
Source Category: Industrial Solvent Cleaning

INTRODUCTION

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

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

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

SOURCE CATEGORY DESCRIPTION

Solvent cleaning operations are an integral part of many industries and involve the use of solvents or solvent vapor to remove water-insoluble contaminants such as grease, oils, waxes, carbon deposits, fluxes, and tars from metal, plastic, glass, and other surfaces. Solvent cleaning is usually performed prior to painting, plating, inspection, repair, assembly, heat treating, and machining. It is used in the manufacture of fabricated metal products, industrial and commercial machinery, computer equipment, electronic equipment, transportation equipment, furniture and fixtures, and various other products.

There are four general categories of solvent cleaning operations:

- Batch cold cleaning uses a solvent to clean a metal surface at ambient temperatures or at temperatures below the boiling point of the cleaning solvent. Cold cleaning units are batch operated and may include immersion of parts and spraying of solvent to facilitate cleaning.
- Batch open top vapor degreasers heat the solvent to create a vapor zone where the cleaning process occurs. Freeboard height and condensing coils are used to control the vapor zone. Design features and operating practices contain and capture the vapors, minimizing vapor losses.
- Conveyorized degreasers utilize a continuous process to clean and remove soils from metal parts using either cold or vaporized solvents. Cleanup solvents are used to clean external surfaces, such as products, parts and equipment, floors, tables, and walls, and internal surfaces or containers, such as tanks and supply lines.
- Cleaning processes may include wiping using mops, brushes, and rags, spraying, flushing the interiors of equipment, purging spray equipment, or dipping small parts in vessels of solvents.

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**TABLE 1 – CONTROL MEASURE SUMMARY FOR
INDUSTRIAL SOLVENT CLEANING – AREA SOURCES**

Control Measure Summary	VOC Emissions (tons/year) in 5-State MRPO Region	
2002 existing measures: CTG Requirements in 1-hour nonattainment areas; halogenated solvent cleaning MACT standard	2002 Base:	61,226
2009 On-the Books measures: Illinois cold cleaning VOC regulation for the Chicago and Metro East areas and an equivalent regulation affecting the southern Indiana counties of Clark and Floyd is expected to achieve the 66 percent VOC reduction in 2009 in those counties.	2002 Base: 2009 Reduction: 2009 Remaining:	61,226 <u>-4,931</u> 56,295
Candidate measure: Adopt Chicago/Metro East Cold Cleaning Regulations in additional counties <i>Measure ID:</i> SOLV6A <i>Emission Reductions:</i> reduction of 36-63% from 2002 levels depending on the geographic coverage <i>Control Cost:</i> \$1,400 per ton <i>Timing of Implementation:</i> Assuming 2007 effective date of rule, emission reductions are achieved in 2009 <i>Implementation Area:</i> (1) 8-hr ozone nonattainment areas, (2) 8-hr ozone nonattainment areas plus adjacent counties, or (3) all counties	2002 Base: 2009 Reduction: 2009 Remaining:	61,226 <u>-38,310</u> 22,916

- Notes: 1) 2002 emission reductions shown are reductions from uncontrolled levels;
 2) 2009 emission reductions shown are reductions for 2002 base emissions, assuming that control measures are implemented statewide;
 3) 2009 emissions are not growth-adjusted.

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Emissions of volatile organic compounds (VOC) occur as a result of evaporation are from storage and handling of fresh and spent solvents, solvent evaporation from the cleaned surfaces, evaporation as the solvent is splashed or sprayed, fugitive emissions from flushing or spray systems, and evaporation from solvent-soaked rags or cleaning tools. All solvent not recycled or sent to waste disposal is eventually emitted into the atmosphere.

Industrial solvent cleaning was estimated to account for about 3 percent of the total anthropogenic VOC emissions in the MRPO region in 2002. An important aspect of the inventory is that it includes both point and area industrial solvent cleaning sources. Table 2 shows the point and area source emission estimates by surface coating category and state. Emissions from area sources are substantial, but also highly uncertain and may potentially be overestimated. The methodology for estimating area source emissions relies on per employee emission factors and employment data or per capita emission factors. For the most part, the EPA emission factors are based on data collected in the 1980s, and may not be representative of the types of cleaning solvents, waste solvent disposal practices, and control technologies currently used. Also, the employment data used introduces additional uncertainty. More detailed analysis of the area source calculation methodologies is need to better understand, and if possible, reduce the uncertainty associated with the emission estimates for industrial solvent cleaning.

REGULATORY HISTORY

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

Title I regulates criteria pollutants by requiring local governments to adopt State Implementation Plans (SIPs) that set forth their strategy for achieving reductions in the particular criteria pollutant(s) for which they are out of attainment. The SIPs must include reasonably available control technology (RACT) requirements on major sources in nonattainment areas. States must establish RACT levels based on the level of emissions reductions that can reasonably be achieved at a reasonable cost. The U.S. EPA issued the Control Technology Guideline (CTG) for solvent metal cleaning in November 1977. The CTG addressed cold cleaning, vapor top degreasing, and conveyORIZED degreasing.

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

EPA is required under Title III of the CAA to substantially reduce emissions of toxic air pollutants from industrial solvent cleaning operations. These Maximum Achievable Control Technology (MACT) standards apply to operations located at major sources of hazardous air pollutants (HAPs). MACT standards are based on the best-performing existing sources and the current status of control technology. A MACT standard for Halogenated Solvent Cleaners was published in December 1994 with compliance required by December 1997. The MACT regulates the use of six chlorinated solvents, some of which are VOCs. The VOC reductions from the MACT standard are thought to be minimal to negligible. The MACT includes multiple alternatives to allow owners or operators maximum compliance flexibility. These alternatives include an equipment standard, in conjunction with work practice requirements, and an alternative overall solvent emissions standard.

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

Sector	SCC	Type of Cleaning	Industry Sector	IL	IN	MI	OH	WI	MRPO
Area	241500000	All types	All Processes/All Industries	0	0	8,845	17,877	0	26,722
Area	2415005000	All types	Furniture and Fixtures (SIC 25)	535	0	0	0	0	535
Area	2415015000	All types	Secondary Metal Industries (SIC 33)	764	0	0	0	0	764
Area	2415020000	All types	Fabricated Metal Products (SIC 34)	3,298	0	0	0	0	3,298
Area	2415025000	All types	Industrial Machinery/Equipment (SIC 35)	2,679	0	0	0	0	2,679
Area	2415030000	All types	Electronic and Other Elec. (SIC 36)	1,534	0	0	0	0	1,534
Area	2415035000	All types	Transportation Equipment (SIC 37)	313	0	0	0	0	313
Area	2415040000	All types	Instruments and Related Products (SIC 38)	1,090	0	0	0	0	1,090
Area	2415045000	All types	Miscellaneous Manufacturing (SIC 39)	949	0	0	0	0	949
Area	2415230000	Conveyorized	Electronic and Other Elec. (SIC 36)	0	180	0	0	565	745
Area	2415245000	Conveyorized	Miscellaneous Manufacturing (SIC 39)	0	645	0	0	1,041	1,686
Area	2415345000	Cold Cleaning	Miscellaneous Manufacturing (SIC 39)	0	1,310	0	0	1,753	3,063
Area	2415360000	Cold Cleaning	Auto Repair Services (SIC 75)	0	8,825	0	0	9,025	17,850
Area Subtotal				11,162	10,960	8,845	17,877	12,384	61,228
Point	Various	Open Top	Various	390	32	46	0	168	636
Point	Various	Conveyorized	Various	17	11	37	0	6	71
Point	Various	Cold Cleaning	Various	384	230	435	896	1,127	3,072
Point	Various	Other	Various	183	805	405	23	180	1,596
Point Subtotal				974	1,078	923	919	1,481	5,375
Total				12,136	12,038	9,768	18,796	13,865	66,603

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The South Coast Air Quality Management District Rule 1122 reduces VOC emissions by the use of low-VOC content solvents and changes in operating practices. The rule was originally adopted in 1979, but has since been modified to specify more stringent requirements. The rule contains a VOC content limit of 25 gm/liter (0.21 lbs/gal).

In 2001, the Ozone Transport Commission (OTC) developed a model rule for solvent cleaning operations that establishes hardware and operating requirements and alternative compliance options for vapor cleaning machines used to clean metal parts. These requirements are based on MACT standard for chlorinated solvent vapor degreasers. The requirements implement higher levels of technology than required under most existing State requirements, based on the CTG. The cold cleaner solvent volatility provisions are based on regulatory programs in place in several States, including Maryland and Illinois.

The Illinois cold cleaning VOC regulation for the Chicago and Metro East areas was used as a basis for the OTC model rule. The emission reduction credit for this regulation is a 66 percent reduction from the levels required by the CTG. An equivalent regulation affecting the southern Indiana counties of Clark and Floyd is expected to achieve the same 66 percent VOC reduction in 2002. In Wisconsin, the 2002 solvent cleaning emission estimates reflect VOC control efficiencies for four source classification codes in the nine county southeastern Wisconsin area. Beginning in year 2002, there is a 30 percent VOC emission reduction applied in the 6 county area Washington, Ozaukee, Waukesha, Milwaukee, Racine and Kenosha counties, while an 8 percent VOC emission reduction is applied in Kewaunee, Manitowoc, and Sheboygan counties.

A comparison of Federal requirements and current State regulations is presented in Attachment 1 for industrial solvent cleaning.

CANDIDATE CONTROL MEASURES

The most promising reductions beyond current requirements can be obtained by increasing the stringency of existing RACT rules and extending the geographic coverage of the rules. Since area source cold cleaning emissions are the largest component of this category, the most promising candidate for strengthening RACT is to adopt limits on the volatility of cleaning solvents used for cold cleaning operations. More stringent requirements are already in place in several counties in the Chicago Metro East areas of Illinois and four counties in Indiana. The requirements of the Illinois and Indiana rules are very similar to those contained in the OTC model rule. The cold cleaner provisions would primarily affect small business and solvent suppliers. Most of the cold cleaning machines are provided to users through contract with regional and national companies. The machine providers would be responsible for assuring that the cold cleaner solvent meets the volatility limit. In other cases, the users and solvent providers would have to assure that the solvent meets the required limit. The existing State regulations apply only a limited area. These regulations could be extended to the newly designated 8-hr nonattainment counties. Optionally, the control measures could be extended to counties adjacent to 8-hr nonattainment areas or to all counties in the MRPO region. Other types of cleaning in the point source sector are covered by RACT or MACT and little additional VOC reductions appear to be available.

Measure SOLV6A – Adopt Chicago/Metro East Cold Cleaning RACT regulations to all 8-hr nonattainment areas and adjacent counties. This control measure is based on the use of current control methods required in the Chicago and Metro East to reduce emissions from both point and area sources. prohibits the use of solvent for cold cleaning with a vapor pressure greater than 1.0 mm Hg at 68°F except when used in electronics degreasing. The emission reduction credit for this regulation is a 66 percent reduction from uncontrolled levels for all cold cleaning categories except electronics. It will be applied in

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all 8-hr nonattainment counties (except for those counties in Illinois and Indiana where the requirements were already in place in 2002). Optionally, the control measures could be extended to counties adjacent to 8-hr nonattainment areas or to all counties in the MRPO region.

EXPECTED EMISSION REDUCTIONS

We calculated the approximate emission reductions expected from extending the existing Chicago/Metro East cold cleaning regulations to additional counties in the following manner:

- Obtained 2002 actual emissions from the MRPO's 2002 inventory (Note: States reported degreasing emissions using an inconsistent set of SCCs, as shown previously in Table 2);
- Calculated uncontrolled levels for the nine Wisconsin counties based on above reductions from State rules;
- Assumed that the Chicago/Metro East rules are extended beyond the current counties and that full implementation will be achieved by 2009, resulting in a 66% from baseline levels;

Current emissions from cold cleaning and the expected emission reductions from the candidate control measure are summarized in Table 3. As mentioned above, reductions were calculated for three options for geographic implementation - all 8-hr nonattainment counties, all counties in or adjacent to an 8-hr nonattainment area, and all counties in the MRPO region.

If the MRPO States choose to adopt the cold cleaning regulations, there would be an incremental reduction of 38-65 percent from 2002 levels, depending on the geographic coverage.

Note that these estimated emission reductions are very uncertain for two reasons. First, the area source emissions are calculated using the per employee emission factors collected by the EPA in the 1980s, and may not be representative of the types of cleaning solvents. Substantial efforts went into promoting pollution prevention efforts in the 1990s, including the use of aqueous solvents and alternative cleaning techniques which would tend to reduce the amount VOC used for cold cleaning. Second, we applied the 66 percent reduction to all area source degreasing emissions since the inventories for IL, MI, and OH did not differentiate between cold cleaning and other types of degreasing processes. Further refinement of the inventory for cold cleaning operations is needed.

TIMING OF IMPLEMENTATION

States generally provided a 2-year period for compliance with RACT rules. For the purposes of this White Paper, we have assumed that SIP rules would be adopted in early 2007. If the MRPO states chose to extend the existing RACT rules for the Chicago/Metro East areas to additional counties, sources would be required to use solvents with lower volatility. Since the lower-VOC content limits already California and several northeastern states, solvent manufacturers would not need to reformulate products. It seems reasonable to assume that a 2-year period after SIP submittal is adequate for the installation of controls. Thus, emission reductions would occur in 2009 for Measure SOLV6A.

COST EFFECTIVENESS AND BASIS

The existing RACT rules in the Chicago/Metro East areas are very similar to the OTC Model Rule. The OTC estimated a cost of \$1,400 per ton of VOC reduced based on the SCAQMD's cost analysis for their solvent cleaning rule (Rule 1122). This value should approximate costs that would be incurred to meet the same limits in the OTC rules.

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TABLE 3 – COMPARISON OF 2002 VOC EMISSIONS (tpy) WITH COLD CLEANING RACT SCENARIO

		<i>Measure SOLV6A</i>						
		<i>Adopt Chicago/Metro East Cold Cleaning RACT regulations</i>						
		Controls in 8-hr Nonattainment Counties		Controls in 8-hr Nonattainment plus Adjacent Counties		Controls Statewide		
State	Counties	2002	2009 Reduction	2009 Remaining	2009 Reduction	2009 Remaining	2009 Reduction	2009 Remaining
IL	Nonattainment	7,471	4,163	3,308	4,163	3,308	4,163	3,308
	Adjacent	1,041	0	1,041	618	424	618	424
	Not adjacent	<u>2,648</u>	<u>0</u>	<u>2,648</u>	<u>0</u>	<u>2,648</u>	<u>1,573</u>	<u>1,075</u>
	Total	11,161	4,163	6,998	4,781	6,380	6,354	4,807
IN	Nonattainment	6,591	4,286	2,304	4,286	2,304	4,286	2,304
	Adjacent	3,337	0	3,337	2,161	1,176	2,161	1,176
	Not adjacent	<u>1,033</u>	<u>0</u>	<u>1,033</u>	<u>0</u>	<u>1,033</u>	<u>668</u>	<u>365</u>
	Total	10,960	4,286	6,674	6,447	4,513	7,115	3,845
MI	Nonattainment	5,259	3,471	1,788	3,471	1,788	3,471	1,788
	Adjacent	1,276	0	1,276	842	434	842	434
	Not adjacent	<u>2,309</u>	<u>0</u>	<u>2,309</u>	<u>0</u>	<u>2,309</u>	<u>1,524</u>	<u>785</u>
	Total	8,845	3,471	5,374	4,313	4,531	5,838	3,007
OH	Nonattainment	12,413	8,193	4,220	8,193	4,220	8,193	4,220
	Adjacent	4,034	0	4,034	2,663	1,372	2,663	1,372
	Not adjacent	<u>1,430</u>	<u>0</u>	<u>1,430</u>	<u>0</u>	<u>1,430</u>	<u>944</u>	<u>486</u>
	Total	17,877	8,193	9,684	10,855	7,022	11,799	6,078
WI	Nonattainment	4,007	1,873	2,134	1,873	2,134	1,873	2,134
	Adjacent	3,810	0	3,810	2,406	1,405	2,406	1,405
	Not adjacent	<u>4,566</u>	<u>0</u>	<u>4,566</u>	<u>0</u>	<u>4,566</u>	<u>2,926</u>	<u>1,641</u>
	Total	12,384	1,873	10,510	4,279	8,105	7,205	5,179
MRPO	Nonattainment	35,741	21,986	13,755	21,986	13,755	21,986	13,755
	Adjacent	13,499	0	13,499	8,689	4,810	8,689	4,810
	Not adjacent	<u>11,986</u>	<u>0</u>	<u>11,986</u>	<u>0</u>	<u>11,986</u>	<u>7,634</u>	<u>4,352</u>
	Total	61,226	21,986	39,240	30,676	30,551	38,310	22,916

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

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CONTROL FACTORS

For purposes of modeling, we have assumed that rules will be adopted in 2007 and that full compliance will occur by the end of 2008. The control efficiency (CE) is the weighted average emission reduction efficiency for the entire category. Because emissions will be controlled via reformulations, the EIIIP guidance recommends that the rule effectiveness (RE) can be assumed to be 100 percent for all coating types affected by the rule. Since all products will be expected to comply by 2009, the rule penetration (RP) is also set to 100 percent.

In developing the control factor files for this category, we will use a base year a forecast year 66 percent incremental VOC emission reduction value in 2009 for counties affected by measure SOLV6A. We will use a base year 30 percent emission reduction in the 6-county area in Wisconsin (Kenosha, Milwaukee, Ozaukee, Racine, Washington, and Waukesa) and 8 percent emission reduction in Kewaunee, Manitowoc, and Sheboygan Counties.

RULE DEVELOPMENT ISSUES

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

GEOGRAPHIC APPLICABILITY

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

TEMPORAL APPLICABILITY

Emission reductions would be realized throughout the year.

AFFECTED SCCs

Area source SCCs affected by this control measure include:

2415000000	All types	All Processes/All Industries
2415005000	All types	Furniture and Fixtures (SIC 25)
2415015000	All types	Secondary Metal Industries (SIC 33)
2415020000	All types	Fabricated Metal Products (SIC 34)
2415025000	All types	Industrial Machinery/Equipment (SIC 35)
2415035000	All types	Transportation Equipment (SIC 37)
2415040000	All types	Instruments and Related Products (SIC 38)
2415045000	All types	Miscellaneous Manufacturing (SIC 39)
2415345000	Cold Cleaning	Miscellaneous Manufacturing (SIC 39)
2415360000	Cold Cleaning	Auto Repair Services (SIC 75)

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3. E.H. Pechan & Associates, Inc. *Control Measure Development Support Analysis of Ozone Transport Commission Model Rules*. March 31, 2001.
4. E.H. Pechan & Associates, Inc. *Development of Growth and Control Factors for Lake Michigan Air Directors Consortium*. December 14, 2004.

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Attachment 1 - Comparison of RACT Regulations

CTG Category: Cold Cleaning	
<p>CTG RACT Recommendation: 11/1977 CTG recommendations: Cold cleaner must have cover, the ability to drain parts, and label with operating instructions. Parts must be drained for at least 15 seconds, unit closed when not in use, and waste solvent managed in covered containers. Additional requirements based on solvent vapor pressure: If solvent has vapor pressure over 15 mm (0.3 psi) Hg at 100°F or the solvent is heated or agitated cover must be designed to be easily operated with one hand. If solvent has vapor pressure over 15 mm Hg (0.3 psi) at 100°F must have internal drainage and any solvent spraying must be a solid stream without excessive splashing. If solvent has vapor pressure over 33 mm Hg (0.6 psi) at 100°F or is heated above 50 °F the cold cleaning unit must have controls: either a freeboard ratio of 0.7 or greater, use a water cover if the solvent is insoluble and heavier than water, or use of an equivalent control approach. In September 1978 EPA clarified the 3 lb/hour and 15 lb/day exemptions did <u>not</u> apply to cold cleaning units.</p>	
LADCO States	
Illinois – Subpart 215.182, 218.182, and 219.182 Cold Cleaning	<p>Applicability: Statewide Control Requirement: Essentially the same as CTG For Chicago and Metro East Areas includes additional requirement that prohibit the use of solvent for cold cleaning with a vapor pressure greater than 1.0 mm Hg at 68°F except when used in electronics degreasing or in listed model number for a DetriX cold batch cleaning unit.</p>
Indiana – 326 IAC 8-3-2, Cold Cleaning Operations, 8-3-5 Cold Cleaner Degreaser Operation & Control, 8-3-8 Material Requirements for Cold Cleaning Degreasers	<p>Applicability: Cleaning units at facilities with 100 ton/year potential VOC emissions as of 1/1/1980 in Clark, Elkhart, Floyd, Lake, Marion, Porter, and St. Joseph counties and new units statewide after 1/1/1980. Control Requirements: Essentially the same as CTG requirements for cover, drainage, and waste management (8-3-2). Except CTG provisions based on solvent vapor pressure only apply to cold cleaner degreasers without remote solvent reservoirs existing as of 1/1/1990 in listed counties (8-3-5). In addition, in Clark, Floyd, Lake and Porter Counties, prohibits the use of solvent for cold cleaning with a vapor pressure greater than 1.0 mm Hg at 68°F except when used in electronics degreasing (8-3-8).</p>

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CTG Category: Cold Cleaning	
Michigan – 336.1611 Existing Cold Cleaners & .1707 New Cold Cleaners	Applicability: Statewide Control Requirements: Essentially the same as CTG requirements for cover, drainage, and waste management for existing units as of 7/1/1979. CTG control requirements apply to new units as 7/1/1979 based on Reid vapor pressure of more than 0.6 psia or use of solvent that is heated and a mechanically assisted cover based on a Reid vapor pressure of more than 0.3 psia, solvent agitation or use of a solvent that is heated.
Ohio – 3745-21-09 (O) (2) Solvent Metal Cleaning	Applicability: all sources in 24 listed counties, and in all other counties: sources constructed after 10/19/1979 or cleaning units at sources with the potential to emit 100 tons/year VOC. Control Requirements: Essentially the same as CTG requirements
Wisconsin – 423.03 (3) Solvent Metal Cleaning	Applicability: Statewide Control Requirements: Essentially the same as CTG Exemptions: units smaller than 1.1 square feet only require covers.
Other States	
California – Bay Area – Rule 16 Solvent Cleaning Operations	Applicability: District-wide Control Requirement: Similar but more prescriptive requirements when compared to CTG. Allows remote reservoir in lieu of cover when solvent contains less than 50 gm/liter (0.42 lbs/gal) VOC. If the solvent's VOC content exceeds 50 gm/liter or the solvent is agitated, the cover must be designed to be easily operated with one hand. If the solvent's VOC content exceeds 0.42 gm/liter internal drainage is required. Requires controls similar to CTG including use of 90% control device if solvent's VOC content exceeds 50 gm/liter. Exemptions: Unheated cold cleaners containing less than 1 gallon of solvent or having less than sq. ft. surface area; cold cleaners using emulsion or solution cleaners containing less than 1% VOC by weight. Cold cleaners regulated by other regulations for semiconductors, aerospace stripping, printed circuit board stripping, dry cleaning,
California – South Coast 1122 Solvent Degreasers	Applicability: District-wide Control Requirement: similar but more prescriptive requirements when compared to CTG. Tightly fitted cover; closed at all times except during parts entry and removal; 15 seconds drain time or until solvent dripping ceases or parts are visibly dry, cleaning unit and auxiliary equipment must not have leaks; use of solid liquid stream when spraying; solvent agitation by pump recirculation, ultrasonics, mixer, or air agitation under cover with less than 2 psi air pressure; and recovery of drained solvent. Does not include CTG vapor pressure criteria. Includes limit on VOC content in cleaning solvent of 25 gm/liter (0.21 lbs/gal) Exemptions: those listed expire 1/1/2005

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CTG Category: Cold Cleaning	
Maryland – 26.11.11.19.09 Control of VOC Emissions from Cold and Vapor Degreasing	Applicability: Statewide Control Requirements: Degreasing material must have a vapor pressure that does not exceed 1 mm Hg at 20°C (68°F)
Massachusetts – 310 CMR 7.18 (8) Solvent Metal Degreasing	Applicability: Statewide Control Requirements: Similar to CTG requirements. Remote reservoir required for units with solvent that has vapor pressure over 33 mm Hg (0.6 psi) at 100°F or is heated above 50 °F. All other units must meet CTG-like control requirements including cover capable of being operated by one hand.
New Jersey – 7.27- 16.6 Open Top Tanks and Solvent Cleaning Operations	Applicability: Statewide Control Requirements: Similar to CTG requirements. Applies to units with 2 gallons or more solvent containing 55 or more VOC. Degreasing solvent must have a vapor pressure less than does 1 mm Hg at 20°C (68°F). Requires visible fill line and freeboard ratio of 0.75 or greater for immersion cold cleaning units or heated units. Requires tight cover or remote reservoir. Precludes use of atomized spray or air agitated solvent baths.

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CTG Category: Open Top Vapor Degreasers	
<p>CTG RACT Recommendation: <u>Equipment Design Requirements</u> Cover designed to open and close without disturbing vapor phase Switches to control sump heat source and spray pump Freeboard ratio of 0.75, and Powered cover for cleaners with openings greater than 10 square feet, or Freeboard chiller, or Carbon adsorption system or equivalent control system <u>Operating Requirements</u> Closed cover except when processing workloads through unit Parts management procedures to minimize solvent carry-out including 15 second drain time Not to be used on porous materials Workloads should not occupy more than half the open top area Vapor level should not drop more than 4 inches when the work load enters No spraying above the vapor level Limit exhaust ventilation to 65 cfm per square foot unless necessary to meet OSHA requirements Manage waste solvent in closed containers, limiting losses to less than 20 percent</p>	
LADCO States	
Illinois – Subpart 215.183, 218.183, and 219.183 Open Top Vapor Degreasing	<p>Applicability: Statewide to sources with 3 lbs per hour or 15 lbs pr day or more VOC emissions Control Requirement: Equipment and operating requirements similar to CTG</p>
Indiana – 326 IAC 8-3-3, Open Top Vapor Degreaser Operation, 8-3-6 Open Top Vapor Degreaser Operation & Control Requirements	<p>Applicability: Cleaning units with more than 10 square feet opening as of 7/1/1990 in Clark, Elkhart, Floyd, Lake, Marion, Porter, and St. Joseph counties and new units statewide after 7/1/1990. Control Requirements: Equipment and operating requirements similar to CTG Cleaning units at 100 ton/year potential emission sources in as of 1/1/1980 in Clark, Elkhart, Floyd, Lake, Marion, Porter, and St. Joseph counties and all new units statewide after /1/1980 must meet requirements similar to CTG less the provisions for freeboard, powered cover, and use of a control system</p>

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CTG Category: Open Top Vapor Degreasers	
Michigan – 336.1612 Existing Open Top Vapor Degreasers & .1708 New Open Top Vapor Degreasers	Applicability: Statewide Control Requirements: Equipment and operating requirements similar to CTG for new units as of 7/1/1979 with greater than 10 square feet All units greater than 4 square feet openings requirement similar to CTG less the provisions for freeboard, powered cover, and use of a control system
Ohio – 3745-21-09 (O) (3) Open Top Vapor Degreasers	Applicability: all units in 24 listed counties, and in all other counties new units as of 10/19/1979 or cleaning units at sources with the potential to emit 100 tons/year VOC Control Requirements: Equipment and operating requirements similar to CTG
Wisconsin – 423.03 (4) Open Top Vapor Degreasers	Applicability: Statewide, with limits on requirements for units in counties other than Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington, and Waukesha Control Requirements: Equipment and operating requirements similar to CTG; additional cover specifications for units with greater than 10 square feet opening CTG control system requirements don't apply outside of listed counties or to units less with than 10.8 square feet in listed counties.
Other States and Local Jurisdictions	
California – Bay Area – Rule 16 Solvent Cleaning Operations	Applicability: District-wide Control Requirement: Equipment and operating requirements similar to CTG with limitation on solvent losses during waste management to less than 10% and option for system providing 90% equivalent control efficiency
California – South Coast 1122 Solvent Degreasers	Applicability: District-wide Control Requirement: more prescriptive control requirements than CTG requirements including provisions for automated parts handling system, circumferential primary condensing coil, water separator, 1.0 freeboard ratio, and a superheated vapor zone or a refrigerated freeboard chiller with limits on chilled air blanket temperature, 40% of solvent boiling point, unless solvent forms an azeotrope with water, then maximum of 50% of solvent boiling point. More prescriptive operating requirements than CTG requirements including provisions for startup and shutdown, maintaining temperature in the superheated zone 10°F above solvent boiling point, and managing parts in vapor zone.

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CTG Category: Open Top Vapor Degreasers	
Maryland – 26.11.11.19.09 Control of VOC Emissions from Cold and Vapor Degreasing	Applicability: Statewide Control Requirements: Requires use of condenser or control device with over 90% overall control efficiency. Vapor degreaser must have separate enclosed chambers for draining parts and capture of vapors.
Massachusetts – 310 CMR 7.18 (8) Solvent Metal Degreasing	Applicability: Statewide Control Requirements: Equipment and operating requirements similar to CTG
New Jersey – 7.27- 16.6 Open Top Tanks and Solvent Cleaning Operations	Applicability: Statewide Control Requirements: provides control options that are more prescriptive than CTG requirements that parallel the MACT requirement. Ten control options delineated for units with less than 13 square feet and seven control options for units with greater than 13 square feet solvent/air interface areas. Allow alternative approaches to achieve a chilled air blanket temperature that is no greater than 30% of the solvents boiling temperature. Provisions include operating requirements similar to CTG.

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