TECHNICAL SUPPORT DOCUMENT
FOR
CONTROLLING VOM EMISSIONS
FROM
LITHOGRAPHIC PRINTING, LETTERPRESS PRINTING, FLEXIBLE PACKAGE PRINTING, FLAT WOOD PANELING COATING, AND INDUSTRIAL CLEANING OPERATIONS

DIVISION OF AIR POLLUTION CONTROL
BUREAU OF AIR
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
SPRINGFIELD, IL 62702

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1.0 INTRODUCTION

Section 172 of the Clean Air Act (CAA) requires that state implementation plans (SIPs) for nonattainment areas, such as the Chicago and Metro-East St. Louis nonattainment areas (NAAs) in Illinois, must include requirements for "reasonably available control technology" (RACT) as it applies to emissions sources.[1] The Chicago NAA currently includes the entire counties of Cook, DuPage, Kane, Lake, McHenry, and Will, as well as Aux Sable and Goose Lake Townships in Grundy County, and Oswego Township in Kendall county. Madison, Monroe, St. Clair, and Jersey counties are part of the ozone NAA in the St. Louis/Metro-East geographic location.

In March 2008, the United States Environmental Protection Agency (USEPA) strengthened the eight-hour ozone standard. It is likely that the same areas in Illinois that are currently designated as nonattainment for the present standards will soon be designated as nonattainment for this revised standard. Reducing VOM emissions in these areas will likely help Illinois achieve the newly revised NAAQS as well as satisfy CAA obligations.

USEPA is expected to finalize the nonattainment designations in 2010, initiating a new cycle of planning and regulatory development. Obviously, such planning has not occurred yet, so it is not possible to identify specific emission reduction measures needed to attain these standards. However, VOM emission reductions will improve ozone air quality, which will help to meet the new standards and should help to address any future requirements to implement RACT for the new standards.

Section 182(b)(2)(A) of the CAA further requires that SIPs be revised to include RACT for volatile organic material (VOM) emissions sources that are covered by a control techniques guideline (CTG) document issued by USEPA after November 15, 1990, and before the area's date of attainment.

The USEPA defines RACT as "the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility." (44 FR 53761, September 17, 1979.) In developing the CTGs for the categories covered by this Technical Support Document (TSD), USEPA evaluated the sources of VOM emissions from the applicable industries, the available control possibilities to address the associated emissions, and the cost of such control measures.

Emissions of VOM result from various points in the processes covered by this TSD. These VOM emissions react with other pollutants in the atmosphere, such as oxides of nitrogen (NOx) and carbon monoxide (CO), to form ozone. Ozone formation is most active during the summer months because the chemical reactions involved rely on direct sunlight and high ambient temperatures. Ozone

is a powerful oxidant, and as such reacts readily with a wide range of substances. In humans, ozone irritates the respiratory system and reduces lung function. Laboratory studies suggest that it may damage lung and other tissue. There is concern that this damage can impair breathing and reduce immunity to disease for people in good health, and the effect may be more severe for people with pre-existing respiratory diseases. Ozone oxidation can also impair plant tissue and reduce the yield of some crops, as well as damage materials such as rubber products.

This TSD presents the rationale, documentation, and methodology relied upon to technically justify the Illinois EPA's proposed regulatory changes to control VOM emissions from the categories known collectively as the Consumer and Commercial Products, Group II, which includes lithographic printing, letterpress printing, flexible packaging printing, flat wood paneling coating, and industrial cleaning solvents.

To assist in evaluating the potential for implementing new emission standards for Illinois sources, the Illinois Environmental Protection Agency (Illinois EPA) reviewed and evaluated the USEPA CTGs, as well as other available information, including regulations in other states and those already existing within Illinois. In addition, Illinois EPA staff held conversations with staff from USEPA and other states, as well as with representatives from various industry groups. Based on this information, the Illinois EPA determined the applicability thresholds for application of controls and is recommending appropriate control measures. This TSD is based on the aforementioned documents and addresses the technological feasibility and economic reasonableness of implementing new standards for lithographic printing, letterpress printing, flexible package printing, flat wood paneling coating, and industrial cleaning processes.

2.0 PROCESS DESCRIPTION AND SOURCES OF EMISSIONS

2.1 Lithographic Printing

Offset lithographic printing has a broad range of applications, including books, magazines, periodicals, labels and wrappers, catalogs and directories, financial and legal documents, business forms, advertising materials, newspapers, newspaper inserts, charts and maps, calendars, tickets and coupons, greeting cards, and stamps.

None of the above applications are exclusive to offset printing; other modes of printing in the graphic arts industry can produce items such as those mentioned above. However, the newspaper industry uses offset lithography predominantly, with over 70 percent of all newspapers in the United States printed by this method.

Lithography is a planographic method of printing; that is, the printing and nonprinting areas are essentially in the same plane on the surface of a thin metal "lithographic" plate. The distinction between the areas is maintained chemically; when the lithographic plate is made, the image area is rendered water repellent, and the nonimage area is rendered water receptive.

In offset lithographic printing, ink is transferred from the lithographic plate to a rubber-covered "intermediate," or "blanket," cylinder and then to the substrate. Transfer of the ink from the lithographic plate to the blanket cylinder, rather than directly to the substrate, is the offset characteristic of this type of printing.

A printing press is made up of a number of printing units. Printing units are available that print both sides of the substrate at the same time (a process known as perfecting), as well as only one side (known as nonperfecting).

Offset lithographic printing is also characterized by the form in which the material to be printed on – the substrate – is fed to the press. In sheet-fed printing, individual sheets of paper or other substrate are fed to the press. In web printing, continuous rolls of paper are fed to the press and the paper is cut to size after it is printed.

Lithographic inks are composed of pigments, vehicles, binders, and other additives. The pigments provide the desired color and are composed of organic and inorganic materials. Lithographic inks may be heatset, where heat is required to set the ink, or non-heatset, where the inks are set by absorption into the substrate by oxidation or other methods not requiring added heat. Heatset inks may contain up to 45 percent VOMs. Non-heatset inks have higher boiling points than heatset inks and are less pasty. They usually contain less than 35 percent VOMs. Most non-heatset inks used in sheet-fed printing are below 25 percent VOM.

A fountain solution is applied to the lithographic plate to render the nonimage areas unreceptive to ink. Since printing inks are oil-based and oil is repelled by water, the fountain solution is water-based. The fountain solution contains small quantities of gum arabic or synthetic resins, acids, and buffer salts to maintain the pH of the solution, and a wetting agent or "dampening aid" to enhance the spreadability of the fountain solution across the print plate. The role of the dampening aid is to reduce the surface tension of water as well as increase viscosity.

Isopropyl alcohol (IPA), a VOM, had been used as the primary dampening aid since the 1950s. Ethanol and normal propyl alcohol have also been used in this capacity. Before the 1980s, concentration of alcohol in the fountain solution could range from 0 to 35 percent or higher, with most presses using between 15 and 20 percent. However, in more recent years, printers have significantly reduced

fountain solution alcohol contents and often replaced alcohol completely with other dampening aids. Indeed, current Illinois rules for heatset web presses in the NAAs require that subject sources use no more than 1.6 percent alcohol, or 3 percent if the fountain solution is refrigerated; fountain solutions using only alcohol substitutes may use up to 5 percent VOM. Non-heatset web presses cannot use any alcohol and are subject to the same 5 percent VOM limit. Sheet-fed presses are limited to 5 percent VOM content or 8.5 percent if the fountain solution is refrigerated.

Cleaning solutions are used to remove excess printing inks, oils, and paper components from press equipment. The solutions are petroleum-based solvents, often mixed with detergent and/or water. The cleaning compound may be a single solvent, such as kerosene, or a combination of solvents. Cleaning solutions are used to wash the blankets, the rollers, the outside of the presses, and to remove excess ink residue between color changes. Some cleaning is done automatically, while other cleaning is done manually.

2.2 Letterpress Printing

Letterpress printing involves the use of a reverse-imaged raised surface that is inked and then pressed against a substrate to transfer the image. Letterpress operations make up a very small percentage of the printing industry compared to other types of printing (lithographic, flexographic, rotogravure). Indeed, according to information from the Illinois EPA's source inventory, no letterpress printing facility could be found in the Metro-East NAA, with very few of these facilities found even in the Chicago NAA.

Letterpress inks and lithographic inks are very similar, and letterpress operations also may be accomplished through sheet-fed and web presses. Thus, ink emission sources are similar to those described above for lithographic printing.

Letterpress operations do not use fountain solutions, but the cleaning solutions are once again similar to those used in lithographic printing operations.

2.3 Flexible Package Printing

The existing regulations found in Sections 218/219.401-404 currently cover all rotogravure and flexographic printing. The modifications being proposed in this rulemaking cover both types of printing, but only as they apply to flexible packaging. Flexible packaging means any package or part of a package, the shape of which can be readily changed. Flexible packaging includes, but is not limited to, bags, pouches, liners, and wraps utilizing paper, plastic, film, aluminum foil, metalized or coated paper or film, or any combination of these materials. Shrink-wrap labels or wrappers (but not self-adhesive labels) printed on or in-line with a flexible packaging printing press are also considered to be flexible packaging.

Flexible packaging does not include folding cartons, gift wraps, hot stamp foils, wall coverings, vinyl products, decorative laminates, floor coverings, or tissue products.

Rotogravure printing uses an image etched or engraved into a plate or cylinder. Inks, coatings, and adhesives may be applied to a substrate through the rotogravure process.

Flexographic printing has an image raised above the level of the printing plate, with the image carrier made of rubber or other flexible material. Flexographic printing is better suited to short production runs, in contrast to rotogravure printing, which is more useful for long runs.

VOM emissions for both types of printing originate from the drying of inks as well as solvents used to clean presses and other components.

According to the CTG for Flexible Package Printing, the use of waterbased inks is increasing. However, USEPA also noted, "Many facilities use hundreds of different inks to print various custom colors required by their packaging customers. Low [VOM] inks, coatings, and adhesives may not be available to meet all of the performance requirements."[3]

As such, most VOM control for flexible package printing is achieved through the use of add-on control devices. In these processes, most of the solvent is captured through evaporation in a dryer, along with hoods and other collection devices for solvent that evaporates elsewhere in the printing process. Older presses frequently do not allow for the same level of capture as newer installations do, but the CTG notes, "There have been significant improvements in capture efficiency of flexographic presses and rotogravure presses" since the last time USEPA reviewed those types of operations. It continues, "Since 1990, many vendors have guaranteed capture efficiency of 85 to 90 percent without use of a permanent total enclosure." Control devices, which destroy or recover the captured solvents, "can achieve at least 95 percent control," according to USEPA.[3]

USEPA's recommended approach to reducing VOM emissions from flexible package printing cleaning materials focuses on work practices, "such as keeping solvent containers closed except when filling, draining or conducting cleaning operations, keeping used shop towels in closed containers, and conveying cleaning materials from one location to another in closed containers or pipes."[3]

2.4 Industrial Cleaning Solvents

The industrial cleaning solvents category encompasses many products and cleaning styles that are used to clean dirt, soil, oil, and grease as well as remove adhesives, paints, and inks. Studies done by USEPA on six focus industries

(automotive, electrical equipment, magnetic tape, furniture, packaging, and photographic supplies) identified nine main areas where emissions of VOM occurred during cleaning processes. These nine cleaning categories are spray gun cleaning, spray booth cleaning, large manufactured components cleaning, parts cleaning, equipment cleaning, line cleaning, floor cleaning, tank cleaning, and small manufactured components cleaning. The majority of VOM emissions were released during the first four types of operations, especially the spray gun cleaning, which made up 50 percent of emissions by itself. However, it should be noted that while the CTG focused on these specific areas, it recommends coverage of a wide range of cleaning activities and the proposed industrial cleaning regulation follows that recommendation.

VOM emissions occur during the cleaning process while wiping, flushing, brushing, and from the storage and disposal of used solvents and rags. General cleaning of offices, bathrooms, and other janitorial type services are not covered by this proposed regulation.

2.5 Flat Wood Paneling Coating

According to the CTG for Flat Wood Paneling Coatings, "Flat wood paneling products are used in construction and can be classified as three main product types: decorative interior panels, exterior siding, and tileboard." [5]

Decorative interior panels are often embossed and usually grooved, having more decorative coating requirements than many other products. Substrates include hardwood, plywood, medium density fiberboard, and particle board.

Exterior siding may be coated at the production facility or on-site (the latter is not subject to this proposed regulation). Exterior trim is also generally manufactured at the same production facility and coated with the same coatings. Substrates include solid wood, hardboard, and waferboard.

Tileboard is used in high-moisture areas such as kitchens and bathrooms, and is considered a premium interior wall paneling. Tileboard meets the specifications for Class I hardboard according to the American National Standards Institute.

Flat wood paneling products are coated to provide protection from the environment, modify the surface, and present a desired appearance.

According to the CTG for Flat Wood Paneling Coatings, "A typical flat wood coating facility applies stains and varnishes to natural plywood panels used for wall coverings. Other plants print wood grain patterns on particle board panels that were first undercoated with an opaque coating to mask the original surface. Coatings applied to flat wood paneling include fillers, sealers, 'groove' coats, primers, stains, basecoats, inks and topcoats. Most coatings are applied by direct

roll coating. Filler is usually applied by reverse roll coating. The offset rotogravure process is used where the coating and printing operation requires precision printing techniques. Other coating methods include spray techniques, brush coating and curtain coating. A typical flat wood paneling coating line includes a succession of coating operations. Each individual operation consists of the application of one or more coatings followed by a heated oven to cure the coatings. A typical production line begins with mechanical alterations of the substrate (filling of holes, cutting of grooves, sanding, etc.), followed by the coating operations, and packaging/stacking for shipment."[5]

VOM emissions occur primarily during the coating process as the coatings dry and cure, but also as coatings are applied, and during mixing before application.

3.0 TECHNICAL FEASIBILITY OF CONTROLS

CTGs for each of these categories were published by the USEPA in September 2006. Each of the CTGs contain information about add-on controls, process modifications, work practices, and material reformulation and substitution that can be used to accomplish the necessary emission reductions. The Illinois EPA depended on the CTGs, as well as discussions with other states and industry, in developing and implementing the proposed regulations.

3.1 Lithographic Printing

Add-On Controls

Add-on control devices are applicable only to heatset web offset lithographic printing, not non-heatset or sheet-fed lithographic printing, and can be grouped into two broad categories: combustion control devices (destructive) and recovery devices (nondestructive). Combustion control devices are designed to destroy VOMs in the vent stream prior to atmospheric discharge; recovery devices limit VOM emissions by recovering material for reuse.

The heatset web offset lithographic printing industry employs three basic add-on control devices: (1) thermal afterburners, (2) catalytic afterburners, and (3) condenser filter systems. The experience of the Illinois EPA indicates that the field is dominated by thermal and catalytic afterburners, which can often achieve 98 percent or greater VOM removal.

The condenser filter systems currently in use have been designed specifically for the heatset web offset printing industry. Condenser filter systems can achieve as high as 97 percent VOM removal efficiency, with 90 percent being easily achievable for older systems.

Fountain Solution Reformulation and Process Modifications

A significant portion of VOM emissions from lithographic printing can be ascribed to evaporation from fountain solutions. Alcohol substitutes have been in use for over 20 years to replace or minimize the amount of alcohol used in a fountain solution. These substitutes have lower volatility than alcohol and thus reduce emissions.

Process modifications are changes in operational methods or equipment resulting in improved VOM control. Such modifications may involve retrofitting existing equipment or replacing older equipment with new technology to accommodate the process change. However, the Illinois EPA does not expect retrofitting or replacement to be an issue with this rulemaking.

Cooling a fountain solution is one process modification that reduces VOM emissions from the fountain solution by minimizing evaporation. Refrigerated circulators can cool the fountain solution to a temperature that usually ranges between 55 and 60°F. Refrigeration has been shown to reduce consumption of alcohol in the solution by as much as 44 percent.

Material Reformulation or Substitution for Cleaning Solutions

As with fountain solutions, cleaning solutions can also be a significant source of VOM emissions from the overall lithographic printing process. To reduce these emissions, cleaning solutions may be reformulated in one of two ways. Solutions containing a smaller amount of VOM may be used. The current Illinois rule limits such solutions to no more than 30 percent VOM. While no problems with this limit have been reported to Agency personnel in Illinois, there have apparently been complaints on a national level. As such, the CTG now recommends limiting such solutions to 70 percent VOM.[2] The Illinois EPA's proposed regulation contains this higher limit for sources between 15 and 100 pounds per day (PPD), with the previous limit remaining in effect for larger sources.

In addition, an alternative to low-VOM cleaning materials are solutions with a low vapor pressure. The CTG notes, "Cleaning materials with [VOM] composite vapor pressure less than 10 millimeters of mercury (mm Hg) at 20°C have been used successfully by many printers for blanket washing and other cleaning activities."[2] It was determined by USEPA prior to Illinois' promulgation of the previous lithographic printing rule that the use of cleaning materials with a VOM composite vapor pressure less than 10 mm Hg at 20°C would result in a comparable emission reduction to using cleaning materials that contain less than 30 weight percent VOM. Once again, the Agency believes that currently-subject sources are using materials that meet this limit without problems. As such, this limit is not being changed; it will just apply to smaller sources as well.

3.2 Letterpress Printing

Letterpress emission sources are similar to those for lithographic printing, with the exception that letterpress operations do not use a fountain solution. In addition, letterpress printing presses are often operated at the same source as lithographic printing and many of the control options for letterpress printing are the same as the control options for lithographic printing as well. This is especially true in terms of cleaning solutions, though. Because letterpress operations have never been specifically regulated in Illinois before, the Agency is proposing to use the 70 percent VOM content limit for all subject letterpress units. It is the Agency's belief, supported by conversations with industry representatives, that Illinois does not currently contain any heatset web letterpress operations in either the Chicago or Metro-East NAA, but the regulation is necessary and technically feasible should a new such operation locate into one of the NAAs.

3.3 Flexible Packaging Printing

Similar to the types of printing discussed above, the two main sources of VOM emissions from flexible package printing are the evaporation of inks, coatings, and adhesives, as well as the use of cleaning materials. These VOM emissions may be controlled by material reformulation or, especially in the case of ink emissions, through the use of add-on controls.

Material Reformulation

This approach, similar to that described above, focuses on the substitution of low-VOM inks, coatings, and adhesives. According to the CTG, such reformulation "has been achieved by many facilities in the packaging rotogravure and flexographic printing industries."[3] Whether a particular facility is able to use such reformulated materials depends upon their specific activities, including the substrate(s) being used.

Add-On Controls

Add-on controls, however, may be used by all such printers. The most common control devices used by these sources are thermal oxidizers, catalytic oxidizers, and carbon adsorbers, with adsorbers probably being the least-used of the three. As the CTG notes, "Today, these control devices can achieve at least 95 percent control device efficiency."[3]

Capture systems have evolved over the years. These systems collect the VOM-containing air so it may be destroyed or reclaimed by the control device described above. While new presses may be able to obtain as high as 100 percent capture if designed properly, older presses were not necessarily constructed with emissions

capture in mind. As such, the Agency is proposing a tiered approach to capture and control in this rulemaking.

Work Practices for Cleaning Materials

The CTG recommends work practice requirements as the best means to control emissions from cleaning operations at flexible package printing sources. In particular, the document says these practices should include "keeping solvent containers closed except when filling, draining or conducting cleaning operations, keeping used shop towels in closed containers, and conveying cleaning materials from one location to another in closed containers or pipes."[3]

3.4 Industrial Cleaning Solvents

The industrial cleaning solvents proposed regulation covers a wide range of products that remove contaminants from parts, products, tools, machinery, and other work production areas. The nine main cleaning categories mentioned in Section 2.4, above, use a multitude of different solvents with different styles of applications. VOM emission reductions can be attained by work practices, solvent substitution, and controls.

The CTG recommends that sources exceeding 15 lbs/day of VOM emissions from the cleaning category must comply with the following requirements.[4] The proposed regulation follows this suggestion.

Work Practices

Reductions can be obtained through solvent management practices. General work practices include keeping solvent containers and used applicators covered; properly storing and disposing of spent solvents and used cleaning rags; minimizing air circulation around all cleaning operations; and implementing equipment practices that reduce emissions, e.g., leak detection and repair practices.

VOM Content Limits

Solvent substitution to a low-VOM or no-VOM solvent can also reduce emissions. The CTG recommends a content limit of 50 grams VOM per liter (0.42 lb/gal) of cleaning material for those industries that are not already covered, or to be covered, by a CTG, as listed in Section 218.187(a)(2)(B).[4] However, discussions with industry, other states, and USEPA led to the addition of a number of exemptions and higher VOM content limits for certain specific cleaning activities.

Higher limits have been considered for categories that may not be able to easily meet this limit, based on recommendations from industry as well as from other states. These higher limits are outlined within the rule.

Alternate Vapor Pressure Limit

Low vapor pressure solvents are also recommended since the slower evaporation reduces the amount of VOM released into the atmosphere. The CTG recommends that a limit of 8 mm Hg at 20 degrees Celsius be allowed in place of the 50 gram VOM per liter of cleaning material, and the proposed regulation follows this recommendation.

Alternate Control

Emissions can also be reduced by add-on controls, modifying equipment, or changing the method of cleaning. The CTG recommends an overall control efficiency of 85 percent reduction in emissions of VOM, which is reflected in the proposed rule.

Exclusions

As noted above, the CTG suggests excluding certain categories from the cleaning regulations, as these categories already have or will have their own recommended work practices and limitations. These categories include coating operations for aerospace, wood furniture, flat wood paneling, large appliance, metal furniture, plastic parts, paper film and foil, miscellaneous metal parts, auto and light-duty truck assembly, and shipbuilding and repair; flexible packaging printing materials; lithographic printing materials; letterpress printing materials; fiberglass boat manufacturing materials; and miscellaneous industrial adhesives.

Other categories with specific exemptions have also been suggested by the CTG as well as by discussions with industry groups. These include electrical and electronic components; precision optics; numismatic dies; stripping of cured inks, coatings, and adhesives; cleaning of resin, coating, ink, and adhesive mixing, molding, and application equipment; research and development laboratories; medical device or pharmaceutical manufacturing; and performance or quality assurance testing of coatings, inks, or adhesives.

Further exclusion recommendations include cleaning of paper-based gaskets and clutch assemblies; cleaning of adhesive application equipment used for thin metal laminating; touch-up cleaning on circuit boards; cleaning of coating and adhesive application processes utilized to manufacture transdermal drug delivery product using less than three gallons per day of ethyl acetate; cleaning of application equipment used to apply coatings on satellites and radiation effect coatings; cleaning of application equipment used to apply solvent-borne fluoropolymer

coatings; cleaning of ultraviolet or electron beam adhesive application; and cleaning of electrical cables.

3.5 Flat Wood Paneling Coatings

Flat wood paneling coating, like other forms of industrial coating, provides two options for controlling VOM emissions: reformulation or add-on controls.

Material Reformulation

Reformulation would entail sources changing from high-VOM coatings to low-VOM materials. According to the CTG, low-VOM, water-based coatings "are generally available" and "can lower [VOM] emissions greatly, and most coatings operations are capable of converting to waterborne coatings."[5]

Another option for reformulation is the use of coatings that emit almost zero VOM and are cured through the use of ultraviolet light or an electron beam. The use of such systems are more limited than those for waterbased coatings, but they are available.

Add-On Controls

Add-on controls for flat wood paneling coating can be used when the source needs, or chooses, to use high-VOM coatings. The CTG notes, "Currently, an overall control and capture efficiency of 90 percent is a widely-accepted and readily available technique."[5] Illinois EPA agrees, based on its experience with a variety of coating operations.

Work Practices for Coatings and Cleaning Materials

The CTG recommends specific work practice requirements for flat wood paneling coating operations: "storing all [VOM] coatings, thinners, and cleaning materials in close containers, minimizing spills of [VOM] containing coatings, thinners, cleaning up spills immediately, conveying any coatings, thinners, and cleaning materials in closed containers or pipes, closing mixing vessels which contain [VOM] coatings and other materials except when specifically in use, and minimizing emissions of [VOM] during cleaning of storage, mixing, and conveying equipment."[5]

Some of these requirements are already in place within Illinois regulations for wood furniture coaters. Under the Agency's proposal, these will apply to flat wood paneling coaters as well, and other specific requirements listed above will apply as well. These will minimize unnecessary VOM emissions from such operations.

4.0 ECONOMIC REASONABLENESS

4.1 Lithographic Printing

The largest cost factor for lithographic printing – add-on control devices – is applicable to heatset web lithographic operations only. Since the Agency's proposal does not increase the number of sources for which this requirement is applicable, there is no foreseen additional cost due to add-on controls for existing sources. New sources will need to achieve a higher control efficiency, but since new add-on control devices would already be expected to achieve that efficiency, no additional cost is expected for this reason either.

Fountain solution and cleaning solution reformulation costs could occur for newly-regulated sources between 15 and 100 PPD of emissions under this proposal. USEPA estimated the cost for cleaning material reformulation at $855 per ton of VOM removed (in 2005 dollars).[2]

For fountain solutions, USEPA actually estimated a cost savings due to a reduction in the use of alcohol. While they did not provide a specific value for the savings, the TSD for the Illinois lithographic printing rule in 1994 put this savings at $920 per ton (while alcohol substitutes are more expensive, the cost is reduced because they are used in lower quantities).[6]

4.2 Letterpress Printing

As previously noted, letterpress printing shares a great deal in common with lithographic printing when it comes to emissions and the applicable controls. As the CTG notes, "Because of the similarities between offset lithographic printing and letterpress printing in terms of the nature of the processes at issue, the sources of [VOM] emissions and available control approaches, it is reasonable to assume that the cost-effectiveness estimates ... for control of [VOM] from heatset inks and control of [VOM] from cleaning materials apply equally to the letterpress printing industry."[2]

The difference is that there is not currently a regulation for heatset web letterpress printing operations in Illinois. As such, the reasoning behind the zero cost estimate for heatset web lithographic printing cannot be used for letterpress operations. Thus, referring to the CTG, USEPA's cost estimate is $2,010 per ton of VOM removed (in 2005 dollars). However, as noted earlier, the Agency believes that the Illinois NAAs do not currently contain any heatset web letterpress operations.

4.3 Flexible Packaging Printing

According to the CTG, "Many facilities located in ozone nonattainment areas are already meeting the control levels being recommended in this CTG."[3] Indeed, this proposal does not expand the number of sources that will be subject to the ink or control device portions of the flexible packaging rotogravure and flexographic printing regulations. It is expected that those sources currently able to use compliant inks and coatings will similarly be able to make use of inks and coatings meeting the new compliance limit, while those using add-on control devices will continue to do so as well. As such, the Illinois EPA expects that there will not be any additional add-on control costs for subject facilities.

In the case of any sources not already meeting the proposed standards and needing to put on an add-on control device, the CTG says, "The costs … will vary depending on the flow rate, hourly solvent use rate, and operating hours." USEPA made reasonable estimates to determine the cost effectiveness, and determined that "a press exhausting approximately 5,800 cubic feet per minute, operating 2000 hours per year, and achieving 70 percent capture efficiency" would have a cost of between $1,300 and $2,800 per ton of VOM removed.[3] A source with a larger press, higher solvent use rate, more operating hours, or better capture efficiency would have an even lower cost per ton of VOM removed.

Costs associated with additional sources becoming subject to the cleaning provisions of this proposed regulation are expected to be minimal. Indeed, some sources may see an overall cost savings as less cleaning solution is necessary.

4.4 Industrial Cleaning Solvents

USEPA estimated that there would be 130 sources in Illinois NAAs that would be impacted by this regulation, with a total of 2293 Mg/yr (2528 tons/yr) of baseline VOM emissions per year by using the 2002 Nation Emissions Inventory database. USEPA then determined the cost effectiveness of meeting the 50 grams of VOM per liter of cleaning material limit for a parts cleaner at $1664/ton based on a study provided by the California Bay Area Air Quality Management District.

Costs associated with switching from high-VOM content solvents to low-VOM content or aqueous solvents may show an actual cost savings of $1460/Mg ($1325/ton) when taking in consideration the reduction of disposal costs, according to the CTG.

4.5 Flat Wood Paneling Coatings

USEPA based their cost estimate on information obtained from the South Coast Air Quality Management District in California, arriving at a cost of between $1,900 and $2,600 per ton of VOM reduced (in 2005 dollars). According to the

CTG, for any sources subject to this rule in Illinois, costs "could be incurred to make changes to their coatings in order to meet" the new regulation.[5] Thus, the only significant cost is expected to be reformulation of coatings.

5.0 EXISTING AND PROPOSED STANDARDS

5.1 Lithographic Printing

Currently, Illinois has regulations covering all types of lithographic printing in the NAAs, with an applicability level of 100 PPD (calculated monthly). In addition, there is a secondary applicability level of 100 tons per year of maximum theoretical emissions for heatset web lithographic printing, which was carried over from the previous rule. The Agency is proposing removing the 100-ton limit, as it is no longer necessary and USEPA has agreed that removing it will not cause a backsliding concern.

This new proposal does not reduce the applicability threshold for add-on control devices used by heatset presses. Thus, no new lithographic printing units will need to add controls. However, new control devices on heatset web lithographic presses will need to meet a 95 percent control efficiency instead of the current 90 percent limit. The Agency believes that control devices in existence today can meet the 95 percent limit, but at the request of printing industry representatives, the Agency has agreed to not ask existing sources to meet the higher control efficiency.

The proposal does provide a new applicability threshold of 15 PPD for fountain solution and cleaning solution requirements for all lithographic printing operations. The requirements are the same as are already present in the Illinois regulations, other than a correction to the fountain solution limits that changes their measurement from "by volume" to "by weight." USEPA has informed Illinois EPA that the limit should be weight-based, and the change will slightly loosen the standard for sources, if anything. The Illinois EPA has not encountered any sources with problems complying with the fountain solution, cleaning solution, recordkeeping, reporting, or material handling portions of the existing rule, and no such issues are expected when lowering the applicability threshold.

Sources between 15 and 100 PPD will be able to take advantage of several new exclusions pertaining to fountain and cleaning solutions. Sheet-fed presses that print substrates no larger than 11 inches by 17 inches and any lithographic press with a fountain solution reservoir of no larger than one gallon are not required to comply with the fountain solution requirements. As described above, all sources in this group will also need to meet only a 70 percent VOM content limit in cleaning solutions rather than the 30 percent limit that is applicable to sources over 100 PPD. All such sources will also be able to use up to 110 gallons of cleaning solution per year that do not meet either the VOM content or vapor

pressure requirements. These exclusions will ease any potential burden on the smallest sources affected by this rule.

Sources which fall below one of the applicability limits, and are thus exempt from one or more control requirements, must certify this exemption to Illinois EPA through calculations showing that their emissions will not exceed the applicable VOM threshold. These calculations must include all VOM emissions, including inks, fountain solution, and cleaning solvents, and are determined on a monthly basis.

It should be noted that the current regulation recognizes that the substrate retains some of the VOM present in the ink, and thus a retention factor of 0.95 is used when calculating emissions from non-heatset inks, and a factor of 0.20 is used when calculating emissions from heatset inks. In addition, it contains a factor recognizing that VOM remains on solvent-laden rags that are stored and disposed of properly. These factors continue to be allowed for determination of applicability. In addition, this proposal adds emission adjustment factors to be used in other situations when not determining applicability (such as Annual Emissions Reports and permit limits). These factors take into account carryover of VOM from automatic blanket wash and fountain solutions into the dryer and control device. All of these factors may be found in the CTG.[2]

Because of the new exclusions that apply only between 15 and 100 PPD, even subject sources in this group must continue to calculate emissions to ensure they do not exceed the 100 PPD threshold and lose the exclusions. Sources may opt out of the exclusions if they do not wish to make use of them, and thus would not need to calculate emissions in this fashion.

5.2 Letterpress Printing

There are currently no specific Illinois regulations covering letterpress printing operations; any such operations would therefore be covered by Subpart TT, Section 218/219.301, or paper coating regulations. The new proposal addresses both heatset and non-heatset letterpress operations.

This proposal would require that heatset letterpress printers use an add-on control device if they meet the applicability requirement of 25 TPY PTE plantwide. However, as noted earlier, the Agency believes there are no such operations in Illinois NAAs.

All letterpress printing operations of 15 PPD or more will be also required to abide by cleaning material limitations equivalent to those described above for lithographic sources between 15 and 100 PPD. That is, cleaning solutions will be required to contain no more than 70 percent VOM or have a maximum composite partial vapor pressure of less than 10 mm Hg.

5.3 Flexible Packaging Printing

Currently, Illinois rules cover all flexographic, packaging rotogravure, and publication rotogravure printing. All ink limits for these different types of printing are identical, with the only difference found in the add-on control requirements – flexographic printers are required to get 60 percent overall VOM reduction, packaging rotogravure are required to get 65 percent overall reduction, and publication rotogravure must achieve 75 percent overall reduction.

The new proposal separates out flexible package printing from the existing flexographic and rotogravure regulations. Thus, any flexographic or rotogravure operation that is not printing on flexible packaging will not see a change to the applicable regulations.

Sources that print on flexible packaging will need to meet either a tightened ink VOM content or add-on control requirement. The required control efficiency will depend on both the date of construction, at the source, of the press and the control device. This recognizes that presses and control devices already installed at the source might not have been designed to obtain capture and control efficiencies as high as are currently obtainable.

5.4 Industrial Cleaning Solvents

Illinois has current regulations for cold cleaning degreasing, open top vapor degreasing, and conveyorized degreasing operations as well as some limitations and work practices on cleaning solvent uses in existing rules, e.g., regulations regarding autobody refinishing, wood furniture coating, and lithographic printing. This new rule sets limitations based on an applicability of 15 lbs/day of actual VOM emissions from cleaning operations. Once applicable, the source will need to follow the work practice standards discussed in Section 3.4, above, and either comply with a VOM content limitation of the cleaning solutions, use a low vapor pressure cleaning solution, or utilize an emissions control system that provides 85 percent overall control of VOM emissions from cleaning activities.

5.5 Flat Wood Paneling Coatings

There are currently no specific Illinois regulations covering flat wood paneling coating operations; any such operations would therefore be covered by Subpart TT, Section 218/219.301, or potentially wood furniture coating, depending on whether the operations fell into the definition related to that process.

The new proposal will add coating VOM requirements and work practice requirements for both coatings and associated cleaning operations. As with other coating categories, there is also an option available to use add-on control instead

of compliant coatings; however, the flat wood paneling coating category will require an overall control of 90 percent rather than the 81 percent overall control required for existing coating categories.

The work practice requirements include several that are already required for wood furniture coaters, which have been accomplished without any problems known to the Agency. In addition, other common sense requirements are being added, including minimizing spills of VOM-containing materials, minimizing VOM emissions during cleaning, and closing mixing vessels except when they are in use.

6.0 AFFECTED SOURCES AND EMISSION REDUCTIONS

6.1 Lithographic Printing

The Agency does not expect any additional reductions from increasing the required control efficiency for heatset web lithographic printers from 90 to 95 percent, because that change will not affect existing control devices.

However, there will be some small VOM reductions related to the addition of fountain and cleaning solution requirements for sources with 15 PPD or more of emissions. It is difficult to estimate such reductions because the Illinois source inventory does not track information such as the number of gallons of cleaning solution used, the size of sheet-fed presses, or the fountain solution reservoir volume – as such, sources that may be excluded from requirements are not identifiable.

The Agency found a total of 98 lithographic printing sources in the Chicago NAA and three in the Metro-East NAA that have lithographic printing emissions over 15 PPD, according to the Bureau of Air's 2005 source inventory (modified for sources that have shut down since that time).

In the Chicago NAA, 66 of the sources are below 100 PPD, and thus are potentially impacted by this rulemaking (two more are over 99 PPD and are assumed to be already complying with the existing lithographic printing regulations). In the Metro-East NAA, all three sources are below 100 PPD. The Agency is conservatively judging that all of the sources listed may be impacted, but it is likely that some of them are already considered subject, as the daily emission rate in the inventory is an average estimate, while sources may have exceeded 100 PPD at some previous point. The Agency has tried to account for sources that are already controlled, as the 100 PPD applicability limit applies to uncontrolled emissions. (See Appendix B for the list of these potentially affected sources.)

For the sources that apparently would be affected by this proposed regulation, the Illinois EPA reviewed its inventory in an attempt to estimate potential emission reductions from fountain solution reformulation. The recent lithographic printing CTG does not contain enough specific information to usefully estimate such reductions, but refers back to the 1993 draft CTG on this source category.[7] Using the information and model plants therein, Illinois EPA determined that fountain solution emission reductions would be estimated at between 25% and 90% for smaller sources. As this draft CTG is 16 years old and the new CTG indicates that steps have been taken to reduce VOM content in fountain solutions, the Illinois EPA used the 25% figure in calculating reductions.

Cleaning solutions can be calculated as a straight 30% reduction, since the regulation requires reformulation such that they cannot contain more than 70% VOM.

As noted above, the Illinois EPA inventory does not necessarily specify, for each source, which emissions result from cleaning and which are from fountain solutions. However, using the model plants from the 1993 draft CTG as a guide, it appears that cleaning solution emissions at smaller plants make up a lower percentage of emissions compared to fountain solutions, ranging up to approximately 50% at certain facilities. Assuming that almost 50% of non-ink emissions come from cleaning solutions, which have 30% reduction, it is safe to use a 25% overall emission reduction to cover all VOM originating from the source.

The total VOM emissions from the 66 Chicago NAA sources are 1.455 tons per day. Thus, a 25% overall reduction equates to 0.36 tons per day of VOM. The total VOM emissions from the three Metro-East NAA sources is 0.0295 tons per day. A 25% overall reduction would provide 0.007 tons per day.

6.2 Letterpress Printing

As noted earlier, the Agency does not believe there are currently any heatset web letterpress printing operations in the NAAs. As such, no emissions reductions are expected from add-on controls for this category.

According to a search of the Bureau of Air's 2005 source inventory, there are two sources in the Chicago NAA, and none in the Metro-East NAA, making use of letterpress printing (see Appendix B). Only one of these sources appears to emit more than 15 PPD from such operations, with less than 0.02 TPD of VOM, including emissions from the letterpress as well as other printing operations. Even if all of the emissions originated from letterpress cleaning solutions, which are to be reduced by 30 percent, the resulting reduction would be 0.005 TPD. As such, the Illinois EPA expects negligible emission reductions overall from the implementation of this regulation.

6.3 Flexible Packaging Printing

It is difficult to estimate emission reductions for the flexible packaging printing category, as the Illinois source database does not generally specify the type of substrate being used by a flexographic or rotogravure printing operation, nor does it specify the date of original installation of the printing press or the associated control device. As such, all existing flexographic and rotogravure printing facilities identified as such in the Illinois inventory and exceeding the proposed applicability threshold are listed in Appendix B as potentially affected sources.

However, the Illinois inventory indicates that all sources but one using flexographic or rotogravure printing of any type are already achieving greater control efficiency than required by the proposed regulation. The remaining source (identified with an asterisk in Appendix B) is required by its permit to achieve 60 percent control efficiency, but will now need to achieve 65 percent. This change would equate to a 0.03 TPD reduction according to its permitted emissions, but a 0.01 TPD reduction according to emissions information in the inventory.

While the inventory does not provide information regarding the use of compliant inks, it has been the Agency's experience that sources printing on flexible packaging have had difficulty with the use of compliant VOM inks on such substrates. Sources either relied on add-on controls or switched to waterbased inks that should meet the newly proposed requirements as well as the existing ones. As such, negligible emission reductions are expected from the new ink limits.

The cleaning materials work practice standards being proposed do not lend themselves to a calculation of emission reductions. The Agency believes that the environment will see actual VOM emission reductions due to the storing of cleaning materials and used shop towels in closed containers, as well as conveying cleaning materials in closed containers or pipes, but calculation of such emission reductions cannot be accomplished without detailed information from every affected source – both before and after such changes are made.

6.4 Industrial Cleaning Solvents

USEPA estimated that there are 130 sources in the impacted areas that have emissions over 15 PPD in Illinois. These sources are estimated to have baseline emissions of 2293 Mg/yr (2528 TPY) of VOM as mentioned previously and include degreasing operations that are already impacted by existing state regulations that will not gain any further reductions.

It is not reasonably practicable to estimate emission reductions for the other impacted sources under the industrial clean-up solvent rule, as any source in either

NAAs that uses cleaning solvents is potentially affected, depending upon the source's usage level. Further, many different types of sources throughout the NAAs may use different types of cleaning solutions and may already be using compliant solutions. For these reasons, Appendix B does not list specific sources that are potentially impacted by this rulemaking.

As discussed above, the Agency believes that the environment will see actual VOM emission reductions due to these proposed regulations, but calculation of such emission reductions cannot be accomplished without detailed information from every affected source.

6.5 Flat Wood Paneling Coatings

A search of the Bureau of Air's 2005 source inventory indicated four sources that will likely be subject to the proposed flat wood paneling coating regulation in the Chicago NAA, and none in the Metro-East NAA. One of these four sources would appear to fall below the proposed applicability threshold. The other three total 0.09 TPD of VOM emissions. According to the CTG, VOM emissions were reduced an average of 60 percent for interior paneling and tileboard manufacturing. This description seems to fit the Illinois NAA sources best. As such, Illinois EPA estimates a VOM reduction of 0.05 TPD in the Chicago NAA and no reductions in the Metro-East NAA.

7.0 OTHER STATES' STANDARDS

7.1 Lithographic Printing

Appendix B of the CTG for Lithographic and Letterpress Printing contains a list of state standards for lithographic printing across the country. Rather than reproduce the entire list here, the reader is referred to that list.[2] A key point to note is that all states with ozone NAAs will need to implement the same Group II CTGs as Illinois is implementing with this rulemaking.

7.2 Letterpress Printing

Appendix C of the CTG for Lithographic and Letterpress Printing contains a list of state standards for letterpress printing across the country. Rather than reproduce the entire list here, the reader is referred to that list.[2] A key point to note is that all states with ozone NAAs will need to implement the same Group II CTGs as Illinois is implementing with this rulemaking.

7.3 Flexible Packaging Printing

Section V of the CTG for Flexible Package Printing contains a list of state standards for flexible package printing across the country. Rather than reproduce

the entire list here, the reader is referred to that list.[3] A key point to note is that all states with ozone NAAs will need to implement the same Group II CTGs as Illinois is implementing with this rulemaking.

7.4 Industrial Cleaning Solvents

The CTG for Industrial Cleaning Solvents contains some information on other state standards throughout the document.[4] Besides those rules, of particular note are regulations in California – South Coast, Bay Area, and San Joaquin Valley – as well as Wisconsin and a proposed regulation in Ohio, from which Illinois obtained most of its proposed limits for activities that have a limit different from the basic one suggested in the CTG.

Appendix A contains a table (originally provided by Ohio and modified to include proposed Illinois limits) that is a comparison of Illinois' proposed limits with the above areas' limits.

7.5 Flat Wood Paneling Coatings

Section V and Appendix B of the CTG for Flat Wood Paneling Coating contains information on state standards for these operations across the country. Rather than reproduce the entire list here, the reader is referred to that list.[5] A key point to note is that all states with ozone NAAs will need to implement the same Group II CTGs as Illinois is implementing with this rulemaking.

8.0 SUMMARY

The regulations proposed in this rulemaking, covering the CTGs from Group II of USEPA's Consumer and Commercial Products category, add new requirements or tighten existing requirements for lithographic printing, letterpress printing, flexible packaging printing, flat wood paneling coating, and industrial cleaning solvents. The Agency believes that all the proposed changes are technically feasible and economically reasonable. Incorporating these additions and modifications to existing Illinois regulations is required by the CAA and USEPA; specifically, Section 182(b)(2)(A) of the CAA requires that SIPs must be revised to include RACT for VOM emissions sources that are covered by a CTG issued by USEPA after November 15, 1990, and before the area's date of attainment.

The Illinois EPA made multiple rounds of outreach efforts in relation to this proposed rulemaking. The first was accomplished electronically, with the second involving follow-up calls from the Agency to sources that had submitted comments as well as detailed discussions between the Agency and industry group representatives. In addition, the Agency has had frequent discussions with USEPA personnel in both the regional office and headquarters, and has gathered information from other states. After this extensive effort, the Agency has proposed

this rulemaking, which incorporates the requirements of the CTGs and USEPA plus comments from industry.

While the Agency recognizes that it is difficult to quantify specific emission reductions that will be achieved through these rule modifications, the environment will see a real reduction of VOM emissions. As previously noted, USEPA strengthened the eight-hour ozone standard last year. It is likely that the same areas in Illinois that are currently designated as nonattainment for the present standards will soon be designated as nonattainment for this revised standard. Any reduction in VOM emissions in the NAAs will help Illinois to achieve the newly revised NAAQS as well as satisfy CAA obligations.

Appendix A: Comparison of Proposed Illinois Industrial Cleaning Solvent Limits to Those in Other States

Solvent Cleaning Operation	**Illinois Rule (proposed)** **VOM content** [lbs/gallon, as used]	**Ohio Rule (proposed)** **VOM content** [lb/gallon, as used]	**South Coast Rule (2006)** **VOM content** [lbs/gallon, as used]	**Bay Area Rule (2002)** **VOM content** [lbs/gallon, as used]	**San Joaquin Valley (2003)** **VOM content** [lbs/gallon, as used]	**Wisconsin Rule (2004)** **VOM content** [lbs/gallon, as used]
(a) Product cleaning during manufacturing process or surface preparation for coating, adhesive, or ink application:						
(i) General	**0.42**	0.42	0.21	0.42	0.42	0.42
(ii) Electrical apparatus components and electronic components	**0.83**	0.83	0.83	Exempt ?	4.2	4.2
(iii) Medical devices and pharmaceuticals	**6.7**	6.7	6.7	Exempt ?	6.7	6.7
(b) Repair and maintenance cleaning:						
(i) General	**0.42**	0.42	0.21	0.42	0.42	0.42
(ii) Electrical apparatus components and electronic components	**0.83**	0.83	0.83	Exempt ?	7.5	7.5
(iii) Medical devices and pharmaceuticals				Exempt ?		
(*a*) Tools, equipment and machinery	**6.7**	6.7	6.7	?	6.7	6.7
(*b*) General work surfaces	**5.0**	5.0	5.0	?	5.0	5.0
(c) Cleaning of ink application equipment:						
(i) General	**0.42**	0.42	0.21	0.42	0.42	0.42
(ii) Flexographic and Rotogravure printing that does not print flexible packaging	**0.83**	0.42	0.21	6.8	0.42	0.42
(iii) Screen printing	**4.2**	4.2	4.2	2.5	6.3	6.4
(iv) Ultraviolet ink and electron beam ink application equipment, except screen printing	**5.4**	5.4	5.4	6.7	6.7	6.7

Appendix B: Potentially Affected Sources

Lithographic Printing Sources

Chicago Nonattainment Area:

BOA ID Number	Source Name
031012AGH	Nuart
031015AAR	Sleepeck Printing Co
031015ACC	Douglas Press Inc
031018AAK	The Buhl Press Inc
031030ACU	Kelvyn Press Inc
031030ACW	H&W Graphics Inc
031030ADM	Rapid Impressions Inc
031051ABM	Unique Printers & Lithographers
031051ADK	Royal Continental Box Co
031063AHP	Chromatech Printing Inc
031063AHU	Des Plaines Printing LLC
031096AAD	TIN Inc DBA Temple-Inland
031096ANR	Tukaiz LLC
031120AAF	Cadore-Miller Printing Inc
031123ABZ	Darwill
031123ACD	Creative Automation
031126AAZ	Liberty Suburban Chicago Newspaper
031186AGD	MeadWestvaco Consumer Packaging Group LLC
031201ADU	Johnson & Quin Inc
031201AEG	Ed Garvey & Co
031201AEQ	SKM Ventures LLC
031288AJJ	Great Lakes Graphics
031297ABT	Calumet Carton Co
031440AFJ	Bruce Offset Co / Pearson I Inc
031440ALJ	Elk Grove Graphics
031440ALO	Quality Color Graphics Inc
031440ALR	Premier Card Solutions LLC
031440AMW	Impact Printers & Lithographers
031600AWL	Lakeside Lithography LLC
031600BGU	Color Communications Inc
031600BKC	Goes Lithographing Co Inc
031600CAG	Chicago Press Corp
031600CHZ	Cardinal Colorprint Printing
031600FAN	Chicago Tribune Co
031600FOV	Seven Worldwide Inc
031600GBC	Newsweb Corp
031600GFC	Melar Litho Inc
031600GHF	American Thiessen LLC
031600GHI	Palmer Printing Inc
031600GJN	Enteron Group LLC
031600GQV	Diemand Printing Co
031821ABB	Ideal Box Co

BOA ID Number	Source Name
043005ALJ	Advantage Printing Inc
043005AMK	Lakewood Printing Inc
043005AMS	ABS Graphics Inc
043020ABI	Tempo Graphics Inc
043020ACM	Flint Ink North America Corp
043030ADL	Johnson Printers
043030AEG	Diamond Web Printing Inc
043030AEL	Jet Lithocolor Inc
043065ACG	Dow Jones & Co Inc
043120AAR	Madden Communication
043452AAW	Vis-o-Graphics
089010ACG	Tegrant Alloyd Brands Inc
089020ABH	Carlith Printing Co
089407AAO	Voris Communications Co Inc d/b/a Kelmscott Press
089438AFT	Hagg Press Inc
089483ACC	InterCo Print LLC
089483ACM	Perfect Plastic Printing Corp
089800ABV	Freedom Imaging Systems Inc
097190ACR	Nosco Inc
097190AFK	Lake County Press Inc
111015ACP	Corporate Express
197025AAM	Joliet Pattern Works Inc
197080AAN	Fox Valley Publications
197491AAD	Vision Integrated Graphics LLC

Metro-East Nonattainment Area:

BOA ID Number	Source Name
119055AAZ	Dow Jones and Co Inc
119819AAA	Highland Supply Corp
133025AAK	Mar Graphics

Letterpress Printing Sources

Chicago Nonattainment Area:

BOA ID Number	Source Name
031288ABA	Federal-Mogul Corp
111015ADP	Stephen Fossler Company

Flexible Packaging Printing Sources

Chicago Nonattainment Area:

BOA ID Number	Source Name
031003ACU	Duro Bag Mfg Co
031009AAS	Weber Marking Systems Inc
031012ACA	Packaging Corp of IL d/b/a Acorn Corrugated Box Co
031012AFM	International Paper Co
031012AGJ	International Paper Co
031015AAM	Alcan Packaging Food & Tobacco Inc
031027AAS	Smurfit-Stone Container Corp
031045AGI	CFC International Inc
031063ADM	International Paper Co
031063AFT	Deluxe Manufacturing Operations Inc
031063AHT	Pamco Printed Tape & Label Co
031096AMM	Formel Industries Inc
031096AOB	Prairie State Group
031186AFK	Wagner Zip Change
031440AHX	Clear-Lam Packaging Inc
031489AAU	Paddock Printing Center
031497AAM	Bio-Industries
031600ACL	Bagcraft Packaging LLC
031600AIL	Solo Cup Operating Corporation
031600BGU	Color Communications Inc
031600BTT	General Packaging Products
031600CKM	MeadWestvaco Packaging Systems LLC
031600DNZ	Bio Star Films LLC
031600GEI	Cenveo
031600GFH	TIN Inc d/b/a Temple - Inland
031600GIB	American Labelmark Co
031600GLJ	General Packaging Products Inc
031820AAI	Bluegrass Flexible Packaging Co LLC
043005AJS	Rollprint Packaging Products Inc
043005ALB	Quality Bags Inc
043020AAC	Graphic Packaging International Inc
043020ACH	Meyercord Revenue Co
043020ACJ	Packaging Personified Inc
043035ACX	Bema Poly Tech d/b/a Bema Film Sys Inc
043462AAA	Genesis Packaging & Design
043806AAN	Pro-pak Industries Inc
089010ACC	Pechiney Plastic Packaging Inc
089055AAK	International Paper
089407AAZ	Covalence Specialty Materials Corp
089438ADW	Printpack Inc
089438AFL	Multifilm Packaging Corp.*
089438AGQ	TIN Inc DBA Elgin Corrugated Box
089483ABV	Dopaco Inc
089483ACY	Moore Wallace North America Inc

BOA ID Number	Source Name
097035ABE	Nosco Inc
097080AAY	Colbert Packaging Corp
097084AAI	Vonco Products Inc
097115ABC	Amcor Flexibles Healthcare Inc
097115ACJ	Parade Packaging
097125AAY	Stone Container Corp
097190ACR	Nosco Inc
097418AAL	Fisher Container Corp
097803AAB	CTI Industries Corp
097809ABG	Kraftseal Corp
111010AAT	AMPAC Flexicon LLC
111035AAP	HS Crocker Co Inc
111065AAR	Diversapack LLC
111803AAF	Catty Corp

Metro-East Nonattainment Area:

BOA ID Number	Source Name
119040ATD	Gateway Packaging Inc
119055AAL	Highland Supply Corp
119819AAA	Highland Supply Corp

Flat Wood Paneling Coating Sources

Chicago Nonattainment Area:

BOA ID Number	Source Name
031600AFA	William Yuenger Manufacturing Co
031600FZW	Interior Crafts Inc
031600GGJ	FCI Inc
197815AAH	Illinois Flush Door Inc

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2. Control Techniques Guidelines for Offset Lithographic Printing and Letterpress Printing, United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 2006.
3. Control Techniques Guidelines for Flexible Package Printing, United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 2006.
4. Control Techniques Guidelines: Industrial Cleaning Solvents, United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 2006.
5. Control Techniques Guidelines for Flat Wood Paneling Coatings, United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 2006.
6. Technical Support Document for Controlling VOM Emissions from Lithographic Printing Operations, Illinois Environmental Protection Agency, Air Quality Planning Section, Springfield, IL, October 1994.
7. Control Techniques Guideline Series: Control of Volatile Organic Compound Emissions from Offset Lithographic Printing (DRAFT), United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1993.

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

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ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
1021 NORTH GRAND AVENUE EAST
P.O. BOX 19276
SPRINGFIELD, ILLINOIS 62794-9276

Table of Contents

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_x	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

Tables

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[5]." 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[1-4].

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[4]. 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[3].

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[1-4]. 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."[1]

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[1].

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 [1].

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[1]. 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[1].[1]

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[1].

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

Metal Parts and Products

Coating Category	Air Dried		Baked	
	kg VOM/L Coating	lb VOM/gal Coating	kg VOM/L Coating	lb VOM/gal Coating
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

Plastic Parts and Products

	kg VOM/L Coating	lb VOM/gal Coating
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

	kg VOM/L Coating	lb VOM/gal Coating
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

	kg VOM/L Coating	lb VOM/gal Coating
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

Metal Parts and Products

Coating Category	Air Dried		Baked	
	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

Plastic Parts and Products

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
Automotive/Transportation Coatings		
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	1.87	15.59
Touchup and Repair Coatings	2.13	17.72
Business Machine Coatings		
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[1]. 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[1].

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

Illinois Source ID	Name	City	County
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	ABBEY 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 CONTAINTER 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[1].

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)[6]. 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[2].

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[5] 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[2] 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[2].

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[2].

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

<table>
<tr><td>Assembly Coating Process</td><td colspan="3">Recommended VOM Emission Limit</td></tr>
<tr><td rowspan="2">Electrodeposition primer (EDP) operations (including application area, spray/rinse stations, and curing oven)</td><td>When solids turnover ratio (R_T)≥0.16</td><td>When 0.040≤R_T<0.160</td><td>When R_T≤0.040</td></tr>
<tr><td>0.084 kg VOM/liter (0.7lb/gal coating solids applied</td><td>$0.84 \times 350^{0.160-R_T}$kg VOM/liter coating solids.</td><td>No VOM emission limit.</td></tr>
<tr><td>Primer-surfacer operations (including application area, flash-off area, and oven)</td><td colspan="3">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.</td></tr>
<tr><td>Topcoat operations (including application area, flash-off area, and oven)</td><td colspan="3">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.</td></tr>
<tr><td>Final repair operations</td><td colspan="3">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.</td></tr>
<tr><td>Combined primer-surfacer and topcoat operations</td><td colspan="3">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.</td></tr>
</table>

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)

Material	Recommended VOM Emission Limit
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[6] 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[6], 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[6] as stated above, and a summary of these regulations can be found in the CTG for this category[2].

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[3].

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 (HVLP) 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[3] 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[3] 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[3]. 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[3] 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

General Adhesive Application Processes	Recommended VOM Emission Limit	
	(g/l)	(lb/gal)
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
Specialty Adhesive Application Processes		
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
Adhesive Primer Application Processes		
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[3].

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[4].

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.[4]

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[4].

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[4]. 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[4].

Equation 1:

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

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:

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

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:

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

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 PVi.*

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.