

**TECHNICAL SUPPORT DOCUMENT**

**for**

**CONTROL OF VOLATILE ORGANIC MATERIAL  
EMISSIONS IN NON-ATTAINMENT AREAS**

**from**

**MISCELLANEOUS METAL AND PLASTIC PARTS  
COATINGS; AUTOMOBILE AND LIGHT-DUTY TRUCK  
ASSEMBLY COATINGS; MISCELLANEOUS  
INDUSTRIAL ADHESIVES; AND FIBERGLASS BOAT  
MANUFACTURING MATERIALS**

**AQPSTR 10-01**

**January 2010**

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## List of Acronyms

CAA	Clean Air Act
CO	Carbon Monoxide
CTG	Control Techniques Guidelines
EDP	Electrodeposition Primer
Illinois EPA	Illinois Environmental Protection Agency
MMA	Methyl Methacrylate
NAA	Non-attainment Area
NAICS	North American Industry Classification System
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NO <sub>x</sub>	Nitrogen Oxides
OTC	Ozone Transport Commission
ppm	Parts per million
RACT	Reasonably Available Control Technology
SIP	State Implementation Plan
USEPA	United States Environmental Protection Agency
VOM	Volatile Organic Material

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## Executive Summary

On September 30, 2008, the United States Environmental Protection Agency (“USEPA”) issued final Control Techniques Guidelines (“CTGs”) in lieu of national rules to regulate five categories of consumer and commercial products that have been designated as Group IV Consumer and Commercial Products. The intent of these CTGs was to reduce emissions of volatile organic material (“VOM”) from miscellaneous metal and plastic parts coatings, auto and light-duty truck coatings, miscellaneous industrial adhesives, and fiberglass boat manufacturing materials.

The purpose of this document is to provide technical support for a rulemaking to incorporate the recommended control techniques for the Group IV categories into Illinois regulations, limiting emissions of VOM in ozone non-attainment areas (“NAAs”). This technical support document addresses: the technical feasibility of the proposed control techniques; their economic reasonableness and cost effectiveness; the sources in Illinois that will be impacted by the proposed regulation; the reasoning behind adopting these rules in Illinois; and the process by which the control techniques have been developed by the USEPA in order to meet a reasonably available control technology (“RACT”) standard.

The Illinois Environmental Protection Agency (“Illinois EPA”) has determined that the proposed regulations to implement the recommendations of the USEPA CTGs addressing the Group IV categories are both technically feasible and economically reasonable. The Illinois EPA has relied primarily upon the analysis conducted by the USEPA in developing the CTGs for these categories. Illinois is required by the Clean Air Act (“CAA”) to revise its State Implementation Plan (“SIP”) to include RACT control for sources addressed by a CTG. CAA Section 182(b)(2) requires that states submit SIP revisions in response to any CTG issued between November 15, 1990, and the attainment date for any NAA. The Illinois EPA is proposing regulations consistent with the recommendations contained in the CTGs to control VOM emission from Consumer and Commercial Products, Group IV.

Three of the Group IV categories, miscellaneous metal coatings, plastic parts coatings, and auto and light-duty truck assembly coatings, are currently addressed by Illinois regulations for the

Chicago and Metro-East St. Louis NAAs in 35 Ill. Adm. Code Parts 218 and 219, respectively. The RACT recommendations of the current CTGs provide more stringent limits for sources as well as more specific subcategories for coatings and applications. Parts 218 and 219 have been amended to reflect the CTGs' RACT recommendations.

The other two Group IV categories addressed by CTGs are currently not specifically addressed by Illinois regulations. These categories are miscellaneous industrial adhesives and fiberglass boat manufacturing materials. The Illinois EPA is proposing two new Subparts, Subparts II and JJ, for Parts 218 and 219 that will address these categories.

## 1.0 Introduction

Pursuant to Section 109 of the CAA, as amended in 1990, and to protect the public health, the USEPA revised the National Ambient Air Quality Standard (“NAAQS”) for ozone effective July 17, 1997. The USEPA lowered the NAAQS for ozone to 0.08 parts per million (“ppm”) from the previous 0.120 parts per million. In addition, the time period used for measuring compliance was increased from the previous 1 hour to 8 hours. In Illinois, Chicago and the Metro-East St. Louis area have been designated as moderate ozone NAAs for the 1997 NAAQS. Included in the Chicago NAA are Cook, DuPage, Kane, Lake, McHenry, and Will counties, as well as the Aux Sable Township and Goose Lake Township in Grundy County, and Oswego Township in Kendall County. The Metro-East St. Louis NAA is comprised of Jersey, Madison, Monroe, and St. Clair counties. CAA Section 172 requires that SIPs for these NAAs include requirements for RACT as it applies to emissions sources.

To comply with the requirements for RACT, the Illinois EPA is proposing to reduce VOM emissions from miscellaneous metal and plastic parts coatings, automobile and light-duty truck assembly coatings, miscellaneous industrial adhesives, and fiberglass boat manufacturing materials. These five VOM emission sources have been designated as “Consumer and Commercial Products, Group IV” categories by the USEPA. Pursuant to CAA Section 183(e)(3)(C), USEPA determined that CTGs “will be substantially as effective as national regulations in reducing emissions of volatile organic compounds in ozone national ambient air quality standard nonattainment areas<sup>5</sup>.” Based on that determination, USEPA issued final CTGs in lieu of national regulations for the affected categories on September 30, 2008. Illinois EPA has addressed the CTG recommendations in the proposed rule for this group of source categories<sup>1-4</sup>.

Miscellaneous metal parts coatings, plastic parts coatings, and auto and light-duty truck assembly coatings are currently regulated by the Illinois EPA in Subpart F of 35 Ill. Adm. Code Parts 218.204 and 219.204 for the Chicago and Metro-East St. Louis NAAs respectively. However, the Illinois EPA’s proposed amendments are more stringent, and prescribe VOM content limits for more specific product subcategories, than current Illinois regulations.

Fiberglass boat manufacturing materials are currently regulated by a 2001 National Emission Standard for Hazardous Air Pollutants (“NESHAP”) (40 CFR Part 63 Subpart VVVV). The current Illinois regulation for polyester resin product manufacturing in Subpart CC of 35 Ill. Adm. Code Part 218, requiring high efficiency spray techniques and VOM content limits in resin and gel coat materials, was determined by the USEPA to be less stringent than the 2001 NESHAP<sup>4</sup>. The recommendations in the CTG are based on the emission levels from sources complying with the aforementioned NESHAP.

There are currently no federal or state regulations specifically addressing miscellaneous industrial adhesives<sup>3</sup>.

Further reductions of VOM emissions from the aforementioned categories will be beneficial to the environment and are considered to be both economically reasonable and technologically feasible. For these reasons the Illinois EPA has proposed this rule for controlling VOM emissions from Group IV consumer and commercial products.

In evaluating the potential reductions of VOM emissions from Group IV consumer and commercial products and their cost effectiveness, the Illinois EPA has relied upon the four USEPA CTG documents<sup>1-4</sup>. This technical support document is based on a review of those CTGs and is in support of the amendments proposed to implement RACT control techniques in Illinois. Further regulation of these source categories will be integrated into Illinois’ state implementation plan (“SIP”) for achieving and maintaining attainment of the NAAQS in Illinois NAAs.



## **2.0 Miscellaneous Metal and Plastic Parts Coatings**

### **2.1 Description of Sources and Emissions**

Miscellaneous metal and plastic parts coatings are coatings applied to a wide range of metal and plastic parts for decorative, protective, and functional purposes. The coatings are applied to components of products that include, but are not limited to: fabricated metal products, molded plastic parts, small and large farm machinery, commercial and industrial machinery and equipment, automotive or transportation equipment, interior or exterior automotive parts, construction equipment, motor vehicle accessories, bicycles and sporting goods, toys, recreational vehicles, pleasure craft (recreational boats), extruded aluminum structural components, railroad cars, heavier vehicles, lawn and garden equipment, business machines, laboratory and medical equipment, electronic equipment, steel drums, metal pipes, and numerous other industrial and household products. For the purposes of this technical support document, and for consistency with the corresponding CTG, these varied subcategories of parts will be referred to collectively as “miscellaneous metal and plastic parts coatings.”<sup>1</sup>

Emissions of VOM from this source category occur when the solvent carrying the coating material evaporates and leaves the coating material on the surface during application and drying, and to a lesser extent during the mixing and thinning of the coating, and during cleaning operations<sup>1</sup>.

The coatings affected by the proposed amendments are coatings that are applied by the manufacturers to the parts they produce, and not for coatings that are applied to test panels or coupons for research and development, quality control, or performance testing. Additionally, miscellaneous metal and plastic parts coatings do not include any coatings that are otherwise defined in CAA Section 183(e) which have been previously addressed by other CTGs. These previously addressed coatings include: shipbuilding and repair coatings; aerospace coatings; wood furniture coatings; metal furniture coatings; large appliance coatings; automobile and light-duty truck assembly coatings; flatwood paneling coatings; miscellaneous industrial adhesives; fiberglass boat manufacturing materials; and paper, film, and foil coatings.

The USEPA CTG addressing miscellaneous metal and plastic parts coatings provides a more detailed description of the affected categories and the processes in which they are used and emit VOM<sup>1</sup>.

## **2.2 Emissions in Illinois from Miscellaneous Metal and Plastic Parts Coatings**

The Illinois EPA has determined that there are approximately 111 sources in Illinois NAAs that fall into the miscellaneous metal and plastic parts coating category, and that meet or exceed the 15 pound per day criteria for VOM emissions for sources in the proposed regulation. Because existing emission sources in Illinois are not required to report what portion of their VOM emissions are due to metal and plastic parts coatings, it is difficult to determine the total VOM emissions directly related to the category. The Illinois EPA used data provided by USEPA to determine which Illinois sources would potentially be affected. Based on this information the Illinois EPA estimates that potentially affected sources in Illinois emitted a total of 1730 tons of VOM in 2007. The USEPA's CTG on miscellaneous metal and plastic parts coatings does not detail the level of control anticipated from proposed regulations meeting the CTG's recommendations, so the Illinois EPA has not estimated the VOM reductions that may result from implementation of this proposal.

While the data regarding total emissions of VOM and emission reductions from the proposed regulation of miscellaneous metal plastic parts coatings is uncertain, CAA Section 182(b)(2)(A) requires that SIPs be revised to include RACT for VOM sources covered by a CTG issued by USEPA after November 15, 1990, and before the area's date of attainment<sup>1</sup>. The USEPA CTG regarding this category was intended to provide recommendations for RACT control of the various affected coatings. The Illinois EPA concurs with the recommendations of the CTG and has included them, with few exceptions, in the proposed regulation for Group IV of consumer and commercial products.

## **2.3 Technical Feasibility of Controls**

The CTG issued by USEPA for the control of emissions from miscellaneous metal and plastic parts coatings proposes three options for the control of emissions from affected sources, as well as additional recommendations for work practices related to coating activities and cleaning

activities. The three options for control detailed in the CTG are intended to provide a measure of flexibility in compliance. The Illinois EPA has included all three options in the proposed regulation.

Reduction of VOM emissions from this category can typically be achieved by: pollution prevention methods such as product substitution or reformulation to use lower VOM materials; use of higher efficiency coating application equipment such as electrostatic sprayers or high volume low pressure (“HVLP”) sprayers; the use of capture and control equipment to capture emissions and combust them, or to recover them using adsorption or absorption processes; and the use of recommended work practices. The CTG for miscellaneous metal and plastic parts coatings provides a more complete description of these control methods<sup>1, 1</sup>.

The Illinois EPA has relied upon the CTG to determine the technical feasibility of the proposed VOM limits. The USEPA based the limits and practices in the CTG on regulations achieving the same level of emission reduction in California, and specifically in the South Coast Air Quality Management District. Based upon compliance with these limits in other regions of the U.S., along with the flexibility in compliance measures in the proposed regulation, the limits in the proposed regulation are technically feasible.

### **2.3.1 Use of Low VOM Coatings**

To reduce VOM emissions from miscellaneous metal and plastic parts coatings, an affected source may use low-VOM coatings. Option 1 from the CTG involves recommended application methods and specific limits on VOM content in coatings in terms of mass of VOM per volume of coating. These VOM limits do not include water and exempt compounds in the calculation of mass per volume VOM content. Table 2.1 lists the VOM limits in terms of mass of VOM per volume of coating for each coating category included in the proposed regulation. Table 2.2 specifies the equivalent VOM limits in terms of mass of VOM per volume of solids. Included in the CTG there are a number of exceptions for specified coatings or uses of those coatings that exempt them from either the VOM limits, the application methods, or both. This is due to these coatings requiring a higher VOM content in order to meet performance specifications. These

exemptions are also included in the proposed rulemaking. The CTG addressing this source category provides a more detailed listing of those coatings, their uses, and exemptions<sup>1</sup>.

**Table 2.1 VOM Limits for Metal and Plastic Parts Coatings in Terms of Mass per Volume of Coating**

<b><u>Metal Parts and Products</u></b>				
<b>Coating Category</b>	<b><u>Air Dried</u></b>		<b><u>Baked</u></b>	
	<b>kg VOM/L Coating</b>	<b>lb VOM/gal Coating</b>	<b>kg VOM/L Coating</b>	<b>lb VOM/gal Coating</b>
General One Component	0.34	2.8	0.28	2.3
General Multi Component	0.34	2.8	0.28	2.3
Camouflage	0.42	3.5	0.42	3.5
Electric-Insulating Varnish	0.42	3.5	0.42	3.5
Etching Filler	0.42	3.5	0.42	3.5
Extreme High-Gloss	0.42	3.5	0.36	3.0
Extreme Performance	0.42	3.5	0.36	3.0
Heat-Resistant	0.42	3.5	0.36	3.0
High Performance Architectural	0.74	6.2	0.74	6.2
High Temperature	0.42	3.5	0.42	3.5
Metallic	0.42	3.5	0.42	3.5
Military Specification	0.34	2.8	0.28	2.3
Mold-Seal	0.42	3.5	0.42	3.5
Pan Backing	0.42	3.5	0.42	3.5
Prefabricated Architectural Multi-Component	0.42	3.5	0.28	2.3
Prefabricated Architectural One-Component	0.42	3.5	0.28	2.3
Pretreatment Coatings	0.42	3.5	0.42	3.5
Repair and Touch Up	0.42	3.5	0.36	3.0
Silicone Release	0.42	3.5	0.42	3.5
Solar-Absorbent	0.42	2.5	0.36	3.0
Vacuum-Metalizing	0.42	3.5	0.42	3.5
Drum Coating, New, Exterior	0.34	2.8	0.34	2.8
Drum Coating, New, Interior	0.42	3.5	0.42	3.5
Drum Coating, Reconditioned, Exterior	0.42	3.5	0.42	3.5
Drum Coating, Reconditioned, Interior	0.50	4.2	0.50	4.2
<b><u>Plastic Parts and Products</u></b>				
	<b>kg VOM/L Coating</b>	<b>lb VOM/gal Coating</b>		
General One Component	0.28	2.3		
General Multi Component	0.42	3.5		
Electric Dissipating Coatings and Shock-Free Coatings	0.80	6.7		
Extreme Performance (2-pack coatings)	0.42	3.5		

Metallic	0.42	3.5
Military Specification (1 pack)	0.34	2.8
Military Specification (2 pack)	0.42	3.5
Mold-Seal	0.76	6.3
Multi-colored Coatings	0.68	5.7
Optical Coatings	0.80	6.7
Vacuum-Metalizing	0.80	6.7

**Automotive/Transportation Coatings\***

	kg VOM/L Coating	lb VOM/gal Coating
High Bake Coatings – Interior and Exterior Parts		
Flexible Primer	0.54	4.5
Non-flexible Primer	0.42	3.5
Base Coats	0.52	4.3
Clear Coat	0.48	4.0
Non-basecoat/clear coat	0.52	4.3
Low Bake/Air Dried Coatings – Exterior Parts		
Primers	0.58	4.8
Basecoat	0.60	5.0
Clearcoats	0.54	4.5
Non-basecoat/Clearcoat	0.60	5.0
Low Bake/Air Dried Coatings – Interior Parts	0.60	5.0
Touchup and Repair Coatings	0.62	5.2

**Business Machine Coatings**

	kg VOM/L Coating	lb VOM/gal Coating
Primers	0.35	2.9
Topcoat	0.35	2.9
Texture Coat	0.35	2.9
Fog Coat	0.26	2.2
Touchup and repair	0.35	2.9

\* For red, yellow, and black automotive coatings, except touch up and repair coatings, the recommended limit is determined by multiplying the appropriate limit in this table by 1.15.

**Pleasure Craft Surface Coatings**

	<b>kg VOM/L Coating</b>	<b>lb VOM/gal Coating</b>
Extreme High Gloss Topcoat	0.49	4.1
High Gloss Topcoat	0.42	3.5
Pretreatment Wash Primers	0.78	6.5
Finish Primer/Surfacer	0.42	3.5
High Build Primer Surfacer	0.34	2.8
Aluminum Substrate Antifoulant Coating	0.56	4.7
Other Substrate Antifoulant Coating	0.33	2.8
All other pleasure craft surface coatings for metal or plastic	0.42	3.5

**Motor Vehicle Materials**

	<b>kg VOM/L Coating</b>	<b>lb VOM/gal Coating</b>
Vehicle Cavity Wax	0.65	5.4
Vehicle Sealer	0.65	5.4
Vehicle Deadener	0.65	5.4
Vehicle Gasket/Gasket Sealing Material	0.20	1.7
Vehicle Underbody Coating	0.65	5.4
Vehicle Trunk Interior Coating	0.65	5.4
Vehicle Bedliner	0.20	1.7
Vehicle Lubricating Wax/Compound	0.70	5.8

**2.3.2 Use of Low VOM Coatings and Add-on Controls**

An affected source may also choose to combine the use of low-VOM coatings with add-on controls. This compliance option from the CTG involves achieving equivalent VOM emissions from affected coatings by limiting VOM emission rates in terms of mass of VOM emitted per volume of coating solids applied. Table 2.2 lists the VOM limits for each coating category included in the proposed regulation. This option is intended for use by facilities employing a combination of low-VOM coatings, specific application methods, and add-on controls to achieve the mass of VOM emitted relative to applied coating solids. These limits have been converted from those set forth in section 2.3.1, assuming a VOM density of 883g/L.

**Table 2.2 VOM Limits Metal and Plastic Parts Coatings in Terms of Mass per Volume of Solids**

<u>Metal Parts and Products</u>				
Coating Category	<u>Air Dried</u>		<u>Baked</u>	
	kg VOM/L Solids	lb VOM/gal Solids	kg VOM/L Solids	lb VOM/gal Solids
General One Component	0.54	4.52	0.40	3.35
General Multi Component	0.54	4.52	0.40	3.35
Camouflage	0.80	6.67	0.80	6.67
Electric-Insulating Varnish	0.80	6.67	0.80	6.67
Etching Filler	0.80	6.67	0.80	6.67
Extreme High-Gloss	0.80	6.67	0.61	5.06
Extreme Performance	0.80	6.67	0.80	6.67
Heat-Resistant	0.80	6.67	0.61	5.06
High Performance Architectural	4.56	38.00	4.56	38.00
High Temperature	0.80	6.67	0.80	6.67
Metallic	0.80	6.67	0.80	6.67
Military Specification	0.54	4.52	0.40	3.35
Mold-Seal	0.80	6.67	0.80	6.67
Pan Backing	0.80	6.67	0.80	6.67
Prefabricated Architectural Multi-Component	0.80	6.67	0.40	3.35
Prefabricated Architectural One-Component	0.80	6.67	0.40	3.35
Pretreatment Coatings	0.80	6.67	0.80	6.67
Silicone Release	0.80	6.67	0.80	6.67
Solar-Absorbent	0.80	6.67	0.61	5.06
Vacuum-Metalizing	0.80	6.67	0.80	6.67
Drum Coating, New, Exterior	0.54	4.52	0.54	4.52
Drum Coating, New, Interior	0.80	6.67	0.80	6.67
Drum Coating, Reconditioned, Exterior	0.80	6.67	0.80	6.67
Drum Coating, Reconditioned, Interior	1.17	9.78	1.17	9.78
<u>Plastic Parts and Products</u>				
Coating Category	kg VOM/L Solids	lb VOM/gal Solids		
General One Component	0.40	3.35		
General Multi Component	0.80	6.67		
Electric Dissipating Coatings and Shock-Free Coatings	8.96	74.70		
Extreme Performance (2-pack coatings)	0.80	6.67		



Metallic	0.80	6.67
Military Specification (1 pack)	0.54	4.52
Military Specification (2 pack)	0.80	6.67
Mold-Seal	5.24	43.70
Multi-colored Coatings	3.04	25.30
Optical Coatings	8.96	74.70
Vacuum-Metalizing	8.96	74.70

**Automotive/Transportation Coatings\***

Coating Category	kg VOM/L Solids	lb VOM/gal Solids
<b>Automotive/Transportation Coatings</b>		
High Bake Coatings – Interior and Exterior Parts		
Flexible Primer	1.39	11.58
Non-flexible Primer	0.80	6.67
Base Coats	1.24	10.34
Clear Coat	1.05	8.76
Non-basecoat/clear coat	1.24	10.34
Low Bake/Air Dried Coatings – Exterior Parts		
Primers	1.60	13.80
Basecoat	1.87	15.59
Clearcoats	1.39	11.58
Non-basecoat/Clearcoat	1.87	15.59
Low Bake/Air Dried Coatings – Interior Parts		
Touchup and Repair Coatings	2.13	17.72
<b>Business Machine Coatings</b>		
Primers	0.57	4.80
Topcoat	0.57	4.80
Texture Coat	0.57	4.80
Fog Coat	0.38	3.14
Touchup and repair	0.57	4.80

\* For red, yellow, and black automotive coatings, except touch up and repair coatings, the recommended limit is determined by multiplying the appropriate limit in this table by 1.15.

### Pleasure Craft Surface Coatings

Coating Category	kg VOM/L Solids	lb VOM/gal Solids
Extreme High Gloss Topcoat	1.10	9.20
High Gloss Topcoat	0.80	6.67
Pretreatment Wash Primers	6.67	55.60
Finish Primer/Surfacer	0.80	6.67
High Build Primer Surfacer	0.34	2.80
Aluminum Substrate Antifoulant Coating	0.56	4.70
Other Substrate Antifoulant Coating	0.33	2.80
All other pleasure craft surface coatings for metal or plastic	0.42	3.50

For the limits set forth in Sections 2.3.1 and 2.3.2 of this document, the USEPA recommends one or more of the following application methods: electrostatic application, HVLP spray, flow coat, roller coat, dip coat (including electrodeposition), airless spray, air-assisted airless spray, or other coating application methods capable of achieving a transfer efficiency equivalent to or better than that achieved by HVLP spraying.

#### **2.3.3 90% Capture and Control Efficiency**

In lieu of using low VOM coatings as described in Sections 2.3.1 and 2.3.2, a source may opt to install and operate an add-on capture and control system that provides an overall control efficiency of at least 90%. Sources complying with this compliance option would not be required to meet the aforementioned VOM limits, or to employ recommended application methods. This compliance option is expected to achieve emission reductions of VOM that are equal to or greater than the limits in Sections 2.3.1 and 2.3.2.

#### **2.4 Economic Reasonableness and Cost Effectiveness of Controls**

The Illinois EPA has relied upon the cost analysis conducted by the USEPA for the CTGs for miscellaneous metal and plastic parts coatings to determine that the proposed regulations are cost effective.

The USEPA used the National Emissions Inventory database to estimate the number of miscellaneous metal and plastic parts coatings operations in non-attainment areas in the United States that meet the 15 lb per day threshold. They estimated that there are 1296 such sources in the United States emitting an estimated 22,108 tons of VOM per year. The USEPA also estimated the average cost of compliance with the CTGs for this emission category to be \$10,500 per source, and a cost effectiveness of \$1,758 per ton of VOM reduced<sup>1</sup>. Using these estimates, an affected source, on average, could be expected to achieve a reduction in VOM emissions of 5.97 tons annually. This would amount to an estimated reduction of 662 tons of VOM in Illinois NAAs. However, it should be noted that these estimated reductions would include reductions that have already occurred at sources since the current regulations were implemented, and not necessarily reductions from current emission levels.

The USEPA supplied the data that was used to determine that there were 1269 potentially affected sources nationwide. Of these 1269 sources, 155 were found to be in Illinois NAAs and potentially subject to the CTGs. One hundred eleven of these 155 Illinois sources remained in operation in 2007. Because the source emission data is generally not specific enough to determine whether a source is emitting 15 pounds of VOM per day specifically from miscellaneous metal and plastic parts coatings, a conservative approach for cost estimates was used. For the purposes of cost estimation, the Illinois EPA selected all sources in NAAs that were selected by the aforementioned process. Because there were 111 potentially affected sources, the Illinois EPA estimated, assuming a \$10,500 per source average cost of compliance, a maximum total compliance cost for Illinois state-wide to be approximately \$1,165,500. While this figure is almost certainly an over-estimate of potential costs, the Illinois EPA considers the USEPA's estimate for cost effectiveness of \$1758 per ton to be reasonable for control of VOM.

A more detailed description of the USEPA's cost analyses can be found in the CTG for miscellaneous metal and plastic parts coatings<sup>1</sup>.

## **2.5 Additional Recommendations: Work Practices**

In addition to the limits recommended in the CTG and included in the proposed regulation, the CTG also recommends work practices for miscellaneous metal and plastic parts coating operations. The work practices address coating activities and cleaning activities, and are intended to further reduce VOM emissions from the source category. The CTG states that the emission reductions are unquantifiable, but states that the work practices will result in a net cost savings to sources in this category.

The CTG recommends that work practices for coating related activities include the following: (1) store all VOM-containing coatings, thinners, and coating-related waste materials in closed containers; (2) ensure that mixing and storage containers used for VOM-containing coatings, thinners, and coating-related waste materials are kept closed at all times except when depositing or removing these materials; (3) minimize spills of VOM-containing coatings, thinners, and coating-related waste materials; and (4) convey VOM-containing coatings, thinners, and coating-related waste materials from one location to another in closed containers or pipes.

The CTG further recommends that work practices for cleaning materials include the following: (1) store all VOM-containing cleaning materials and used shop towels in closed containers; (2) ensure that storage containers used for VOM-containing cleaning materials are kept closed at all times except when depositing or removing these materials; (3) minimize spills of VOM containing cleaning materials; (4) convey VOM-containing cleaning materials from one location to another in closed containers or pipes; and (5) minimize VOM emission from cleaning of application, storage, mixing, and conveying equipment by ensuring that equipment cleaning is performed without atomizing the cleaning solvent and all spent solvent is captured in closed containers.

The proposed regulation includes the recommended work practices from the CTG in their entirety.

## 2.6 Potentially Affected Sources in Illinois

In determining the number of sources potentially affected by the proposed regulation regarding miscellaneous metal and plastic parts coatings, the Illinois EPA relied upon information provided by the USEPA. This source specific information was the data that the USEPA relied upon to estimate the number of sources that would be impacted nationwide. The CTG for miscellaneous metal and plastic parts coatings states that 1269 sources nationwide in non-attainment areas would be affected by rules to implement the CTG. Of the 1269 sources in the U.S., 155 sources were found to be in Illinois non-attainment areas, and 111 of these sources remained in operation in 2007. Table 2.3 lists these impacted sources and their location.

**Table 2.3 Potentially Affected Sources in Illinois**

<b>Illinois Source ID</b>	<b>Name</b>	<b>City</b>	<b>County</b>
031045AAE	UGN INC	Chicago Heights	Cook County
089807AAD	ILLINOIS TOOL WORKS - SHAKEPROOF DIV	Elgin	Kane County
089483ACD	MACHINERY COMPONENTS INC	West Chicago	Kane County
031600FXO	UNION PACIFIC RAILROAD CO	Chicago	Cook County
043440AHH	COATING TECHNOLOGIES INC	Elk Grove Village	DuPage County
031003AAE	ARDCO INC	Alsip	Cook County
031096ABM	CLAD REX INC	Franklin Park	Cook County
031600EIM	GENERAL ELECTRIC INTERNATIONAL INC	Chicago	Cook County
031600FSE	ACTION RACK & MANUFACTURING CO	Chicago	Cook County
031600FME	INGLOT ELECTRONICS CORP	Chicago	Cook County
031273ACK	NORTHROP GRUMMAN SYSTEMS CORP	Rolling Meadows	Cook County
031600FTR	DEHLER MANUFACTURING CO	Chicago	Cook County
031282ACH	EAGLE ELECTRONICS INC	Schaumburg	Cook County
043090ADE	ADVANCED ELECTRONICS INC	West Chicago	DuPage County
031015AAC	BORG WARNER TRANSMISSION SYSTEMS	Bellwood	Cook County
031186AGO	PEERLESS INDUSTRIES	Melrose Park	Cook County
031258AAZ	CALUMET ARMATURE & ELECTRIC CO	Riverdale	Cook County
119055AAK	HIGHLAND MACHINE AND SCREW PRODUCT CO	Highland	Madison County
031440AHD	CHEM-PLATE INDUSTRIES INC	Elk Grove Village	Cook County
111075AAD	JOHN STERLING CORP	Richmond	McHenry County
089438ADU	KINNEY ELECTRICAL MFG CO	Elgin	Kane County
031438AAW	ELGIN SWEEPER CO	Elgin	Cook County

043407AAH	FLUID AIR INC	Aurora	DuPage County
031600CUP	KREL LABORATORIES INC	Chicago	Cook County
163060AAC	WIEGMANN AND CO INC	Freeburg	St. Clair County
043055AAC	LOCKFORMER CO	Lisle	DuPage County
119115ABC	MILLENNIUM RAIL INC	Wood River	Madison County
031024ABC	G & W ELECTRIC CO	Blue Island	Cook County
031114AAW	BEE-JAY INDUSTRIES INC	Harwood Heights	Cook County
043030AAG	MAGNETROL INTERNATIONAL	Downers Grove	DuPage County
031440AKI	COMMERCIAL FINISHES CO LTD	Elk Grove Village	Cook County
031805AAG	DURACO PRODUCTS INC	Streamwood	Cook County
031600FSL	S & B FINISHING CO	Chicago	Cook County
031600FPE	RS OWENS AND CO	Chicago	Cook County
031600EYE	SORINI RING MANUFACTURING CO INC	Chicago	Cook County
097200AAZ	ACTION ATHLETIC EQUIPMENT INC	Zion	Lake County
031096ANA	QC FINISHERS	Franklin Park	Cook County
197075AAA	CLEVELAND STEEL CONTAINER CORP	Peotone	Will County
097418AAQ	VAPOR BUS INTERNATIONAL	Buffalo Grove	Lake County
111065AAQ	NISSAN FORKLIFT CORPORATION NA	Marengo	McHenry County
043090ACH	NATIONAL CONTROLS CORP	West Chicago	DuPage County
031414APT	VAPOR POWER	Bensenville	Cook County
031600CSZ	READY METAL MANUFACTURING CO	Chicago	Cook County
097115ABX	EO SCHWEITZER MFG CO INC	Mundelein	Lake County
031045ABP	ALCO SPRING INDUSTRIES	Chicago Heights	Cook County
031096ABK	BRUNNER AND LAY INC	Franklin Park	Cook County
119040ATC	MIDWEST METAL COATINGS LLC	Granite City	Madison County
031174AAA	GENERAL MOTORS - ELECTRO-MOTIVE DIV	McCook	Cook County
163010AAH	EMPIRE COMFORT SYSTEMS	Belleville	St. Clair County
031600EZF	YALE POLISHING & PLATING	Chicago	Cook County
031600CFW	WELDED TUBE CO OF AMERICA	Chicago	Cook County
043030AAU	REXNORD CORP - REX BEARING DIV	Downers Grove	DuPage County
043060ABT	E/M CORP	Lombard	DuPage County
197072AAC	FEDERAL SIGNAL CORP SIGNAL DIVISION	University Park	Will County
097190ADF	CHERRY ELECTRICAL PRODUCTS	Waukegan	Lake County
031027AAG	SIGNODE CORP	Bridgeview	Cook County

043020ABE	AMERICAN FLANGE & MANUFACTURING CO INC	Carol Stream	DuPage County
031015ABZ	HA FRAMBURG AND CO	Bellwood	Cook County
031440AKK	ICON IDENTITY SOLUTIONS	Elk Grove Village	Cook County
197025AAF	HENDRICKSON STAMPING	Crest Hill	Will County
031600FGY	ACE PLATING CO	Chicago	Cook County
031030ACP	BL DOWNEY CO INC	Broadview	Cook County
031030ACM	REPLOGLE GLOBES INC	Broadview	Cook County
031403AAC	BRITT INDUSTRIES	Arlington Heights	Cook County
031297AAN	SHELCO STEEL WORKS INC	South Holland	Cook County
031030AAI	ELKAY MANUFACTURING	Broadview	Cook County
111813AAE	TC INDUSTRIES INC	Crystal Lake	McHenry County
089802AAE	RAYVAC PLASTIC DECORATORS INC	Big Rock	Kane County
043040AAA	CHICAGO BLOWER CORP	Glendale Heights	DuPage County
197085AAS	RUSSELL T BUNDY ASSOCIATES INC D/B/A PAN-GLO	Rockdale	Will County
031600CGP	S & C ELECTRIC CO	Chicago	Cook County
031165ABH	NYLOK FASTENER CORP	Lincolnwood	Cook County
031186ABK	INTERNATIONAL TRUCK AND ENGINE CORP	Melrose Park	Cook County
031440AHP	API INDUSTRIES	Elk Grove Village	Cook County
031600FWW	USPS - CENTRAL VMF	Chicago	Cook County
031234AAM	WEBER-STEPHEN INC	Palatine	Cook County
119055AAB	BASLER ELECTRIC CO	Highland	Madison County
197040AAN	NORWOOD MARKING SYSTEMS INC	Frankfort	Will County
031186AFK	WAGNER ZIP CHANGE	Melrose Park	Cook County
089005AHM	EQUIPTO ELECTRONICS CORP	Aurora	Kane County
097803AAC	CROWN GYM MAT INC	Barrington	Lake County
031600GGA	MORSE AUTOMOTIVE CORP	Chicago	Cook County
031195ABT	ITT BELL AND GOSSETT	Morton Grove	Cook County
031324ACC	ACCO INTERNATIONAL INC	Wheeling	Cook County
031600GAF	R & B POWDER COATING	Chicago	Cook County
031234AAP	ARLINGTON PLATING CO	Palatine	Cook County
031003ABA	GREIF BROS CORP	Alsip	Cook County
031600CEK	ABBAY FINISHING CORP	Chicago	Cook County
031600FXN	NINA ENTERPRISES INC	Chicago	Cook County
031045AMS	GOODER HENRICHSEN CO INC	Chicago Heights	Cook County
043450AAA	ITW BUILDEX	Itasca	DuPage County
163005AAE	METRO EAST INDUSTRIES INC	Alorton	St. Clair County
031600FLE	EAGLEBROOK PLASTICS INC	Chicago	Cook County

031600FAY	MEYER STEEL DRUM INC	Chicago	Cook County
119040AAC	ASF-KEYSTONE INC	Granite City	Madison County
031600FDI	WHEATLAND TUBE CO	Chicago	Cook County
197809AAC	CATERPILLAR INC	Joliet	Will County
031440AFY	ACME FINISHING CO	Elk Grove Village	Cook County
089438AGC	PLASTIC DECORATOR	Elgin	Kane County
031075AAB	ILLINOIS CENTRAL RAILROAD	Homewood	Cook County
119020AAG	OLIN CORP	East Alton	Madison County
031288AHN	AMERICAN LOUVER CO	Skokie	Cook County
031600APY	MEYER STEEL DRUM INC	Chicago	Cook County
031600BRJ	LAKEWOOD ENGINEERING & MFG CO	Chicago	Cook County
097809AAG	JESSUP MANUFACTURING CO	Lake Bluff	Lake County
031600AXT	PALEX CONTAINER SYSTEMS	Chicago	Cook County
197090AAZ	AMERICAN STAIR CORP	Romeoville	Will County
031414AAM	ASTROBLAST INC	Bensenville	Cook County
119055ABE	COOPER B-LINE INC	Highland	Madison County
093807AAB	CATERPILLAR TRACTOR	Aurora	Kendall County
031045ABS	CHICAGO HEIGHTS STEEL	Chicago Heights	Cook County

## 2.7 Existing Regulations

The current Illinois regulations regarding miscellaneous metal and plastic parts coatings can be found in 35 Ill. Adm. Code Parts 218 and 219. A summary of the Illinois rules for metal parts coatings and for plastic parts coatings can be found in Appendices C and D, respectively, of the CTG for these categories<sup>1</sup>.



### **3.0 Auto and Light-Duty Truck Assembly Coatings**

#### **3.1 Description of Sources and Emissions**

Auto and light-duty truck assembly coatings are coatings applied to new automobile or light-duty truck bodies or body parts for those vehicles. These coatings are categorized under Section 183(e) of the CAA, and are most often formulated and marketed for this purpose. These coatings are applied to vehicles to enhance durability and appearance. This coating category includes coatings applied on a contractual basis outside vehicle manufacturing facilities, but does not include coatings used at plastic or composites molding facilities described in the Auto and Light-Duty Trucks NESHAP (40 CFR Part 63, Subpart III)<sup>6</sup>. Likewise, aerosol coatings are not included in this coating category, as they are addressed by the national VOM rule for aerosol coatings and are a separate category under CAA Section 183.

Emissions of VOM from auto and light-duty truck coatings occur when the solvent carrying the coating material evaporates and leaves the coating material on the surface during application and drying, and to a lesser extent during the mixing and thinning of the coating. The majority of emissions from this category occur during coating application, flash off, and the drying and curing of the coatings. Emissions from this product category can be reduced through the use of lower VOM coatings, specific application methods and work practices, and by add-on control equipment for the capture and control of emissions.

The coating process for automobiles and light-duty trucks generally consists of surface preparation, priming operations, topcoat operations, and final repair operations. The proposed regulation includes control measures for each of these phases of the coating process to meet the recommendations of the CTG regarding this category. The CTG provides a more detailed description of these processes<sup>2</sup>.

#### **3.2 Emissions in Illinois from Auto and Light-Duty Truck Coatings**

The Illinois EPA has identified only one source in an Illinois non-attainment area that will be affected by the proposed regulation regarding auto and light-duty truck coatings. Ford Motor Co., located in Cook County, is currently the only source in the Illinois EPA inventory that is classified by the North American Industry Classification System (“NAICS”) codes specified by

USEPA's notice of final determination and availability of control technique guidelines<sup>5</sup> to be affected by the auto and light-duty truck coatings category. This single source reported emissions of approximately 466 tons of VOM from the affected coating lines in 2007. These coating operations consist of topcoat operations, prime coat operations, sealer application, dip coating application, and a final repair coating line. All of these operations exceed the 15 pounds VOM per day criteria taken from the CTG<sup>2</sup> and included in the proposed regulation.

### **3.3 Technical Feasibility of Controls**

The Illinois EPA has relied upon the CTG regarding auto and light-duty truck coatings to determine the appropriate level of control and the feasibility of those measures. The CTG regarding this category was intended to provide recommendations for RACT control of the affected coating operations for automobiles and light-duty trucks. The Illinois EPA's proposed regulations for Group IV consumer and commercial products are consistent with the CTG's recommendations.

Reduction of VOM emissions from this category can typically be achieved by: pollution prevention methods, such as product substitution or reformulation to use lower VOM coatings and cleaning materials; use of higher efficiency coating application equipment such as electrostatic sprayers or high volume low pressure ("HVLP") sprayers; the use of capture and control equipment to capture emissions and combust them, or use of a hybrid system employing a concentrator and an oxidizer; and the use of recommended work practices. For a more complete description of these control methods the reader is directed to the CTG for auto and light-duty truck assembly coatings<sup>2</sup>.

The CTG issued by the USEPA for control of emissions from auto and light-duty truck coatings recommends VOM emission limits for coating operations; work practices for storage and handling of coatings, thinners, and waste materials; and work practices for handling and use of cleaning materials. The limits and work practices included in the CTG reflect current practices that the USEPA considers to be RACT, and were supplied to the USEPA by member and non-member companies of the Alliance of Automobile Manufacturers in 2008. For a more detailed

account of local, state, and federal actions leading to the USEPA determination of these limits please refer to USEPA’s CTG for auto and light-duty truck coatings<sup>2</sup>.

The recommended VOM limits for auto and light-duty truck coatings listed in Table 3.1 are specified by assembly coating process, and in the case of electrodeposition primer (“EDP”) operations, the VOM content is dependent on the solids turnover ratio,  $R_T$ . The solid turnover ratio is defined as the ratio of total volume of coating solids that is added to the EDP system in a calendar month divided by the total volume design capacity of the EDP system.

**Table 3.1 Recommended VOM Emission Limits for Automobile and Light-Duty Truck Assembly Coatings**

Assembly Coating Process	Recommended VOM Emission Limit		
Electrodeposition primer (EDP) operations (including application area, spray/rinse stations, and curing oven)	When solids turnover ratio ( $R_T \geq 0.16$ )	When $0.040 \leq R_T < 0.160$	When $R_T \leq 0.040$
	0.084 kg VOM/liter (0.7lb/gal coating solids applied)	$0.84 \times 350^{0.160 - R_T}$ kg VOM/liter coating solids.	No VOM emission limit.
Primer-surfacer operations (including application area, flash-off area, and oven)	1.44 kg of VOM/liter of deposited solids (12.0 lbs VOM/gal deposited solids) on a daily weighted average basis as determined by following the procedures in the revised Automobile Topcoat Protocol.		
Topcoat operations (including application area, flash-off area, and oven)	1.44 kg VOM/liter of deposited solids (12.0 lb VOM/gal deposited solids) on a daily weighted average basis as determined by following the procedures in the revised Automobile Topcoat Protocol.		
Final repair operations	0.58 kg VOM/liter (4.8 lb VOM/gallon of coating) less water and less exempt solvents on a daily weighted average basis or as an occurrence weighted average.		
Combined primer-surfacer and topcoat operations	1.44 kg VOM/liter of deposited solids (12.0 lb VOM/gal deposited solids) on a daily weighted average basis as determined by following the procedures in the revised Automobile Topcoat Protocol.		

In addition to the emission limits for assembly coating operations for automobiles and light-duty trucks, the CTG recommends VOM emission limits for a number of miscellaneous materials used in auto and light-duty truck assembly coating. These limits are listed in Table 3.2, and have been included in their entirety in the proposed regulation.

**Table 3.2 Recommended VOM Emission Limits for Miscellaneous Materials Used at Automobile and Light-Duty Truck Assembly Coating Facilities (grams of VOM per liter of coating excluding water and exempt compounds as applied)**

<b>Material</b>	<b>Recommended VOM Emission Limit</b>
Automobile and light-duty truck glass bonding primer	900 g VOM/liter
Automobile and light-duty truck adhesive	250 g VOM/liter
Automobile and light-duty truck cavity wax	650 g VOM/liter
Automobile and light-duty truck sealer	650 g VOM/liter
Automobile and light-duty truck deadener	650 g VOM/liter
Automobile and light-duty truck gasket/gasket sealing material	200 g VOM/liter
Automobile and light-duty truck underbody coating	650 g VOM/liter
Automobile and light-duty truck trunk interior coating	650 g VOM/liter
Automobile and light-duty truck bed liner	200 g VOM/liter
Automobile and light-duty truck weatherstrip adhesive	750 g VOM/liter
Automobile and light-duty truck lubricating wax/compound	700 g VOM/liter

### **3.4 Economic Reasonableness and Cost Effectiveness of Controls**

The USEPA estimates that there will be no additional cost for the implementation of the control techniques guidelines for auto and light-duty truck assembly coating. Affected sources have reduced VOM emissions from coating operations in response to the New Source Performance Standards (“NSPS”), the 2004 NESHAP<sup>6</sup> for this category, and various State rules. The recommendations from the CTG for this category were derived from information supplied to the USEPA by the Alliance of Automobile Manufacturers, and reflect measures currently being implemented at affected sources. Further, the USEPA estimates that the additional work practices recommended in the CTG will result in a net cost savings to sources, as implementing these work practices reduces the amount of coating and cleaning materials used.

### 3.5 Additional Recommendations: Work Practices

In addition to the limits recommended in the USEPA CTG and included in the proposed regulation, the CTG also recommends work practices for auto and light-duty truck assembly coating operations. The work practices included in the CTG address coating activities and cleaning activities, and are intended to further reduce VOM emissions from the source category. The CTG states that the emission reductions are unquantifiable, but states that the work practices will result in a net cost savings to sources in this category.

The CTG recommends that work practices for coating related activities and cleaning activities include the following: (1) store all VOM-containing coatings, thinners, and coating-related waste materials in closed containers; (2) ensure that mixing and storage containers used for VOM-containing coatings, thinners, and coating-related waste materials are kept closed at all times, except when depositing or removing these materials; (3) minimize spills of VOM-containing coatings, thinners, and coating-related waste materials; (4) convey VOM-containing coatings, thinners, and coating-related waste materials from one location to another in closed containers or pipes; and (5) minimize VOM emissions from cleaning of storage, mixing, and conveying equipment.

The CTG further recommends that sources in this category develop and implement a work practice plan to ensure that VOM emissions are minimized from the following operations: vehicle body wiping; coating line purging; flushing of coating systems; cleaning of spray booth grates; cleaning of spray booth walls; cleaning of spray booth equipment; cleaning external spray booth areas; and other housekeeping measures (e.g., keeping solvent-laden rags in closed containers). If an affected source already has a work practices plan in place from the aforementioned 2004 NESHAP<sup>6</sup>, the proposed regulation does not require a new plan.

The proposed regulation includes the recommended work practices from the USEPA CTG in their entirety.

### **3.6 Potentially Affected Sources in Illinois**

As previously stated, Illinois EPA has only identified one source from its emissions inventory that will be affected by the regulation regarding auto and light-duty truck assembly coatings. This source is Ford Motor Co. in Cook County (source ID 031600AAR).

### **3.7 Existing Regulations**

The current Illinois regulations regarding automobile and light duty truck assembly coatings in NAAs can be found in 35 Ill. Adm. Code Parts 218 and 219. These rules currently are based upon the 2004 NESHAP<sup>6</sup> as stated above, and a summary of these regulations can be found in the CTG for this category<sup>2</sup>.

#### **4.0 Miscellaneous Industrial Adhesives**

##### **4.1 Description of Sources and Emissions**

The miscellaneous industrial adhesives category includes adhesives and adhesive primers at manufacturing and repair facilities with adhesive application operations. The category does not include adhesives that have been addressed by earlier CTGs. Miscellaneous industrial adhesives are used for joining surfaces in assembly and construction of a large variety of products. Adhesives allow for faster assembly speeds, less labor input, and more ability for joining dissimilar materials than other fastening methods. Although there are a wide variety of adhesives formulated from a multitude of synthetic and natural raw materials, all adhesives can be generally classified as solution/waterborne, solvent-borne, solventless or solid (e.g., hot melt adhesives), pressure sensitive, hot-melt, or reactive (e.g., epoxy adhesives and ultraviolet-curable adhesives). Adhesives can also be generally classified according to whether they are structural or nonstructural. Structural adhesives are commonly used in industrial assembly processes and are designed to maintain a product's structural integrity<sup>3</sup>.

The VOM emissions from miscellaneous industrial adhesives are generally due to evaporation of solvents during application of the adhesive, drying and curing of the adhesive, and in cleaning operations. The majority of emissions occur during the application and drying/curing of the adhesives. Industrial adhesives are applied in a number of ways that include: air atomized spray, electrostatic spray, high volume/low pressure (HVLV) spray, dip coating, flow coating, brush or roll coating, electrocoating, and hand application. For a more detailed description of operations involved in the use of miscellaneous industrial adhesives please refer to the USEPA CTG<sup>3</sup> for the category.

There are currently no Federal or Illinois regulations specifically addressing miscellaneous industrial adhesives. The intent of the CTG regarding the category is to recommend control measures that are considered RACT. The USEPA determination of RACT and the issuing of CTGs were based upon a number of current regulations for industrial adhesives in place in a number of California air quality management districts. For a more detailed description of the regulatory history that was evaluated by the USEPA, the reader is directed to the CTG<sup>3</sup> for miscellaneous industrial adhesives.

#### **4.2 Emissions in Illinois from Miscellaneous Industrial Adhesives**

The Illinois EPA has determined that there are approximately 12 sources in Illinois non-attainment areas that could be potentially affected by the proposed regulation for miscellaneous industrial adhesives. The Illinois EPA identified these sources from data provided by the USEPA while that agency was researching the CTG addressing this category. This group of sources was screened to determine whether a source was in an Illinois NAA, and finally to determine whether the source could potentially exceed the 15 pound per day VOM emission criteria from the CTG. Because the Illinois emission inventory data is not adequately specific to determine what portion of a source's emissions are due to industrial adhesives, it is difficult to determine the total VOM emissions directly related to the category at any given source. The potentially affected sources in Illinois NAAs emitted an estimated total of 120 tons of VOM in 2007.

While the data regarding total emissions of VOM and emission reductions from the proposed regulation of miscellaneous industrial adhesives is uncertain, CAA Section 182(b)(2)(A) requires that SIPs be revised to include RACT for VOM sources covered by a CTG issued by USEPA after November 15, 1990<sup>3</sup>. The USEPA CTG regarding this category was intended to provide recommendations for RACT control of the various affected coatings. The Illinois EPA's proposed regulations for Group IV consumer and commercial products are consistent with the CTG's recommendations.

#### **4.3 Technical Feasibility of Controls**

The Illinois EPA has relied upon the USEPA CTG regarding miscellaneous industrial adhesives to determine the appropriate level of control and the feasibility of those measures. The two most common emission control techniques for reducing VOM emissions from miscellaneous industrial adhesives are pollution prevention and add-on control equipment. The pollution prevention measures involve the use of lower VOM adhesives, higher solids content adhesives, higher efficiency application methods, and work practices to reduce waste and minimize emissions during cleaning operations. Add-on controls for capture and control of VOM emissions are systems similar to those used for a variety of processes that generate VOM emissions, and



involve capture and oxidation or recovery. The recommendations for control of VOM from this category in the CTG were based upon rules currently in effect in California and the Ozone Transport Commission (“OTC”). The USEPA believes these measures to be RACT, and the Illinois EPA concurs. The CTG for miscellaneous industrial adhesives<sup>3</sup> contains a complete description of USEPA’s determination of RACT for this category.

In order to provide sources some flexibility in compliance measures, the USEPA has recommended three control options for reduction of VOM emissions from this category. The first option for control involves the use of low VOM adhesives and adhesive primers. The second control option is the use of a combination of low VOM adhesives and primers and add-on controls to achieve emissions equivalent to the VOM content limits of the first option. In the third compliance option a source may employ add-on controls to achieve a control efficiency of 85% as an alternative to the prescribed emission limits of the first control option. This 85% control efficiency criteria is expected to achieve emission reductions of VOM that are equal to or greater than the prescribed emission limits for the industrial adhesives. The Illinois EPA has included all three options in the proposed regulation.

The emission limits for various adhesives and primers recommended in the CTG and included in the proposed regulation are given in grams of VOM per liter of adhesive. These limits are listed in Table 4.1.

**Table 4.1 VOM Emission Limits for General and Specialty Adhesive Application Processes**

<b>General Adhesive Application Processes</b>	<b>Recommended VOM Emission Limit</b>	
	<b>(g/l)</b>	<b>(lb/gal)</b>
Reinforced Plastic Composite	200	1.7
Flexible Vinyl	250	2.1
Metal	30	0.3
Porous Material (Except Wood)	120	1.0
Rubber	250	2.1
Wood	30	0.3
Other Substrates	250	2.1
<b>Specialty Adhesive Application Processes</b>		
Ceramic Tile Installation	130	1.1
Contact Adhesive	250	2.1
Cove Base Installation	150	1.3
Floor Covering Installation (Indoor)	150	1.3
Floor Covering Installation (Outdoor)	250	2.1
Floor Covering Installation (Perimeter Bonded Sheet Vinyl)	660	5.5
Metal to Urethane/Rubber Molding or Casting	850	7.1
Motor Vehicle Adhesive	250	2.1
Motor Vehicle Weatherstrip Adhesive	750	6.3
Multipurpose Construction	200	1.7
Plastic Solvent Welding (ABS)	400	3.3
Plastic Solvent Welding (Except ABS)	500	4.2
Sheet Rubber Lining Installation	850	7.1
Single-Ply Roof Membrane Installation/Repair (Except EPDM)	250	2.1
Structural Glazing	100	0.8
Thin Metal Laminating	780	100
Tire Repair	100	0.8
Waterproof Resorcinol Glue	170	1.4
<b>Adhesive Primer Application Processes</b>		
Motor Vehicle Glass Bonding Primer	900	7.5
Plastic Solvent Welding Adhesive Primer	650	5.4
Single-Ply Roof Membrane Adhesive Primer	250	2.1
Other Adhesive Primer	250	2.1

#### **4.4 Economic Reasonableness and Cost Effectiveness of Controls**

The Illinois EPA has relied upon the cost analysis conducted by the USEPA for the CTGs for miscellaneous industrial adhesives and determined that the proposed regulations are cost effective.

The USEPA used the National Emissions Inventory database to estimate the number of sources operating miscellaneous industrial adhesives application processes in non-attainment areas in the United States that meet the 15 lb per day VOM emission criteria contained in the CTGs. The USEPA estimated that there are 180 such sources in the United States, emitting an estimated 4,881 tons of VOM per year. The USEPA relied upon cost estimates from California's Ventura County Air Pollution Control District's 1993 study. This study estimated that the annualized cost for a source to convert to using low VOM adhesives was approximately \$2300 per source. The USEPA then scaled that cost estimate to 1997 dollars and estimated the cost of control to be \$3,356 per source. This estimate was based upon the assumption that sources would use the VOM limits in the proposed regulation rather than the alternative add-on control option. This assumption was made because sources in currently regulated areas have already implemented the use of these low VOM adhesives, and the reformulated products should be readily available today. Using these assumptions the USEPA estimated the cost effectiveness on a per ton basis of \$265 per ton of VOM reduced. The Illinois EPA estimates that, with 12 of the 180 affected sources nationwide, the total cost statewide for the proposed regulation will be approximately \$40,272 annually. The Illinois EPA considers these figures for cost effectiveness and total statewide cost to be reasonable for control of VOM.

A more detailed description of the USEPA's cost analyses can be found in the CTG for miscellaneous industrial adhesives<sup>3</sup>.

#### **4.5 Additional Recommendations: Work Practices**

In addition to the limits recommended in the USEPA CTG and included in the proposed regulation, the CTG also recommends work practices for miscellaneous industrial adhesives. The work practices included in the CTG address adhesive related activities and cleaning activities, and are intended to further reduce VOM emissions from the source category. The

CTG states that the emission reductions are unquantifiable, but states that the work practices will result in a net cost savings to sources in this category.

The CTG recommends that work practices for adhesive related activities include the following: (1) store all VOM-containing adhesives, adhesive primers, and process-related waste materials in closed containers; (2) ensure that mixing and storage containers used for VOM-containing adhesives, adhesive primers, and process-related waste materials are kept closed at all times, except when depositing or removing these materials; (3) minimize spills of VOM-containing adhesives, adhesive primers, and process-related waste materials; and (4) convey VOM-containing adhesives, adhesive primers, and process-related waste materials from one location to another in closed containers or pipes.

The CTG further recommends that work practices for cleaning materials should include the following: (1) store all VOM-containing cleaning materials and used shop towels in closed containers; (2) ensure that storage containers used for VOM-containing cleaning materials are kept closed at all times except when depositing or removing these materials; (3) minimize spills of VOM-containing cleaning materials; (4) convey VOM-containing cleaning materials from one location to another in closed containers or pipes; and (5) minimize VOM emission from cleaning of application, storage, mixing, and conveying equipment by ensuring that equipment cleaning is performed without atomizing the cleaning solvent and all spent solvent is captured in closed containers.

The proposed regulation includes the recommended work practices from the USEPA CTG in their entirety.

#### **4.6 Potentially Affected Sources in Illinois**

In determining the number of sources potentially affected by the proposed regulation regarding miscellaneous industrial adhesives the Illinois EPA relied upon information provided by the USEPA. This source specific information was the data that the USEPA relied upon to estimate the number of sources that would be impacted nationwide. The CTG for miscellaneous industrial adhesives states that 180 sources nationwide in non-attainment areas would be affected

by rules to implement the CTG. Of the 180 sources in the U.S., 17 sources were found to be in Illinois non-attainment areas. Of those 17 sources, 5 sources ceased operation and 12 sources were in operation in 2007. Table 4.2 lists these impacted sources and their location.

**Table 4.2 Potentially Affected Sources in Illinois**

Source ID	Name	City	County
031471ABS	DELTA-UNIBUS CORPORATION	Northlake	Cook
031015AAC	BORG WARNER TRANSMISSION SYSTEMS	Bellwood	Cook
031081ACU	TAPECOAT CO INC	Evanston	Cook
031324ACZ	TECHNICAL LAMINATIONS & COATINGS INC	Wheeling	Cook
031440AFH	UNIVERSAL CHEMICALS & COATINGS INC	Elk Grove Village	Cook
031440AFY	ACME FINISHING CO	Elk Grove Village	Cook
031096ABM	CLAD REX INC	Franklin Park	Cook
031440AKY	D & K INTERNATIONAL INC	Elk Grove Village	Cook
031600FXL	ARCHITECTURAL SPECIALTY PRODUCTS INC	Chicago	Cook
031600FPE	RS OWENS AND CO	Chicago	Cook
063060ACR	RITCHIE BROS AUCTIONEERS (AMERICA) INC	Morris	Grundy
007005AAB	PACTIV CORPORATION	Trenton	St. Claire

## **5.0 Fiberglass Boat Manufacturing Materials**

### **5.1 Description of Sources and Emissions**

The CTG addressing fiberglass boat manufacturing materials applies to sources manufacturing fiberglass hulls or decks for boats, or sources that construct molds for the manufacture of fiberglass boat hulls or decks. The CTG does not apply to sources solely manufacturing boat parts, however if a source manufactures fiberglass boat hulls and decks, the manufacture of all fiberglass boat parts at the source is covered by the CTG.

Emissions of VOM from fiberglass boat manufacture occur from the use of gel coats and resins applied to fiberglass in the manufacturing process, and from material used to clean application equipment used in the process. For a more complete description of manufacturing processes for this subcategory the reader is directed to the USEPA CTG addressing fiberglass boat manufacturing materials<sup>4</sup>.

### **5.2 Recommended Control Techniques for Fiberglass Boat Manufacturing Materials**

The USEPA in its CTG for fiberglass boat manufacturing materials has made recommendations for what it considers RACT control for the subcategory. In order to provide affected sources with a degree of flexibility in compliance measures the CTG provides three options for control. Much like the proposed regulation for miscellaneous metal and plastic parts coatings, these options include use of compliant low VOM coatings, an emission averaging option, and an overall control efficiency option. The USEPA recommends that States include all three options in their determination of RACT for the subcategory. Illinois EPA has included all three options in the proposed regulation.

It should be noted that for the fiberglass boat manufacturing materials subcategory that the control measures are intended to reduce emissions of monomer VOM. The CTG describes monomer VOM as such:

*A monomer is a volatile organic compound that partially combines with itself, or other similar compounds, by a cross-linking reaction to become a part of the cured resin. A fraction of each monomer compound evaporates during resin and gel coat application and curing. Not all of the styrene and MMA evaporate,*

*because a majority of these compounds are bound in the cross-linking reaction between polymer molecules in the hardened resin or gel coat and become part of the finished product.*<sup>4</sup>

Styrene and methyl methacrylate (“MMA”) are the primary monomer VOMs used in gel coats and resins for the manufacture of fiberglass boats. Non-monomer VOM is generally less than 5% of a resin or gel coat formulation. The proposed regulation does not limit non-monomer VOM directly, however, if a product is found to contain greater than 5% non-monomer VOM, the percentage exceeding 5% will be added to the monomer VOM content of a product for the purposes of compliance.

There are a number of methods to reduce monomer VOM emissions from fiberglass boat manufacturing material. Many of these methods are similar to the emission reduction measures for the other categories in the proposed regulation such as lower monomer VOM materials, add-on capture and control equipment, and recommended work practices. Other control options are specific to this category and include the use of vapor suppressed resins and gel coats, the use of non-atomizing resin application, and various closed molding techniques. These control methods are discussed at length in the USEPA CTG for fiberglass boat manufacturing materials<sup>4</sup>.

### **5.2.1 Use of Low Monomer VOM Manufacturing Materials**

The USEPA CTG recommends a compliance option for sources using low monomer VOM resins and gel coats. A source may meet the requirements by using low monomer VOM products that meet the emission limits given for each material used in a given operation, or the VOM content for all materials used in a covered operation can be averaged on a weight-adjusted basis<sup>4</sup>. Table 5.1 lists the monomer VOM content limits based upon the material type and the application method used.

The applicable recommended limits in Table 5.1 above would be considered met if all materials of a certain type meet the applicable monomer VOM content limit for a specific application method on a weighted-average basis. The weighted-average monomer VOM content would be determined based on a 12-month rolling average.

**Table 5.1 Compliant Materials Monomer VOM Content Recommendations for Open Molding Resin and Gel Coat**

Material	Application Method	Weighted Average Monomer VOM Content (weight percent)
Production Resin	Atomized (spray)	28
Production Resin	Non-atomized	35
Pigmented Gel Coat	Any method	33
Clear Gel Coat	Any method	48
Tooling Resin	Atomized	30
Tooling Resin	Non-atomized	39
Tooling Gel Coat	Any method	40

A source would use Equation 1 to determine weighted-average monomer VOM content for a particular open molding resin or gel coat material<sup>4</sup>.

**Equation 1:**

$$\text{Weighted Average Monomer VOM Content} = \frac{\sum_{i=1}^n (M_i VOM_i)}{\sum_{i=1}^n (M_i)}$$

Where:

$M_i$  = Mass of open molding resin or gel coat,  $i$ , used in the past 12 month in an operation, in megagrams.

$VOM_i$  = Monomer VOM content, by weight percent, of open molding resin or gel coat,  $i$ , used in the past 12 months in an operation.

$n$  = Number of different open molding resins or gel coats used in the past 12 months in an operation.

**5.2.2 Emissions Averaging Option**

The second compliance option from the USEPA CTG involves averaging the monomer VOM emissions for all operations that a source chooses to include in an averaging group. Emission limits from other operations at a source could be met by the compliance options detailed in Sections 5.2.1 or 5.2.3. The monomer VOM emission limit for operations for which a source chooses to use the averaging option is a source-specific monomer VOM limit determined by



Equation 2. The numerical coefficients on the right side of Equation 2 are the allowable monomer VOM emission rates for each material in units of kilograms per megagram.

**Equation 2:**

$$\text{Monomer VOM Limit} = 46(M_R) + 159(M_{PG}) + 291(M_{CG}) + 54(M_{TR}) + 214(M_{TG})$$

Where:

*Monomer VOM Content* = Total allowable monomer VOM that can be emitted from the open molding operations included in the average, kilograms per 12-month period.

$M_R$  = Mass of production resin used in the past 12 months, excluding any materials that are exempt, megagrams.

$M_{PG}$  = Mass of pigmented gel coat used in the past 12 months, excluding any materials that are exempt, megagrams.

$M_{CG}$  = Mass of clear gel coat used in the past 12 months, excluding any materials that are exempt, megagrams.

$M_{TR}$  = Mass of tooling resin used in the past 12 months, excluding any materials that are exempt, megagrams.

$M_{TG}$  = Mass of tooling gel coat used in the past 12 months, excluding any materials that are exempt, megagrams.

After a monomer VOM limit for a source's averaged operations has been determined using Equation 2, an emission average is determined on a 12 month rolling-average basis and calculated at the end of each month. At the end of the first 12 month period, and at the end of each subsequent month, the monomer VOM emissions from the source's averaged operations are calculated, using Equation 3, to determine whether these emissions exceed the source's limit.

**Equation 3:**

$$\text{Monomer VOM Emissions} = (PV_R)(M_R) + (PV_{PG})(M_{PG}) + (PV_{CG})(M_{CG}) + (PV_{TR})(M_{TR}) + (PV_{TG})(M_{TG})$$

Where:

*Monomer VOM emissions* = Monomer VOM emissions calculated using the monomer VOM emission equations for each operation included in the average, kilograms.

$PV_R$  = Weighted-average monomer VOM emission rate for production resin used in the past 12 months, kilograms per megagram.

$M_R$  = Mass of production resin used in the past 12 months, megagrams.

$PV_{PG}$  = Weighted-average monomer VOM emission rate for pigmented gel coat used in the past 12 months, kilograms per megagram.

$M_{PG}$  = Mass of pigmented gel coat used in the past 12 months, megagrams.

$PV_{CG}$  = Weighted-average monomer VOM emission rate for clear gel coat used in the past 12 months, kilograms per megagram.

$M_{CG}$  = Mass of clear gel coat used in the past 12 months, megagrams.

$PV_{TR}$  = Weighted-average monomer VOM emission rate for tooling resin used in the past 12 months, kilograms per megagram.

$M_{TR}$  = Mass of tooling resin used in the past 12 months, megagrams.

$PV_{TG}$  = Weighted-average monomer VOM emission rate for tooling gel coat used in the past 12 months, kilograms per megagram.

$M_{TG}$  = Mass of tooling gel coat used in the past 12 months, megagrams.

Equation 4 is used to calculate the weighted average monomer VOM emission rate over the previous 12 month period ( $PV_{OP}$ ) for each operation being averaged in Equation 3.

**Equation 4:**

$$PV_{OP} = \frac{\sum_{i=1}^n (M_i PV_i)}{\sum_{i=1}^n (M_i)}$$

Where:

$PV_{OP}$  = Weighted-average monomer VOM emission rate for each open molding operation (PVR, PVPG, PVCG, PVTR, and PVTG) included in the average, kilograms of monomer VOM per megagram of material applied.

$M_i$  = Mass of resin or gel coat,  $i$ , used within an operation in the past 12 months, megagrams.

$n$  = Number of different open molding resins and gel coats used within an operation in the past 12 months.

$PV_i$  = The monomer VOM emission rate for resin or gel coat,  $i$ , used within an operation in the past 12 months, kilograms of monomer VOM per megagram of material applied. Use the equations in Table 4 to compute  $PV_i$ .

The monomer VOM emission rates for the specific materials and application methods are given in Table 5.2.

**Table 5.2 Monomer VOM Emission Rate Formulas for Open Molding Operations**

Material	Application Method	Formula to Calculate Monomer VOM Emission Rate
Production Resin, Tooling Resin	Atomized	$0.014 \times (\text{Resin VOM}\%)^{2.425}$
	Atomized, plus vacuum bagging with roll-out	$0.01185 \times (\text{Resin VOM}\%)^{2.425}$
	Atomized, plus vacuum bagging without roll-out	$0.00945 \times (\text{Resin VOM}\%)^{2.425}$
	Nonatomized	$0.014 \times (\text{Resin VOM}\%)^{2.275}$
	Nonatomized, plus vacuum bagging with roll-out	$0.0110 \times (\text{Resin VOM}\%)^{2.275}$
	Nonatomized, plus vacuum bagging without roll-out	$0.0076 \times (\text{Resin VOM}\%)^{2.275}$
Pigmented Gel Coat, Clear Gel Coat, Tooling Gel Coat	All methods	$0.445 \times (\text{Gel coat VOM}\%)^{1.675}$

### 5.2.3 Add-on Controls

In the case that performance requirements or other aspects of an operation require the use of materials that do not meet the monomer VOM emission limits, a source may opt to use add-on control equipment to reduce VOM emissions to below the limit determined by Equation 2. A

source would be considered to be compliant if measured emissions at the outlet of a control device were less than the applicable emission limit for that operation.

### **5.3 Technical Feasibility of Controls**

The Illinois EPA concurs with USEPA's RACT determination in the CTG addressing fiberglass boat manufacturing materials. Illinois EPA also concurs with the determination that the recommendations of the CTG are technically feasible because these recommended control measures are merely based on controls currently in place at affected sources due to the aforementioned 2001 NESHAP. It is also assumed that any source that intended to commence operation of a source in this category in an Illinois non-attainment area would necessarily consider the proposed regulation in the planning of source operations, and that the proposed controls would be technically feasible for any new source.

### **5.4 Economic Reasonableness and Cost Effectiveness of Controls**

Because there are currently no sources in Illinois that will be affected by the proposed regulation of this source category, there will be no associated economic impact for sources in Illinois. The CTG states that the USEPA expects sources in this category will incur little if any increased costs due to the control recommendations. The Illinois EPA considers the controls to be technically feasible and concurs with the USEPA determination of the economic reasonableness of the measures.

### **5.5 Additional Recommendations: Work Practices**

In addition to the monomer VOM limits recommended in the USEPA CTG and included in the proposed regulation, the CTG also recommends work practices for fiberglass boat manufacturing materials. The work practices included in the CTG address work practices for resin and gel coat mixing containers and for cleaning activities, and are intended to further reduce VOM emissions from the source category. The CTG states that the emission reductions are unquantifiable, but are beneficial in reducing overall emissions at a source in this category.

For resin and gel coat mixing containers, the CTG recommends that all containers with a capacity of 55 gallons or greater should have a cover with no visible gaps in place at all times.

This does not apply to containers smaller than 55 gallons, or when material is being manually added or removed from a container.

The USEPA CTG further recommends the use of low-VOM and low vapor pressure cleaning materials. It is recommended that VOM cleaning solvents should contain no more than 5% VOM by weight, or have a composite vapor pressure of no more than 0.50 mm Hg at 68 °F.

The proposed regulation includes the recommended work practices from the USEPA CTG in their entirety.

## References

1. Control Techniques Guidelines for Miscellaneous Metal and Plastic Parts Coatings, U.S. Environmental Protection Agency Office of Air Quality Planning and Standards Sector Policies and Programs Division Research Triangle Park, NC, September 2008.
2. Control Techniques Guidelines for Automobile and Light-Duty Truck Assembly Coatings, U.S. Environmental Protection Agency Office of Air Quality Planning and Standards Sector Policies and Programs Division Research Triangle Park, NC, September 2008.
3. Control Techniques Guidelines for Miscellaneous Industrial Adhesives, U.S. Environmental Protection Agency Office of Air Quality Planning and Standards Sector Policies and Programs Division Research Triangle Park, NC, September 2008.
4. Control Techniques Guidelines for Fiberglass Boat Manufacturing Materials, U.S. Environmental Protection Agency Office of Air Quality Planning and Standards Sector Policies and Programs Division Research Triangle Park, NC, September 2008.
5. Consumer and Commercial Products, Group IV: Control Techniques Guidelines in Lieu of Regulations for Miscellaneous Metal Products Coatings, Plastic Parts Coatings, Auto and Light-Duty Truck Assembly Coatings, Fiberglass Boat Manufacturing Materials, and Miscellaneous Industrial Adhesives, 73 FR 58481-58491, October 7, 2008.
6. National Emission Standards for Hazardous Air Pollutants: Surface Coating of Automobiles and Light-Duty Trucks; National Emission Standards for Hazardous Air Pollutants for Surface Coating of Plastic Parts and Products, 72 FR 20227-20237, April 24, 2007.