure: Adopt More Stringent RACT regulations, lower applicability thresholds, and extend geographic coverage <i>Measure ID:</i> SOLV5A <i>Emission Reductions:</i> reduction of 42-83% from 2002 levels depending on the geographic coverage <i>Control Cost:</i> varies considerably by process, ranging from \$100 for uncontrolled high concentration streams to \$21,000 per ton for very low-VOC concentration streams. <i>Timing of Implementation:</i> Assuming 2007 effective date of rule, emission reductions are achieved in 2009 <i>Implementation Area:</i> (1) 8-hr ozone nonattainment areas, (2) 8-hr ozone nonattainment areas plus adjacent counties, or (3) all counties	2002 Base: 2009 Reduction: 2009 Remaining:	70,380 <u>-58,216</u> 12,164

- Notes: 1) 2002 emission reductions shown are reductions from uncontrolled levels;
 2) 2009 emission reductions shown are reductions for 2002 base emissions, assuming that control measures are implemented statewide;
 3) 2009 emissions are not growth-adjusted.
 4) Information regarding existing control devices/measures (i.e., low-VOC coatings, incinerators, etc.) may not be complete in the MRPO database, so we may be overestimating the incremental emission reductions as some sources may already be controlled.

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**TABLE 1b – CONTROL MEASURE SUMMARY FOR
INDUSTRIAL SURFACE COATING – AREA SOURCES**

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
2002 existing measures: None identified	2002 Base:	118,036
2009 On-the Books measures: None identified	2002 Base: 2009 Reduction: 2009 Remaining:	118,036 <u>-0</u> 118,036
Candidate measure: Adopt More Stringent RACT regulations, lower applicability thresholds, and extend geographic coverage <i>Measure ID:</i> SOLV5B <i>Emission Reductions:</i> reduction of 42-72% from 2002 levels depending on the geographic coverage <i>Control Cost:</i> varies considerably by process, ranging from \$100 for uncontrolled high concentration streams to \$21,000 per ton for very low-VOC concentration streams. <i>Timing of Implementation:</i> Assuming 2007 effective date of rule, emission reductions are achieved in 2009 <i>Implementation Area:</i> (1) 8-hr ozone nonattainment areas, (2) 8-hr ozone nonattainment areas plus adjacent counties, or (3) all counties	2002 Base: 2009 Reduction: 2009 Remaining:	118,036 <u>-84,986</u> 33,050

Notes: 1) 2002 emission reductions shown are reductions from uncontrolled levels;
2) 2009 emission reductions shown are reductions for 2002 base emissions, assuming that control measures are implemented statewide;
3) 2009 emissions are not growth-adjusted.
4) These estimated emission reductions are very uncertain for two reasons. First, the area source emissions are calculated using the per employee emission factors collected by the EPA in the 1980s, and may not be representative of the types of coatings and control technologies currently used. Second, information regarding existing control devices/measures (i.e., low-VOC coatings, incinerators, etc.) may not be complete in the MRPO database, so we may be overestimating the incremental emission reductions as some sources may already be controlled.

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Emissions result from the evaporation of the paint solvent and any additional solvent used to thin the coating. Emissions also result from the use of solvents in cleaning the surface prior to coating and in cleaning coating equipment after use. VOC emissions from small industrial surface coating operations are influenced by several factors. Emissions from surface preparation and coating applications are a function of the VOC content of the product used. Emissions are also a function of the coating process used, including the transfer efficiency of the spray equipment. Transfer efficiency is the percentage of coating solids sprayed that actually adhere to the surface being coated. Emissions from cleaning operations are dependent on the type of cleanup and housekeeping practices used.

Over the past 10-15 years, many industries such as the auto industry have implemented control strategies both from the pollution prevention standpoint as well as end-of-process treatment. They have implemented “low emission paint systems” that focus on reducing or eliminating the amount of VOC in the materials being applied or on minimizing the amount of material used in order to reduce potential for emissions. Add-on controls systems have also been used to destroy VOCs in the effluent air stream or to recover VOC for recycling and reuse.

Industrial surface coating was estimated to account for about 7.5 percent of the total anthropogenic VOC emissions in the MRPO region in 2002. Two aspects of the inventory are important to consider when assessing candidate control measures for this category:

- First, it is important to note that the inventory includes both point and area industrial surface coating sources. Table 2 shows the point and area source emission estimates by surface coating category and state. Emissions from area sources are substantial, but also highly uncertain and may potentially be overestimated. The methodology for estimating area source emissions relies on per employee emission factors and employment data. For the most part, the per employee emission factors are based on data collected by the EPA in the 1980s, and may not be representative of the types of coatings and control technologies currently used. Also, the employment data used introduces additional uncertainty.
- Second, many point sources are already controlled or will soon be controlled as a result of the recently promulgated MACT standards. Table 3 shows the uncontrolled and controlled point source emissions in 2002, as well as the anticipated reductions associated with sources coming into compliance with the MACT requirements after 2002. The uncontrolled emissions were calculated using the overall control efficiencies for each source as reported in the NIF CE files. There is some uncertainty about the accuracy and completeness of the CE data files. However, this analysis shows that substantial reductions have already been obtained from the point source segment of the industrial surface coating inventory, and significant reductions are expected from compliance with the MACT requirements prior to 2009.

More detailed analysis of the area source calculation methodologies and existing point source controls is need to better understand, and if possible, reduce the uncertainty associated with the emission estimates for industrial surface coating.

REGULATORY HISTORY

Industrial surface coating processes are currently governed by multiple state and federal regulations under the Titles I and III of the Clean Air Act. Each of these regulatory programs is discussed in the following paragraphs.

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**TABLE 2 – COMPARISON OF 2002 POINT AND AREA SOURCE VOC EMISSIONS (tpy)
FOR INDUSTRIAL SURFACE COATING**

Category	<u>Illinois</u>		<u>Indiana</u>		<u>Michigan</u>		<u>Ohio</u>		<u>Wisconsin</u>		<u>MRPO</u>	
	POINT	AREA	POINT	AREA	POINT	AREA	POINT	AREA	POINT	AREA	POINT	AREA
Industrial Adhesives	456	0	644	5,693	808	0	302	0	418	0	2,628	5,693
Fabrics	3	0	33	0	51	0	0	0	166	0	253	0
Paper	478	0	160	2,070	270	0	368	0	1,376	0	2,652	2,070
Large Appliances	48	0	83	71	94	990	330	3,221	71	3,236	626	7,518
Magnet Wire	275	0	718	0	1	0	44	0	7	0	1,045	0
Autos & Light Trucks	1,161	0	2,283	0	9,345	2,844	4,706	6,869	1,076	0	18,571	9,713
Metal Cans	692	0	360	549	0	6,533	1,100	4,874	1,131	4,612	3,283	16,568
Metal Coil	438	0	792	2,237	16	0	394	0	43	0	1,683	2,237
Wood Furniture	543	0	4,146	1,507	641	9,279	89	12,536	785	2,656	6,204	25,978
Metal Furniture	51	0	0	0	235	0	171	0	65	1,212	522	1,212
Flatwood Products	144	0	568	5,216	284	0	95	1,453	331	1,687	1,422	8,356
Plastic Parts	499	0	1,206	0	2,394	0	465	0	338	0	4,902	0
Large Ships	0	0	0	80	0	1,005	0	142	47	168	47	1,395
Aircraft	11	0	0	1,209	10	309	0	2,008	10	0	31	3,526
Misc. Metal Parts	1,258	0	1,259	0	1,039	2,513	402	6,288	1,662	1,931	5,620	10,732
Steel Drums	155	0	4	0	52	0	149	0	107	0	467	0
Railroad	0	0	0	0	0	0	0	0	0	244	0	244
Machinery	0	0	0	1,400	0	3,379	0	2,792	0	3,515	0	11,086
Electronic/Electrical	5	0	0	175	1	503	0	0	1	1,100	7	1,778
General	2,147	0	4,696	0	1,366	0	1,478	0	2,430	0	12,117	0
Miscellaneous	581	0	3,056	1,848	751	3,015	11	3,426	762	1,647	5,161	9,936
Thinning Solvents	327	0	1,940	0	422	0	47	0	408	0	3,144	0
Total	9,272	0	21,948	22,055	17,780	30,370	10,151	43,609	11,234	22,008	70,385	118,042

Note: Illinois requires very small sources to report their emissions annually; thus, Illinois indicates that all industrial surface coaters are included in the point source inventory.

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**TABLE 3 – COMPARISON OF UNCONTROLLED AND CONTROLLED POINT SOURCE VOC EMISSIONS (tpy)
FOR INDUSTRIAL SURFACE COATING**

Category	2002 Uncontrolled	2002 Reduction	2002 Actual	Average % Reduction from Uncontrolled	Post 2002 MACT % Reduction from 2002 Actuals	2009 Reduction	2009 Remaining	Average % Reduction from Uncontrolled After MACT Compliance
Industrial Adhesives	13,803	11,176	2,627	81		0	2,627	81
Fabrics	779	527	252	68	60	151	101	87
Paper	32,665	30,013	2,652	92	80	2,122	530	98
Large Appliances	627	0	627	0	0	0	627	0
Magnet Wire	13,958	12,913	1,045	93		0	1,045	93
Autos & Light Trucks	31,406	12,834	18,572	41	40	7,429	11,143	65
Metal Cans	24,109	20,827	3,282	86	70	2,297	985	96
Metal Coil	31,017	29,335	1,682	95	53	891	791	97
Wood Furniture	7,070	866	6,204	12		0	6,204	12
Metal Furniture	522	0	522	0	0	0	522	0
Flatwood Products	1,466	44	1,422	3	63	896	526	64
Plastic Parts	77,541	72,639	4,902	94	0	0	4,902	94
Large Ships	47	0	47	0		0	47	0
Aircraft	31	0	31	0		0	31	0
Misc. Metal Parts	8,576	2,956	5,620	34	0	0	5,620	34
Steel Drums	1,012	546	466	54	0	0	466	54
Railroad	0	0	0	0		0	0	0
Machinery	0	0	0	0		0	0	0
Electronic/Electrical	7	0	7	0		0	7	0
General	39,218	27,102	12,116	69		0	12,116	69
Miscellaneous	21,617	16,457	5,160	76		0	5,160	76
Thinning Solvents	7,708	4,564	3,144	59		0	3,144	59
Total	313,179	242,799	70,380	78		13,786	56,594	82

Note: Uncontrolled emissions were calculated using the total control efficiency as reported in the NIF CE file.

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Title I imposes New Source Performance Standards (NSPS) on certain specified categories of new and modified large stationary sources. In the early 1980's, EPA codified the NSPS for many industrial surface coating operations. These NSPS applied to surface coating operations that were constructed or modified after certain dates as specified in each NSPS. Generally, surface coating operations constructed or modified after 1980 are subject to NSPS requirements. The NSPS generally set VOC emission rate limits that could be complied with using either compliant coatings or add-on capture and control devices. In addition, the NSPS set transfer efficiency requirements for certain categories.

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

Title I regulates criteria pollutants by requiring local governments to adopt State Implementation Plans (SIPs) that set forth their strategy for achieving reductions in the particular criteria pollutant(s) for which they are out of attainment. The SIPs must include reasonably available control technology (RACT) requirements on major sources in nonattainment areas. States must establish RACT levels based on the level of emissions reductions that can reasonably be achieved at a reasonable cost. The U.S. EPA issued a series of Control Technology Guidelines (CTGs) documents as a means of defining RACT for a number of industrial surface coating categories. For sources not covered by a CTG document, state regulations require that case-specific RACT determinations be made. EPA has also developed Alternative Control Technology (ACT) documents that provide information on costs and emission reductions for various control measures to aid in the determination of RACT for major non-CTG sources. Most of the CTGs and ACT documents for industrial surface coating were developed prior to 1990. In many cases, the MRPO states have adopted various regulations that are based on the CTG recommendations. In other cases, the MRPO states have adopted regulations that are more stringent than the CTG/ACT requirement or have a lower applicability threshold. Several California districts and some States in the Northeast have adopted RACT regulations that are more stringent than the CTG/ACT requirements.

Over the past five years, EPA has published several final rules under Title III of the CAA to substantially reduce emissions of toxic air pollutants from industrial surface coating operations. These Maximum Achievable Control Technology (MACT) standards apply to operations located at major sources of hazardous air pollutants (HAPs). MACT standards are based on the best-performing existing sources and the current status of control technology. EPA provides a number of options within MACT rules. A source can use formulation and/or control to meet its limits. The MACT standards are generally similar to, but somewhat more stringent than, the current VOC standards. For instance, the new standards generally require removal efficiencies on the order of 95 to 98 percent if add-on controls are used, whereas many older VOC standards required control efficiencies on the order of 90 to 95 percent.

A comparison of Federal requirements and current State regulations is presented in Attachment 1 for four important industrial surface coating categories – automobile and light duty trucks, metal cans, paper, and wood furniture. These comparisons indicated that reductions beyond current VOC requirements in the MRPO states have been demonstrated and achieved.

This long-history of regulation of industrial surface coating operations by various CAA programs has resulted in a variety of control requirements resulting from SIP, NSPS, NSR, or MACT requirements.

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The specific emission limits and control requirements for a given source vary and depend on coating category, facility age, size, and geographic location.

CANDIDATE CONTROL MEASURES

Reductions beyond current requirements appear to be reasonable and can be obtained by increasing the stringency of existing RACT rules, eliminating exemptions and lowering applicability thresholds, and extending the geographic coverage of the rules.

There are many options for increasing the stringency of existing RACT rules. In recent years, a shift to more transfer efficient coating techniques has occurred as a result of pollution prevention initiatives to reduce the volume of coatings used. Continued reformulation efforts should be able to provide low-solvent substitute formulations for many types of coatings. Total permanent enclosures and thermal/catalytic incinerators are now commonly used to capture and destroy VOC emissions. Cleanup solvent usage is another area where further emission reductions may be possible in the coating industry.

Eliminating exemptions and lowering the applicability threshold for RACT rules can potentially result in substantial emission reductions. As shown in Table 2, VOC emissions from area sources exceed those from point sources and it appears that most area source emissions were calculated assuming no control programs are in place. While there is some uncertainty about these emission estimates, it seems feasible to obtain significant emission reductions by requiring non-major sources to reduce emissions using one or more of the techniques described above for major sources.

The existing State regulations for surface coating generally apply to all sources covered by a CTG and all major sources not covered by a CTG (e.g., plastic parts coating) in 1-hr nonattainment or maintenance counties. These regulations will likely be extended to the newly designated 8-hr nonattainment counties. Optionally, the control measures could be extended to counties adjacent to 8-hr nonattainment areas or to all counties in the MRPO region.

A single generic candidate control measure is discussed below that proposes more stringent control requirements, lowers applicability thresholds to obtain reductions from area sources, and expands the geographic coverage of control requirements.

Measure SOLV5A – Adopt More Stringent RACT regulations, lower applicability thresholds, and extend geographic coverage. This is a generic control measure based on the use of currently available control methods to reduce emissions from both point and area sources. Many point source industrial surface coating operations are already controlled, as previously shown in Table 3. For this White Paper, we are assuming that more stringent requirements are feasible and could generally achieve a 90 percent reduction from uncontrolled levels. The types of abatement methods described above (or combinations of the abatement methods) typically have control efficiencies in excess of 90 percent. Three options for the geographic coverages of the more stringent requirements are considered – applying more stringent RACT in all 8-hr nonattainment counties, in all counties that are in or adjacent to an 8-hr nonattainment area, and in all counties in the MRPO region. More specific control factors cannot be developed at this time due to the uncertainty in the area source emissions (magnitude and extent to which area sources are controlled) and lack of specific information for point sources (existing regulatory requirements, existing compliance strategies and control systems, facility size and age).

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EXPECTED EMISSION REDUCTIONS

We calculated the approximate emission reductions expected in the following manner:

- Obtained 2002 actual emissions from the MRPO's 2002 inventory;
- For point sources subject to post-2002 MACT standards, calculated emissions reductions from post-2002 MACT using the control factors developed by E.H. Pechan and Associates;
- For point sources, calculated uncontrolled levels based on control efficiencies reported in the NIF CE file; applied a generic 90% reduction to the uncontrolled emissions for all sources to calculate future controlled levels (unless the source was already controlled beyond 90 percent, in which case no additional reduction was calculated);
- For area sources, assumed 2002 emission levels are based on uncontrolled emission factors; applied a generic 72% reduction to area source emission estimates based on a 90% control efficiency and an 80% rule effectiveness.

Current emissions from industrial surface coating, and the expected emission reductions from post-2002 MACT standards and the candidate control measure, are summarized in Table 4. As mentioned above, reductions were calculated for three options for geographic implementation - all 8-hr nonattainment counties, all counties adjacent to an 8-hr nonattainment area, and all counties in the MRPO region.

For point sources, compliance with the post-2002 MACT standards is estimated to result in an incremental reduction of 20 percent from 2002 levels. For area sources, no incremental reduction is anticipated from the post-2002 MACT standards.

For point sources, adoption of Measure SOLV5A would result in a reduction of 24-52 percent reduction from 2002 levels, depending on the geographic coverages. For area sources, adoption of Measure SOLV5A would result in a reduction of 43-72 percent from 2002 levels, depending on the geographic coverage.

Note that these estimated emission reductions are very uncertain for two reasons. First, the area source emissions are calculated using the per employee emission factors collected by the EPA in the 1980s, and may not be representative of the types of coatings and control technologies currently used. Second, information regarding existing control devices/measures (i.e., low-VOC coatings, incinerators, etc.) may not be complete in the MRPO database, so we may be overestimating the emission reductions as some sources that may already be controlled.

TIMING OF IMPLEMENTATION

States generally provided a 2-year period for compliance with RACT rules. For the purposes of this White Paper, we have assumed that SIP rules would be adopted in early 2007. If the MRPO states chose to adopt Measure SOLV5A, manufacturers may need to reformulate coatings and sources may be required to install high transfer-efficiency painting equipment or add-on controls. It seems reasonable to assume that a 2-year period after SIP submittal is adequate for the installation of new process or control equipment. Thus, emission reductions would occur in 2009 for Measure SOLV5A.

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TABLE 4 – COMPARISON OF 2002 VOC EMISSIONS (tpy) AND PROJECTED EMISSIONS

State	Counties	2002 Actual		<i>On-the-Books Controls (Post-2002 MACT Standards)</i>				<i>Measure SOLV5A – Adopt More Stringent RACT regulations, lower applicability thresholds, and extend geographic coverage</i>			
				2009 Reduction		2009 Remaining		2009 Reduction		2009 Remaining	
				Point	Area	Point	Area	Point	Area	Point	Area
IL	Nonattainment	3,118	0	620	2,498	0	0	656	1,413	0	0
	Adjacent	1,933	0	463	1,470	0	0	104	50	0	0
	Not adjacent	<u>4,221</u>	<u>0</u>	<u>572</u>	<u>3,649</u>	<u>0</u>	<u>0</u>	<u>3,034</u>	<u>1,198</u>	<u>0</u>	<u>0</u>
	Total	9,272	0	1,655	7,617	0	0	3,794	2,661	0	0
IN	Nonattainment	9,831	12,067	1,478	8,353	0	12,067	6,243	1,451	8,688	3,379
	Adjacent	10,496	7,819	542	9,954	0	7,819	7,678	1,358	5,630	2,189
	Not adjacent	<u>1,621</u>	<u>2,166</u>	<u>73</u>	<u>1,548</u>	<u>0</u>	<u>2,166</u>	<u>1,286</u>	<u>230</u>	<u>1,560</u>	<u>606</u>
	Total	21,948	22,052	2,093	19,855	0	22,052	15,207	3,039	15,877	6,175
MI	Nonattainment	16,223	22,913	4,116	12,107	0	22,913	6,889	2,934	16,497	6,416
	Adjacent	1,068	4,248	22	1,046	0	4,248	594	130	3,059	1,189
	Not adjacent	<u>486</u>	<u>3,206</u>	<u>34</u>	<u>452</u>	<u>0</u>	<u>3,206</u>	<u>255</u>	<u>143</u>	<u>2,308</u>	<u>898</u>
	Total	17,777	30,367	4,172	13,605	0	30,367	7,738	3,207	21,864	8,503
OH	Nonattainment	5,042	27,272	1,767	3,275	0	27,272	1,498	1,286	19,636	7,636
	Adjacent	4,368	13,234	1,234	3,134	0	13,234	2,049	756	9,528	3,706
	Not adjacent	<u>741</u>	<u>3,103</u>	<u>215</u>	<u>526</u>	<u>0</u>	<u>3,103</u>	<u>322</u>	<u>91</u>	<u>2,234</u>	<u>869</u>
	Total	10,151	43,609	3,216	6,935	0	43,609	3,869	2,133	31,398	12,211
WI	Nonattainment	2,598	9,542	475	2,123	0	9,542	1,536	260	6,870	2,672
	Adjacent	3,863	2,998	1,049	2,814	0	2,998	666	114	2,159	839
	Not adjacent	<u>4,772</u>	<u>9,468</u>	<u>1,130</u>	<u>3,642</u>	<u>0</u>	<u>9,468</u>	<u>4,038</u>	<u>750</u>	<u>6,817</u>	<u>2,651</u>
	Total	11,233	22,008	2,654	8,579	0	22,008	6,240	1,124	15,846	6,162
MRPO	Nonattainment	36,812	71,794	8,456	28,356	0	71,794	21,012	7,344	51,692	20,102
	Adjacent	21,728	28,299	3,310	18,418	0	28,299	15,117	2,408	20,375	7,924
	Not adjacent	<u>11,841</u>	<u>17,943</u>	<u>2,024</u>	<u>9,817</u>	<u>0</u>	<u>17,943</u>	<u>8,300</u>	<u>2,412</u>	<u>12,919</u>	<u>5,024</u>
	Total	70,381	118,036	13,790	56,591	0	118,036	44,429	12,164	84,986	33,050

Note: The 2009 emission estimates presented here are not growth-adjusted.

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COST EFFECTIVENESS AND BASIS

Cost effectiveness of applying specific requirements to coating operations would vary depending on the particular source and process type. Factors might include the size of the operation, the age and type of coating equipment used, and availability of add-on controls including high efficiency spray guns or reformulated coatings. Improved transfer efficiency requirements will result in the modification or replacement of conventional spray equipment. Costs for new/modified equipment will be offset by a savings in paint consumption. According to EPA, the use of add-on control devices such as catalytic or thermal incinerators \$100-21,000 per ton of VOC removed. Costs can be substantially higher than in the ranges shown when used for low to moderate VOC concentration streams (less than around 1000 to 1500 ppmv). As a rule, smaller units controlling a low concentration waste stream will be much more expensive (per unit volumetric flow rate) than a large unit cleaning a high pollutant load flow. The cost of reformulation of low-VOC coatings is difficult to predict. BAAQMD assumes a cost-effectiveness of \$2,000 per ton removed based on cost estimates used in the past for coating reformulations.

CONTROL FACTORS

For purposes of modeling, we have assumed that rules will be adopted in 2007 and that full compliance will occur by the end of 2008. For area sources, we are assuming a control efficiency (CE) of 90 percent for all industrial surface coating categories, a rule effectiveness (RE) value of 80 percent, and a rule penetration (RP) value of 100 percent. For point sources, we will assign source-specific control factors using an overall future year control efficiency of 90 percent, unless the source is already controlled above that level, in which case the future year control efficiency will be set to the base year control efficiency.

RULE DEVELOPMENT ISSUES

EPA has not yet issued final rules for implementing the RACT/RACM provisions associated with the 8-hour ozone SIPs. The proposed implementation rule contained different options for residual 1-hour areas and 8-hour basic, marginal, and moderate areas. For ozone nonattainment areas, States can work from existing authority under state and federal law. States may need additional authority to impose VOC RACT/RACM requirements outside on nonattainment areas.

GEOGRAPHIC APPLICABILITY

We developed three options for geographic applicability for the candidate control measures. The first option is to apply the candidate control measure only in those counties designated as nonattainment for the 8-hr ozone standard. The second option is to apply the candidate control measures to both nonattainment counties and all counties that are adjacent to a nonattainment county. The third option is to apply the candidate control measure to all counties in the 5-state MRPO region.

TEMPORAL APPLICABILITY

Emission reductions would be realized throughout the year.

AFFECTED SCCs

Area source SCCs affected by this control measure include:

2401015000 All Solvent Types - Factory Finished Wood: SIC 2426 thru 242 - Surface Coating

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2401020000	All Solvent Types - Wood Furniture: SIC 25 - Surface Coating
2401025000	All Solvent Types - Metal Furniture: SIC 25 - Surface Coating
2401030000	All Solvent Types - Paper: SIC 26 - Surface Coating
2401040000	All Solvent Types - Metal Cans: SIC 341 - Surface Coating
2401045000	All Solvent Types - Metal Coils: SIC 3498 - Surface Coating
2401050000	All Solvent Types - Miscellaneous Finished Metals: SIC 34 - (341 + 3498)
2401055000	All Solvent Types - Machinery and Equipment: SIC 35 - Surface Coating
2401060000	All Solvent Types - Large Appliances: SIC 363 - Surface Coating
2401065000	All Solvent Types - Electronic and Other Electrical: SIC 36 - 363 - Surfa
2401070000	All Solvent Types - Motor Vehicles: SIC 371 - Surface Coating
2401075000	All Solvent Types - Aircraft: SIC 372 - Surface Coating
2401080000	All Solvent Types - Marine: SIC 373 - Surface Coating
2401085000	All Solvent Types - Railroad: SIC 374 - Surface Coating
2401090000	All Solvent Types - Miscellaneous Manufacturing
2440020000	All Solvent Types - Adhesive (Industrial) Application - Miscellaneous Industrial

Point source SCCs affected by this control measure include:

402001xx	Surface Coating Application - General
402002xx	Surface Coating Application - General
402003xx	Surface Coating Application - General
402004xx	Surface Coating Application - General
402005xx	Surface Coating Application - General
402006xx	Surface Coating Application - General
402007xx	Surface Coating Application - General
402008xx	Coating Oven - General
402011xx	Fabric Coating/Printing
402012xx	Fabric Dyeing
402013xx	Paper Coating
402014xx	Large Appliances
402015xx	Magnet Wire Surface Coating
402016xx	Automobiles and Light Trucks
402017xx	Metal Can Coating
402019xx	Wood Furniture Surface Coating
402020xx	Metal Furniture Operations
402021xx	Flatwood Products
402022xx	Plastic Parts
402023xx	Large Ships
402024xx	Large Aircraft
402025xx	Miscellaneous Metal Parts
402026xx	Steel Drums
402030xx	Semiconductors
402040xx	Fabric Printing
40204xxx	Fabric Coating, Knife Coating
4029999x	Miscellaneous

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OTHER IMPACTS

No significant adverse environmental impacts are expected as a result of this control measure. The proposed changes in paint formulation, application techniques, and cleaning methods will likely reduce the waste streams or impact on other media. If additional control of VOC emissions by incinerators is needed as a result of this control measure, then an increase in natural gas consumption will occur. The use of thermal or catalytic incineration to control VOC may result in emissions of CO and NO_x. Where carbon adsorption systems are used, the activated bed eventually becomes spent and must be reactivated or disposed of at a treatment, storage, and disposal facility.

REFERENCES

1. TRC Environmental Corporation. *Emission Inventory Improvement Program, Industrial Surface Coating, Volume III, Chapter 8*. September 1997.
2. E.H. Pechan & Associates, Inc. Revised table of Post-2002 MACT Standards and Expected VOC, NO_x, and PM Reductions. November 2005.
3. Bay Area Air Quality Management District. *Bay Area 2004 Ozone Strategy, Appendix C – Stationary and Mobile Source Measure Descriptions, Draft*. August 2004.
4. Bay Area Air Quality Management District. *Bay Area 1997 Clean Air Plan – Appendix F; Stationary and Mobile Source Control Measure Descriptions*. December 17, 1997.
5. E.H. Pechan & Associates, Inc. *AirControlNET Version 3.2, Documentation Report*. September 2003.
6. U.S. EPA. *Air Pollution Control Technology Fact Sheet – Catalytic Incinerator*. EPA-452/F-03-018.
7. U.S. EPA. *Air Pollution Control Technology Fact Sheet – Thermal Incinerator*. EPA-452/F-03-018.
8. U.S. EPA. *Air Pollution Control Technology Fact Sheet – Regenerative Incinerator*. EPA-452/F-03-021.
9. U.S. EPA. *Supporting Documents for Proposed National Emission Standards for Automobile and Light Duty Truck Surface Coating: 40 CFR 63, Subpart IIII*. October 2002.

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Attachment 1 - Comparison of RACT Regulations

CTG Category: Paper Coating	
<p>CTG RACT Recommendation: Emission limit of 2.9 lbs VOC per gallon of coating (minus water/exempt solvents) achievable by compliant coatings or incineration based on hourly or daily average Applicable to sources with 3 lbs/hour or 15 lbs/day of uncontrolled actual emissions</p>	
LADCO States	
<p>Illinois – Subpart 215.204(c), 218.204(c), and 219.204(c) Emission Limitations</p>	<p>Applicability: Statewide Control Requirement: Chicago and Metro East: 2.3 lbs/gallon (-water), daily weighted average 81% overall control efficiency and 90% destruction Elsewhere in State: 2.9 lbs/gallon (-water) elsewhere, daily weighted average or 3.5 lbs/gallon (-water) for “Specialty High Gloss Catalyzed Coatings” or 81% overall control efficiency and 90% destruction Exemptions: Chicago and Metro East areas: 15 lbs/day or less uncontrolled VOC emissions from all coating lines Elsewhere in State less than 25 tons/year potential VOCs from coating plant</p>
<p>Indiana – 326 IAC 8-2-5 Paper coating Operations</p>	<p>Applicability: existing facilities at sources with 100 ton/year or more potential VOC emissions as of 1/1/1980 and new facilities constructed after 1/1/1980 with potential VOC emissions of 25 tons/year or more Control Requirements: Same as CTG, based on daily volume weighted average</p>
<p>Michigan – 336.1610 Existing Coating Lines</p>	<p>Applicability: Statewide to coating lines at sources with actual VOC emissions equal to or greater than 100 lbs/day or 2,000 lbs/month Control Requirements: Same limit as CTG, based on daily volume weighted average</p>

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CTG Category: Paper Coating	
Ohio – 3745-21-09(G)	<p>Applicability: all sources in 24 listed counties, and in all other counties: sources constructed after 10/19/1979 or units at sources with the potential to emit 100 tons/year VOC.</p> <p>Control Requirements: essentially same as CTG 2.9 lbs/gallon (-water) elsewhere, daily weighted average, or 4.8 pounds of VOC/gallon of solids if control device is used, or 81% overall control efficiency and 90% destruction</p> <p>Exemptions: less than 3 gallons per day</p>
Wisconsin – 422.07 Paper Coating	<p>Applicability: Statewide</p> <p>Control Requirements: Essentially the same as CTG</p> <p>Exemptions: 15 lbs/day or less uncontrolled emissions from coating process Outside of 20 listed counties with uncontrolled emissions less than 100 tons per year 55 gallons/year of non-compliant coatings</p>
Other States	
California – Bay Area – Rule 12 Paper, Fabric, and Film Making	<p>Applicability: District-wide</p> <p>Control Requirement: more stringent than CTG 2.2 lbs/gallon (-water) for Low-Solvent Coatings or Adhesives, or 1.0 pounds VOC/gallon (-water) or less by using a control system</p> <p>Exemptions: any coating line that emits less than 14.3 lbs/day</p>
California – South Coast Rule 1128 Paper, Fabric, and Film Coating Operations	<p>Applicability: District-wide</p> <p>Control Requirement: more stringent than CTG Less than 2.2 lbs/gallon (-water/exempt) Less than 0.17 lbs/gallon (-water/exempt) any plastisol coatings Less than 2.2 lbs/gallon (-water/exempt) any wash coatings, or 90% or more capture and 95% or more control by weight or 50 ppm or less as carbon outlet concentration Specifies acceptable application methods Cleaning materials (Rule 1171): 0.21 lbs/gallon VOC for cleaning application equipment effective 7/1/2005</p> <p>Exemptions: application methods not limited for coatings with less than 0.17 lbs/gallon (-water/exempt)</p>

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CTG Category: Paper Coating	
Maryland – 26.11.19.07 Paper, Fabric, Vinyl, and Other Plastic Coating	<p>Applicability: Statewide</p> <p>Control Requirements: essentially same as CTG 2.9 lbs/gallon (-water) for each coating applied or with control system, or water based coatings with VOCs less than 25% of volatile fraction by volume</p> <p>Exemptions facilities with less than 20 lbs/day of VOC</p>
Massachusetts – 310 CMR 7.18 (14) Paper Surface Coating	<p>Applicability: Statewide</p> <p>Control Requirements: 4.8 pounds of VOC/gallon of solids each coating or for each 3-hour period when using control system</p> <p>Exemptions: 15 lbs/day or less uncontrolled emissions from coating process 55 gallons/year of non-compliant coatings</p>
New Jersey – 7.27- 16.7 Surface Coating and Graphic Arts	<p>Applicability: Statewide</p> <p>Control Requirements: essentially same as CTG 2.9 lbs/gallon (-water), daily volume weighted average for compliant coatings or 90% or greater control of VOC each hour, or controlled to meet an equivalent hourly emission rate calculated on a solids as applied basis</p> <p>Exemptions: coating application rates of less than one half gallon/hour and two and one half gallons/day</p>

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CTG Category: Surface Coating of Automobile and Light-Duty Trucks																		
CTG RACT Recommendation: May, 1977 CTG recommended emission limitation for three coating application areas. The limits apply to the emissions from application of the coat, in the flash of area, and in the curing oven, excluding any offline repair:																		
<u>Coating Application</u>	<u>lb VOC/gallon (minus water, exempt solvent)</u>																	
Prime Coating	1.9																	
Surfacer (Guidecoat, based on 15.1 lb/gal solids and 30% transfer efficiency)	2.8																	
Topcoat	2.8																	
Final Repair Coating	4.8																	
<p>Compliance based on daily weighted average EPA guidance does allow add-on control devices that are equivalent to RACT-complying coatings with consideration of transfer efficiency. Also, EPA guidance allows for a daily-weighted average of primer/surfaces coating emissions and topcoat coating emissions in accordance with the document "Protocol for Determining the Daily Volatile Organic Compound Emission Rate of Automobile and Light-Duty Truck Topcoat Operations" (EPA 450-3-88-018).</p>																		
LADCO States																		
Illinois – Subpart 215.204, 218.204, and 219.204 Subpart F Coating Operations	<p>Applicability: Statewide Control Requirement: Same as CTG except in Chicago and metro East Areas where the requirements are:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Coating Application</u></th> <th style="text-align: center;"><u>Limit</u></th> <th style="text-align: center;"><u>Units</u></th> </tr> </thead> <tbody> <tr> <td>Prime Coat</td> <td style="text-align: center;">1.2</td> <td>lb VOC/gallon (minus water, exempt solvent)</td> </tr> <tr> <td>Primer Surface Coat</td> <td style="text-align: center;">15.1</td> <td>lb/gallon of solids applied</td> </tr> <tr> <td>Topcoat</td> <td style="text-align: center;">15.1</td> <td>lb/gallon of solids applied</td> </tr> <tr> <td>Final Repair Coat (Same as CTG)</td> <td style="text-align: center;">4.8</td> <td>lb VOC/gallon (minus water, exempt solvent)</td> </tr> </tbody> </table> <p>Compliance based on daily weighted average Compliance with capture and control system based on daily weighted average or 81% overall control and 90% control device efficiency. Compliance with Primer Surface Coat and Topcoat limits in lbs/gal solids applied based on EPA topcoat test protocol</p>			<u>Coating Application</u>	<u>Limit</u>	<u>Units</u>	Prime Coat	1.2	lb VOC/gallon (minus water, exempt solvent)	Primer Surface Coat	15.1	lb/gallon of solids applied	Topcoat	15.1	lb/gallon of solids applied	Final Repair Coat (Same as CTG)	4.8	lb VOC/gallon (minus water, exempt solvent)
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CTG Category: Surface Coating of Automobile and Light-Duty Trucks																
<p>Indiana – 326 IAC 8-2.2 Automobile and Light Duty Truck Coating Operations</p>	<p>Applicability: Facilities with 100 ton/year potential VOC emissions as of 1/1/1980 or 15 lbs/day actual VOC emissions before controls as of 7/1/1990 in Clark, Elkhart, Floyd, Lake, Marion, Porter, and St. Joseph counties and Statewide new units with 100 ton/year potential VOC emissions after 1/1/1980 or 15 lbs/day actual VOC emissions before controls as of 7/1/1990.</p> <p>Control Requirements: Same as CTG; provides for alternative for equivalent limit based on daily weighted average Include as equivalent limit for topcoat application of 15.1 lb/gallon solids, 30% baseline transfer efficiency, and 62% solids by volume base on EPA topcoat test protocol.</p>															
<p>Michigan – 336.1610 Existing Coating Lines</p>	<p>Applicability: Statewide</p> <p>Control Requirements: More stringent than CTG:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Coating Application</th> <th style="text-align: center;">Limit</th> <th style="text-align: left;">Units</th> </tr> </thead> <tbody> <tr> <td>Prime Coat</td> <td style="text-align: center;">1.2</td> <td>lb VOC/gallon (minus water, exempt solvent)</td> </tr> <tr> <td>Primer Surface Coat</td> <td style="text-align: center;">14.9</td> <td>lb/gallon of solids applied</td> </tr> <tr> <td>Topcoat</td> <td style="text-align: center;">14.9</td> <td>lb/gallon of solids applied</td> </tr> <tr> <td>Final Repair Coat (Same as CTG)</td> <td style="text-align: center;">4.8</td> <td>lb VOC/gallon (minus water, exempt solvent)</td> </tr> </tbody> </table> <p>Compliance averaging time can be authorized up to a calendar month</p> <p>Compliance is determined separately for each coating category and can be based on weighted averages of all coatings in that category</p> <p>Compliance with Primer Surface Coat and Topcoat limits in lbs/gal solids applied based on EPA topcoat test protocol</p>	Coating Application	Limit	Units	Prime Coat	1.2	lb VOC/gallon (minus water, exempt solvent)	Primer Surface Coat	14.9	lb/gallon of solids applied	Topcoat	14.9	lb/gallon of solids applied	Final Repair Coat (Same as CTG)	4.8	lb VOC/gallon (minus water, exempt solvent)
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<p>Ohio – 3745-21-09 (C) Surface coating of Automobiles and Light-duty Trucks</p>	<p>Applicability: all sources in 24 listed counties, and in all other counties: sources constructed after 10/19/1979 or units at sources with the potential to emit 100 tons/year VOC.</p> <p>Control Requirements: Includes CTG requirements plus the following alternative limits based on lbs VOC per gallon of solids if control system is used:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Coating Application</th> <th style="text-align: center;">lb VOC/gallon solids with control system</th> </tr> </thead> <tbody> <tr> <td>Prime coat other than electrodeposition</td> <td style="text-align: center;">2.6</td> </tr> <tr> <td>Topcoat</td> <td style="text-align: center;">15.1</td> </tr> <tr> <td>Final Repair Coat</td> <td style="text-align: center;">13.8</td> </tr> </tbody> </table> <p>Prime coat application by electrodeposition must comply with one of four options based on a calculated solids turnover ratio, from 1.2 to 2.8 lbs/gallon (minus water) or from 1.4 to 15.1 lbs/gallon of solids deposited</p> <p>Compliance with Primer Surface Coat and Topcoat limits in lbs/gal solids applied based on EPA topcoat test protocol</p>	Coating Application	lb VOC/gallon solids with control system	Prime coat other than electrodeposition	2.6	Topcoat	15.1	Final Repair Coat	13.8							
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CTG Category: Surface Coating of Automobile and Light-Duty Trucks																									
Wisconsin – 422.09 Automobile and Light-duty Truck Manufacturing	<p>Applicability: Statewide to sources with actual uncontrolled emissions of 100 tons/year; applies in 20 listed counties to sources with actual uncontrolled of 15 lbs/day or more</p> <p>Control Requirements: Limits same as CTG except 1.2 lbs VOC/gallon (minus water) for primers applied by electrodeposition</p> <p>Compliance based on daily weighted averages</p>																								
Other States																									
California – Bay Area – Rule 11 Metal Container, Closure, and Coil Coating	<p>Applicability: District-wide</p> <p>Control Requirement:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Coating Application</th> <th style="text-align: center;">Limit</th> <th style="text-align: center;">Units</th> </tr> </thead> <tbody> <tr> <td>Spray Primer</td> <td style="text-align: center;">15.0</td> <td>lbs/gallon of solids applied</td> </tr> <tr> <td>Primer Surfacer</td> <td style="text-align: center;">15.0</td> <td>lbs/gallon of solids applied</td> </tr> <tr> <td>Topcoat</td> <td style="text-align: center;">15.0</td> <td>lbs/gallon of solids applied</td> </tr> <tr> <td>Final Repair Coat</td> <td style="text-align: center;">4.8 (same as CTG)</td> <td>lbs/gallon (minus water)</td> </tr> <tr> <td>Electrodeposition (electrophoretic)</td> <td style="text-align: center;">1.2</td> <td>lbs/gallon (minus water), or</td> </tr> <tr> <td></td> <td style="text-align: center;">90% overall control</td> <td></td> </tr> <tr> <td>Off-Line Coating Application</td> <td colspan="2">- 90% overall control, or 2.8 lbs/gallon (minus water)</td> </tr> </tbody> </table>	Coating Application	Limit	Units	Spray Primer	15.0	lbs/gallon of solids applied	Primer Surfacer	15.0	lbs/gallon of solids applied	Topcoat	15.0	lbs/gallon of solids applied	Final Repair Coat	4.8 (same as CTG)	lbs/gallon (minus water)	Electrodeposition (electrophoretic)	1.2	lbs/gallon (minus water), or		90% overall control		Off-Line Coating Application	- 90% overall control, or 2.8 lbs/gallon (minus water)	
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California – South Coast 1115 – Motor Vehicle Assembly Line Coating Operations	<p>Applicability: District-wide</p> <p>Control Requirement:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Coating Application</th> <th style="text-align: center;">Limit</th> <th style="text-align: center;">Units</th> </tr> </thead> <tbody> <tr> <td>Electrodeposition (electrophoretic)</td> <td style="text-align: center;">1.2</td> <td>lbs/gallon (minus water)</td> </tr> <tr> <td>Spray Primer</td> <td style="text-align: center;">15.0</td> <td>lbs/gallon of solids applied</td> </tr> <tr> <td>Primer Surfacer</td> <td style="text-align: center;">15.0</td> <td>lbs/gallon of solids applied</td> </tr> <tr> <td>Topcoat</td> <td style="text-align: center;">15.0</td> <td>lbs/gallon of solids applied</td> </tr> <tr> <td>Final Repair Coat</td> <td style="text-align: center;">4.8 (same as CTG)</td> <td>lbs/gallon (minus water)</td> </tr> </tbody> </table> <p>Control system alternative providing equivalent degree of control</p>	Coating Application	Limit	Units	Electrodeposition (electrophoretic)	1.2	lbs/gallon (minus water)	Spray Primer	15.0	lbs/gallon of solids applied	Primer Surfacer	15.0	lbs/gallon of solids applied	Topcoat	15.0	lbs/gallon of solids applied	Final Repair Coat	4.8 (same as CTG)	lbs/gallon (minus water)						
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CTG Category: Surface Coating of Automobile and Light-Duty Trucks																			
Maryland – 26.11.11.19.03 Automotive and Light-Duty Truck Coating	<p>Applicability: Statewide Control Requirements: Limits same as CTG except 1.2 lbs VOC/gallon (minus water) for prime coat</p>																		
Massachusetts – 310 CMR 7.18 (7) Automobile Surface Coating	<p>Applicability: Statewide to coating lines with greater than 15 lbs VOC per day uncontrolled actual emissions Control Requirements: uses different format than CTG, lbs/gallon of solids.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Coating Application</th> <th style="text-align: center;">Limit</th> <th style="text-align: left;">Units</th> </tr> </thead> <tbody> <tr> <td>Primer</td> <td style="text-align: center;">1.4</td> <td>lb VOC/gallon solids applied</td> </tr> <tr> <td>Primer-Surfacer</td> <td style="text-align: center;">4.5</td> <td>lb VOC/gallon solids applied</td> </tr> <tr> <td>Topcoat</td> <td style="text-align: center;">15.0</td> <td>lb VOC/gallon solids deposited</td> </tr> <tr> <td>Equivalent at 30% transfer efficiency</td> <td style="text-align: center;">4.5</td> <td>lbs VOC/gallon solids applied</td> </tr> <tr> <td>Final Repair</td> <td style="text-align: center;">13.8</td> <td>lb VOC/gallon solids applied</td> </tr> </tbody> </table> <p>Compliance is based on daily, line by line averages</p>	Coating Application	Limit	Units	Primer	1.4	lb VOC/gallon solids applied	Primer-Surfacer	4.5	lb VOC/gallon solids applied	Topcoat	15.0	lb VOC/gallon solids deposited	Equivalent at 30% transfer efficiency	4.5	lbs VOC/gallon solids applied	Final Repair	13.8	lb VOC/gallon solids applied
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Final Repair	13.8	lb VOC/gallon solids applied																	
New Jersey – 7.27-16.7 Surface Coating & Graphic Arts Operations	<p>Applicability: Statewide to facilities apply more than a half gallon per hour and two and a half gallons per day. Control Requirements: Limits same as CTG except 1.2 lbs VOC/gallon (minus water) for primers applied by electrodeposition and 5.0 lbs gallon (minus water) for “Custom Topcoating”. Allows for equivalent limit based on daily weighted mean; allows for use of control system to achieve 90% overall control efficiency each hour or achieve a calculated hourly emission limit based on usage rates and individual coating limits.</p>																		

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CTG Category: Can Coating																	
CTG RACT Recommendation: May, 1977 CTG recommended emission limitation:																	
<u>Coating Application</u>	<u>lb VOC/gallon (minus water, exempt solvent)</u>																
Sheet basecoat and over-varnish; two piece can exterior	2.8																
Two- and three-piece can interior body spray; two-piece can end exterior	4.2																
Three-piece can side-seam spray	5.5																
End sealing compound	3.7																
<p>Allow as alternative, use of 90% or greater efficient control system Exemption levels 3 lbs/hour, 15 lb/day (EPA policy allows a daily-weighted VOC emission limitation for can manufacturing plants (i.e., RACT bubble) in accordance with the 3/10/1982 Federal Register notice (47 FR 10293). Averaging period up to 24 hours</p>																	
LADCO States																	
Illinois – Subpart 215.204, 218.204, and 219.204 Subpart F Coating Operations	<p>Applicability: Statewide Control Requirement: Same as CTG except in Chicago and metro East Areas where the requirements are:</p> <table border="1"> <thead> <tr> <th style="text-align: center;"><u>Coating Application</u></th> <th style="text-align: center;"><u>lb VOC/gallon (minus water, exempt solvent)</u></th> </tr> </thead> <tbody> <tr> <td>Sheet basecoat</td> <td style="text-align: center;">2.2</td> </tr> <tr> <td>Sheet over-varnish (same as CTG)</td> <td style="text-align: center;">2.8</td> </tr> <tr> <td>Exterior basecoat and over-varnish</td> <td style="text-align: center;">2.1</td> </tr> <tr> <td>Interior body spray; two-piece</td> <td style="text-align: center;">3.7</td> </tr> <tr> <td>Interior body spray; three-piece and exterior end coat (same as CTG)</td> <td style="text-align: center;">4.2</td> </tr> <tr> <td>Side-seam spray (same as CTG)</td> <td style="text-align: center;">5.5</td> </tr> <tr> <td>End sealing compound (same as CTG)</td> <td style="text-align: center;">3.7</td> </tr> </tbody> </table> <p>Each coating must comply unless compliance shown with calculated alternative daily emission limitation based on material usage and limits or a capture and control system is used which provides for 75% overall control and 90% control device efficiency.</p>	<u>Coating Application</u>	<u>lb VOC/gallon (minus water, exempt solvent)</u>	Sheet basecoat	2.2	Sheet over-varnish (same as CTG)	2.8	Exterior basecoat and over-varnish	2.1	Interior body spray; two-piece	3.7	Interior body spray; three-piece and exterior end coat (same as CTG)	4.2	Side-seam spray (same as CTG)	5.5	End sealing compound (same as CTG)	3.7
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CTG Category: Can Coating													
Indiana – 326 IAC 8-2.3 Can Coating Operations	<p>Applicability: Facilities with 100 ton/year potential VOC emissions as of 1/1/1980 or 15 lbs/day actual VOC emissions before controls as of 7/1/1990 in Clark, Elkhart, Floyd, Lake, Marion, Porter, and St. Joseph counties and Statewide new units with 100 ton/year potential VOC emissions after 1/1/1980 or 15 lbs/day actual VOC emissions before controls as of 7/1/1990.</p> <p>Control Requirements: Same as CTG; provides for alternative for equivalent limit based on daily weighted average</p>												
Michigan – 336.1610 Existing Coating Lines	<p>Applicability: Statewide</p> <p>Control Requirements: Same as CTG; provides for alternative limits based on daily volume weighted averages</p>												
Ohio – 3745-21-09 (D) Surface coating of Cans	<p>Applicability: all sources in 24 listed counties, and in all other counties: sources constructed after 10/19/1979 or units at sources with the potential to emit 100 tons/year VOC.</p> <p>Control Requirements: Includes CTG requirements plus the following alternative limits based on lbs VOC per gallon of solids if control system is used:</p> <table style="margin-left: 40px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Coating Application</u></th> <th style="text-align: right;"><u>lb VOC/gallon solids with control system</u></th> </tr> </thead> <tbody> <tr> <td>Basecoat, over-varnish, 2-piece and 3-piece</td> <td style="text-align: right;">4.5</td> </tr> <tr> <td>Interior body coating, 2-piece and 3-piece</td> <td style="text-align: right;">9.8</td> </tr> <tr> <td>Exterior bottom end coating, 2-piece</td> <td style="text-align: right;">9.8</td> </tr> <tr> <td>Side-seam coating, 3-piece</td> <td style="text-align: right;">21.7</td> </tr> <tr> <td>End sealing compound, 2-piece and 3-piece</td> <td style="text-align: right;">7.4</td> </tr> </tbody> </table> <p>Provides for calculation of daily alternative limit based on coating usage and limits for each coating</p>	<u>Coating Application</u>	<u>lb VOC/gallon solids with control system</u>	Basecoat, over-varnish, 2-piece and 3-piece	4.5	Interior body coating, 2-piece and 3-piece	9.8	Exterior bottom end coating, 2-piece	9.8	Side-seam coating, 3-piece	21.7	End sealing compound, 2-piece and 3-piece	7.4
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Side-seam coating, 3-piece	21.7												
End sealing compound, 2-piece and 3-piece	7.4												
Wisconsin – 422.05 Can Coating	<p>Applicability: Statewide to sources with actual uncontrolled emissions of 100 tons/year; applies in 20 listed counties to sources with actual uncontrolled of 15 lbs/day or more</p> <p>Control Requirements: Same as CTG; provides for alternative limits based on daily volume weighted averages</p>												

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CTG Category: Can Coating																					
Other States																					
California – Bay Area – Rule 11 Metal Container, Closure, and Coil Coating	<p>Applicability: District-wide Control Requirement: Requirements more stringent than CTG as follows:</p> <table border="0"> <thead> <tr> <th style="text-align: left;"><u>Coating Application</u></th> <th style="text-align: right;"><u>lb VOC/gallon (minus water, exempt solvent)</u></th> </tr> </thead> <tbody> <tr> <td>Sheet basecoat (interior and exterior) and over-varnish</td> <td style="text-align: right;">1.9</td> </tr> <tr> <td>Exterior basecoat, over-varnish, and end coating, 2-piece</td> <td style="text-align: right;">2.1</td> </tr> <tr> <td>Interior body spray; 2-piece</td> <td style="text-align: right;">3.5</td> </tr> <tr> <td>Interior body spray; 3-piece</td> <td style="text-align: right;">3.0</td> </tr> <tr> <td>Side-seam spray, (same as CTG)</td> <td style="text-align: right;">5.5</td> </tr> <tr> <td>End sealing compound</td> <td style="text-align: right;">0.1</td> </tr> <tr> <td>Exterior body spray</td> <td style="text-align: right;">3.5</td> </tr> </tbody> </table> <p>Control system alternative of 90% overall control efficiency.</p>	<u>Coating Application</u>	<u>lb VOC/gallon (minus water, exempt solvent)</u>	Sheet basecoat (interior and exterior) and over-varnish	1.9	Exterior basecoat, over-varnish, and end coating, 2-piece	2.1	Interior body spray; 2-piece	3.5	Interior body spray; 3-piece	3.0	Side-seam spray, (same as CTG)	5.5	End sealing compound	0.1	Exterior body spray	3.5				
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California – South Coast 1125 – Metal Container, Closure and Coil Coating Operations	<p>Applicability: District-wide Control Requirement: Requirements more stringent than CTG as follows:</p> <table border="0"> <thead> <tr> <th style="text-align: left;"><u>Coating Application</u></th> <th style="text-align: right;"><u>lb VOC/gallon (minus water, exempt solvent)</u></th> </tr> </thead> <tbody> <tr> <td>Sheet basecoat (interior and exterior) and over-varnish (3-piece)</td> <td style="text-align: right;">1.9</td> </tr> <tr> <td>Exterior basecoat and over-varnish, 2-piece</td> <td style="text-align: right;">2.1</td> </tr> <tr> <td>Inks</td> <td style="text-align: right;">2.5</td> </tr> <tr> <td>Interior body spray; 2-piece</td> <td style="text-align: right;">3.7</td> </tr> <tr> <td>Interior body spray; 3-piece (same as CTG)</td> <td style="text-align: right;">4.2</td> </tr> <tr> <td>Side-seam spray (same as CTG)</td> <td style="text-align: right;">5.5</td> </tr> <tr> <td>End sealing compound, food beverage cans (same as CTG)</td> <td style="text-align: right;">3.7</td> </tr> <tr> <td>End sealing compound, non-food cans</td> <td style="text-align: right;">0.0</td> </tr> <tr> <td>Exterior body spray</td> <td style="text-align: right;">3.5</td> </tr> </tbody> </table> <p>Control system alternative of 90% capture and 95% destruction or alternative limit based on individual material usage and limits.</p>	<u>Coating Application</u>	<u>lb VOC/gallon (minus water, exempt solvent)</u>	Sheet basecoat (interior and exterior) and over-varnish (3-piece)	1.9	Exterior basecoat and over-varnish, 2-piece	2.1	Inks	2.5	Interior body spray; 2-piece	3.7	Interior body spray; 3-piece (same as CTG)	4.2	Side-seam spray (same as CTG)	5.5	End sealing compound, food beverage cans (same as CTG)	3.7	End sealing compound, non-food cans	0.0	Exterior body spray	3.5
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Maryland – 26.11.11.19.04 Can Coating	<p>Applicability: Statewide Control Requirements: Same as CTG; allows for equivalent control using control device or use of water-based coatings with less than 25% by weight VOC.</p>																				

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CTG Category: Can Coating													
Massachusetts – 310 CMR 7.18 (4) Metal Can Surface Coating	<p>Applicability: Statewide to coating lines with greater than 15 lbs VOC per day uncontrolled actual emissions</p> <p>Control Requirements: uses different format than CTG, lbs/gallon of solids.</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Coating Application</u></th> <th style="text-align: right;"><u>lb VOC/gallon solids</u></th> </tr> </thead> <tbody> <tr> <td>Sheet basecoat (exterior and interior and exterior over-varnish)</td> <td style="text-align: right;">4.5</td> </tr> <tr> <td>Two-piece can exterior (basecoat and over-varnish)</td> <td style="text-align: right;">4.5</td> </tr> <tr> <td>Two- and three-piece can interior body spray; two-piece can end exterior</td> <td style="text-align: right;">9.8</td> </tr> <tr> <td>Three-piece can side-seam spray</td> <td style="text-align: right;">21.8</td> </tr> <tr> <td>End sealing compound</td> <td style="text-align: right;">7.4</td> </tr> </tbody> </table> <p>Allows for establishing equivalent emission limit based on daily weighted average across coating limits and use rates</p>	<u>Coating Application</u>	<u>lb VOC/gallon solids</u>	Sheet basecoat (exterior and interior and exterior over-varnish)	4.5	Two-piece can exterior (basecoat and over-varnish)	4.5	Two- and three-piece can interior body spray; two-piece can end exterior	9.8	Three-piece can side-seam spray	21.8	End sealing compound	7.4
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End sealing compound	7.4												
New Jersey – 7.27- 16.7 Surface Coating & Graphic Arts Operations	<p>Applicability: Statewide to facilities apply more than a half gallon per hour and two and a half gallons per day.</p> <p>Control Requirements: Same as CTG; allows for equivalent limit based on daily weighted mean; allows for use of control system to achieve 90% overall control efficiency each hour or achieve a calculated hourly emission limit based on usage rates and individual coating limits.</p>												

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CTG Category: Wood Furniture

CTG RACT Recommendation: April 1996 CTG recommended emission limits for sources in nonattainment areas with potential VOC emissions of 25 tpy or more. Format (units) chosen to be consistent with MACT standard.

<u>Coating</u>	<u>Limit, lbs VOC/lb solids as applied</u>
Topcoat (waterborne option)	0.8
or,	
Finishing System (high solids option, expected to be 32 to 35% solids by weight)	
Sealers	1.9
Topcoat	1.8
Other Specific Coating Formulations (expected to be approximately 30% solids by weight):	
Acid-cured alkyd amino vinyl sealer and alkyd amino conversion varnish topcoats	
Sealer	2.3
Topcoat	2.0
Other sealer and alkyd amino conversion varnish topcoats	
Sealer	1.9
Topcoat	2.0
Acid-cured alkyd amino vinyl sealer and other varnish topcoats	
Sealer	2.3
Topcoat	1.8
Strippable Booth Coating	0.8

Facilities may meet 90% of the weighted average based on solids as applied of all materials using daily average or longer averaging period chosen by State.

Capture and control system must achieve equivalent reduction in emissions.

CTG includes work practice requirements including limitations on use of conventional air spray guns.

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CTG Category: Wood Furniture																					
LADCO States																					
Illinois – Subpart F Coating Operations 215.204(l), Emission Limitations for Manufacturing Plants, Wood Furniture Coating	<p>Applicability: Statewide (except Chicago and Metro East Areas)</p> <p>Control Requirements: Coating limits:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Coating</u></th> <th style="text-align: center;"><u>Limit lb/gal (-H2O)</u></th> <th style="text-align: left;"><u>Coating</u></th> <th style="text-align: center;"><u>Limit lb/gal (-H2O)</u></th> </tr> </thead> <tbody> <tr> <td>Clear Topcoat</td> <td style="text-align: center;">5.6</td> <td>Opaque Stain</td> <td style="text-align: center;">4.7</td> </tr> <tr> <td>Pigmented Coat</td> <td style="text-align: center;">5.0</td> <td>Repair Coat</td> <td style="text-align: center;">5.6</td> </tr> <tr> <td>Sealer</td> <td style="text-align: center;">5.6</td> <td>Semi-Transparent Stain</td> <td style="text-align: center;">6.6</td> </tr> <tr> <td>Wash-Coat</td> <td style="text-align: center;">6.1</td> <td></td> <td></td> </tr> </tbody> </table> <p>Allows for daily averaging across coatings and coating lines</p> <p>215.205(b) allows as an alternative achievement of 81% overall control efficiency and 90% destruction.</p> <p>215.206(a) exempts facilities with VOC emissions less than 25 tons/year or apply less than 2,500 gallons of coatings/year</p>	<u>Coating</u>	<u>Limit lb/gal (-H2O)</u>	<u>Coating</u>	<u>Limit lb/gal (-H2O)</u>	Clear Topcoat	5.6	Opaque Stain	4.7	Pigmented Coat	5.0	Repair Coat	5.6	Sealer	5.6	Semi-Transparent Stain	6.6	Wash-Coat	6.1		
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Illinois – Subpart F Coating Operations 218.204(l) (Chicago) and 219.204(l) (Metro East) Wood furniture Coating	<p>Applicability: Chicago Area and Metro East Area</p> <p>Control Requirements: Same as CTG</p> <p>Includes same limits for coatings identified in CTG. Also includes limits for Opaque Stain, 4.7 lbs/gal (-H2)) and Non-Topcoat Pigmented Coat, 5.0 lbs/gallon (-H2O).</p> <p>Subsections 218.215 and 219.215 allow for CTG approach, achieving 90% of daily weighted average based on solids applied of the compliant levels for all coatings.</p> <p>Subsections 218.216 and 219.216 allow for use of capture and control system to achieve equivalent reduction.</p> <p>Subsections 218.217 and 219.217 include CTG work practice requirements</p>																				

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CTG Category: Wood Furniture	
Indiana – 326 IAC 8-11 Wood Furniture	<p>Applicability: facilities with potential VOC emissions of 25 tons/year or more in 1-hour non-attainment counties of Lake, Porter, Clark, and Floyd</p> <p>Control Requirements: Same as CTG</p> <p>Includes same limits for coatings identified in CTG.</p> <p>Allows for CTG approach, achieving 90% of daily weighted average based on solids applied of the compliant levels for all coatings.</p> <p>Allows for use of capture and control system to achieve equivalent reduction.</p> <p>Includes CTG work practice requirements.</p>
Michigan	No VOC regulation identified for wood furniture source category.
Ohio 3745-21-15 Effective 5/27/2005	<p>Applicability: facilities with potential VOC emissions of 25 tons/year or more in 1-hour non-attainment counties of Butler, Clermont, Hamilton, and Warren</p> <p>Control Requirements: includes the CTG VOC content limits, the CTG equivalent reduction in emissions for a capture and control system, and the CTG work practice requirements.</p>
Wisconsin – 422.125 Wood Furniture Coating	<p>Applicability: facilities with potential VOC emissions of 25 tons/year or more in the 1-hour non-attainment counties of Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington, and Waukesha</p> <p>Control Requirements: Same as CTG</p> <p>Includes same limits for coatings identified in CTG.</p> <p>Allows for CTG approach, achieving 90% of daily weighted average based on solids applied of the compliant levels for all coatings.</p> <p>Allows for use of capture and control system to achieve equivalent reduction.</p> <p>Includes CTG work practice requirements.</p>
Other States	

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CTG Category: Wood Furniture				
California – Bay Area – Rule 8-32	<p>Applicability: District-wide; facilities using 20 gallons of coating or more/year with exemptions for wood coating operations covered by other standards, refinishing replica furniture, stencil coatings, specific finishes including crackle lacquers, imitation grain, leaf and faux finishes, musical instruments, low-VOC polyester resin, and coating products for extreme environmental conditions</p> <p>Control Requirements: Units: lbs VOC per gallon applied. Specifies use of application techniques other than conventional spray guns. Requires 85 percent overall control efficiency or use of coatings that meet the following:</p>			
	Coating/Limits (lbs/gallon)	General Wood Products	Furniture & Custom Cabinetry & Architectural Millwork	Custom & Contact Furniture
	Clear Topcoat	2.3	4.6	4.6
	Sanding Sealer (includes wash-coats with ≥ 1 lb solids/gallon)	4.6	4.6	4.6
	Pigmented Coating	2.3	4.6	4.6
	High Solids Stain (≥ 1 lb solids/gallon)	5.8	5.8	5.8
	Filler	4.2	4.2	4.2
	Low Solids Stain (<1 lb solids/gallon)	4.0	4.0	4.0
	Low Solids Wash-Coat (<1 lb solids/gallon)	4.0	4.0	4.0

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CTG Category: Wood Furniture						
California – South Coast 1136 Wood Products Coating	<p>Applicability: District-wide, facilities using a gallon or more per day of coating with limited exemptions including coating operations covered by Rule 1104 (Wood Flat Stock) and the use of japans.</p> <p>Control Requirements: Includes limits that go into effect July 1, 2005.</p> <p>Units: multiple units used, lbs/gal (-water, exempt compounds), lbs/gallon, and lbs VOC/lb of solids.</p> <p>Rule allows for achieving 90% of daily weighted average based on solids applied of the compliant levels for all coatings.</p> <p>Allows for use of capture and control system to achieve equivalent reduction.</p> <p>Includes limitations on application techniques.</p>					
	Coating	Lb/lb Solid	Lb/gal (-H2O)	Coating	Lb/lb Solid	Lb/gal (-H2O)
	Clear Sealers	0.36	2.3	Barrier Coat –Plastic Components	0.28	2.3
	Clear Topcoat	0.35	2.3	Composite Wood Edge Filler	0.31	2.3
	Pigmented Primers, Sealers, & Undercoats	0.21	2.3	Extreme Performance Coatings	0.33	0.23
	Pigmented Topcoats	0.25	2.3	Fillers	0.18	0.23
				High-Solids Stain	0.42	2.9
	Low-Solids Barrier Coat – Plastic Components	1.0 lb/gallon		Inks	0.96	4.2
	Low Solids Stains, Toners & Wash-Coats	1.0 lb/gallon		Mold Seal Coatings	4.2	6.3
				Multi-Colored Coatings	0.33	2.3

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CTG Category: Wood Furniture																			
Maryland	No VOC regulation identified for wood furniture source category.																		
Massachusetts – 310 CMR 7.18(23) Wood Products Surface Coating	<p>Applicability: Statewide to facilities with potential VOC emissions before controls of 50 tons per year. Control Requirement: Units: maximum lbs VOC/gallon solids applied. Must submit emission control plan as vehicle for authorizing use of control system or averaging across coating lines.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Coating</th> <th style="text-align: center;">Limit</th> <th style="text-align: left;">Coating</th> <th style="text-align: center;">Limit</th> </tr> </thead> <tbody> <tr> <td>Semitransparent stain</td> <td style="text-align: center;">89.4</td> <td>Wash-Coat</td> <td style="text-align: center;">35.6</td> </tr> <tr> <td>Opaque stain</td> <td style="text-align: center;">35.6</td> <td>Sealer</td> <td style="text-align: center;">23.4</td> </tr> <tr> <td>Pigmented coat</td> <td style="text-align: center;">15.6</td> <td>Clear topcoat</td> <td style="text-align: center;">23.4</td> </tr> </tbody> </table>			Coating	Limit	Coating	Limit	Semitransparent stain	89.4	Wash-Coat	35.6	Opaque stain	35.6	Sealer	23.4	Pigmented coat	15.6	Clear topcoat	23.4
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New Jersey – 7.27-16.7	<p>Applicability: Statewide to facilities that have potential emissions of 3 lbs/hour or more Control Requirement: Units: pounds VOC per gallon (-water). Allows daily averaging across coatings based on volume of coating applied. Allows use of control equipment to achieve 90 percent reduction or more in hourly VOC emissions by weight or meet an hourly emission rate determined based on the volume of solids applied and the VOC limit for the coating type.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Coating</th> <th style="text-align: center;">Limit</th> <th style="text-align: left;">Coating</th> <th style="text-align: center;">Limit</th> </tr> </thead> <tbody> <tr> <td>Semitransparent Stain</td> <td style="text-align: center;">6.8</td> <td>Wash-Coat</td> <td style="text-align: center;">6.1</td> </tr> <tr> <td>Opaque Stain</td> <td style="text-align: center;">4.7</td> <td>Sealer</td> <td style="text-align: center;">5.6</td> </tr> <tr> <td>Pigment Coat</td> <td style="text-align: center;">5.0</td> <td>Clear Topcoat</td> <td style="text-align: center;">5.6</td> </tr> </tbody> </table>			Coating	Limit	Coating	Limit	Semitransparent Stain	6.8	Wash-Coat	6.1	Opaque Stain	4.7	Sealer	5.6	Pigment Coat	5.0	Clear Topcoat	5.6
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