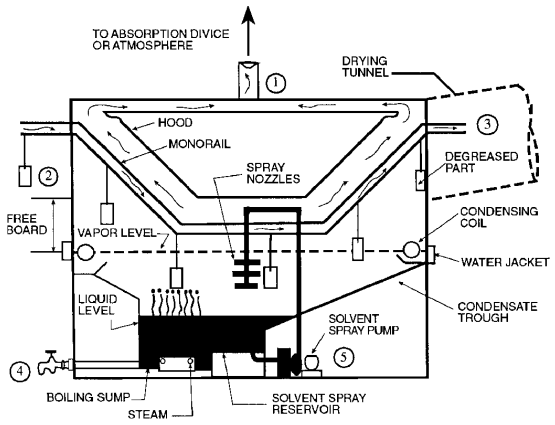
1998 Edition

Clean Air Act Compliance for Vapor Degreasers



Regulatory Strategies for Manufacturers Affected by the Clean Air Act Amendment's NESHAP for Halogenated Solvent Cleaners

Sponsored by:
Tennessee Department of Environment and Conservation
and
The University of Tennessee Center for Industrial Services

Center for Industrial Services

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About the Sponsors

On May 24, 1995, **Clean Air Compliance for Vapor Degreasers**, a teleconference on vapor degreasers, was broadcast nationwide. This manual was written to accompany that teleconference. If you would like to order a copy of the videotape, visit the UT CIS home page at www.cis.utk.edu**.** The following organizations sponsored the teleconference.

EPA's Education and Outreach Group of the Office of Air Quality Planning and Standards manages the programs such as the Air Pollution Training Institute (APTI), the Distance Learning Network (satellite broadcasts), and international training. Through APTI, courses in permitting, engineering, ambient and source monitoring, compliance, and dispersion modeling are offered using various formats including television, classroom, and self-instructional delivery methods. In late 1994, the EOG also became responsible for the Environmental Education Program and an evolving outreach program because of the recognized need to build new and strengthen existing partnerships.

EPA's federal Small Business Assistance Program was established to provide technical support to the state small business stationery source technical and environmental compliance assistance programs. The federal SBAP is located within the Office of Air Quality Planning & Standards Control Technology Center (CTC), a leader in providing technical assistance to state and local agencies. The federal SBAP is run in cooperation with several EPA assistance centers including the Pollution Prevention Information Center, the Chemical Emergency Preparedness and Prevention Office (CEPP), and the Emission Measurement Technical Information Center.

EPA's Office of the Small Business Ombudsman provides a convenient way for small business to access EPA, facilitates communication between the small business community and EPA, investigates and resolves disputes with EPA, and works with EPA personnel to increase their understanding of small businesses in development of enforcement and environmental regulations.

Tennessee's Small Business Assistance Program is located with the Tennessee Department of Environment and Conservation's Division of Pollution Prevention and Environmental Awareness. Its role of employer assistance to those regulated under the Clean Air Act Amendments is guided by the State Ombudsman.

Tennessee Valley Authority is a resource development arm of the federal government committed to environmental leadership supporting creative solutions to environmental problems. Through public and private partnerships, TVA promotes sustainable economic developments by educating corporate America on the value of waste reduction.

The University of Tennessee Center for Industrial Services has been Tennessee's industrial statewide extension program for more than 30 years. CIS provides technical and managerial assistance to Tennessee manufacturers to help them prosper. CIS helps manufacturers with a wide range of industrial issues from the environment to electronic data interchange. This manual was prepared by Todd Thomas, M.S., UT CIS waste reduction consultant.

Foreword

Modern American society has grown dependent on small businesses which provide services that make life easier. From the dry cleaner to the corner print shop to metal finishing employers, small businesses have seen increasing demands placed on them to operate without detriment to the environment.

Air pollution control regulations are very complex to small businesses, which may not be able to afford lawyers or environmental specialists to help them comply with all the requirements they may be responsible for in the new act. Many may be hard pressed to interpret the most basic requirements and deadlines of the control programs that will affect them, let alone the more complicated control issues.

Varying efforts by government are being required to meet the needs of small business. Satellite teleconferencing, accompanied by workbooks such as this, is believed to be one of the most cost-effective delivery techniques. By this means, we can distribute understandable compliance information which is uniform among the states as new federal regulations impact other heretofore unregulated small business sources.

This workbook and accompanying satellite teleconference were produced by the University of Tennessee Center for Industrial Services and Center for Telecommunications and Video in partnership with those concerned about helping small business.

Indeed, we are appreciative of all our federal, state, and private sector partners who make training events such as this possible.

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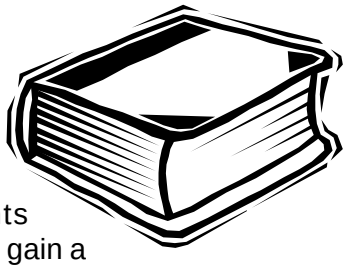
About This Book



This manual will help you understand the National Emission Standards for Hazardous Air Pollutants (NESHAP) for halogenated solvent cleaners. After you gain a clear understanding of the law and its requirements, you can make a better decision on how to comply with it. Thus, this book focuses on explaining the regulation. After finishing, you should be able to answer these questions:

- What is the law's intent?
- What are the details of each option?
- What is required with each option?
- What records must I keep?
- What reports must I submit?
- How often must I submit reports?

Please note that this book applies only to batch vapor or in-line degreasers using halogenated solvents (either pure or blended). Please refer to Appendix A for regulatory information if you use a batch cold degreaser.

US EPA has also prepared a publication, "Guidance Document for the Halogenated Solvent Cleaner NESHAP," to aid small business in determining if the NESHAP rule applies to them and their options for compliance. For a copy of the guidance document, contact the EPA Office of Air Quality Planning and Standards at (919) 541-2777 or contact your state SBAP office. For on-line/electronic copies, call the Technology Transfer Network Bulletin Board helpline at (919) 541-5384. Appendix B contains an article by DOW Chemical on reducing solvent use and minimizing emissions.

Unfamiliar terms appear in the glossary at the end of this book. Words which you see ***bold faced in italics*** are glossary terms.

How this book is arranged?

This book explains the compliance techniques mandated by the NESHAP vapor degreasing regulations. Use whichever technique best fits your operation. However, familiarize yourself with each method before making a decision.

Figure 1 shows an overview of the book. Chapter 1 introduces the law, who must comply, and important deadlines. Chapter 2 gives an overview of the regulation's structure to help you understand the law. Chapter 3 describes the administrative, monitoring, and performance details associated with each compliance technique. The final chapter discusses recordkeeping and reporting. Here is where you'll find items that you must track for each method and information required for each report.

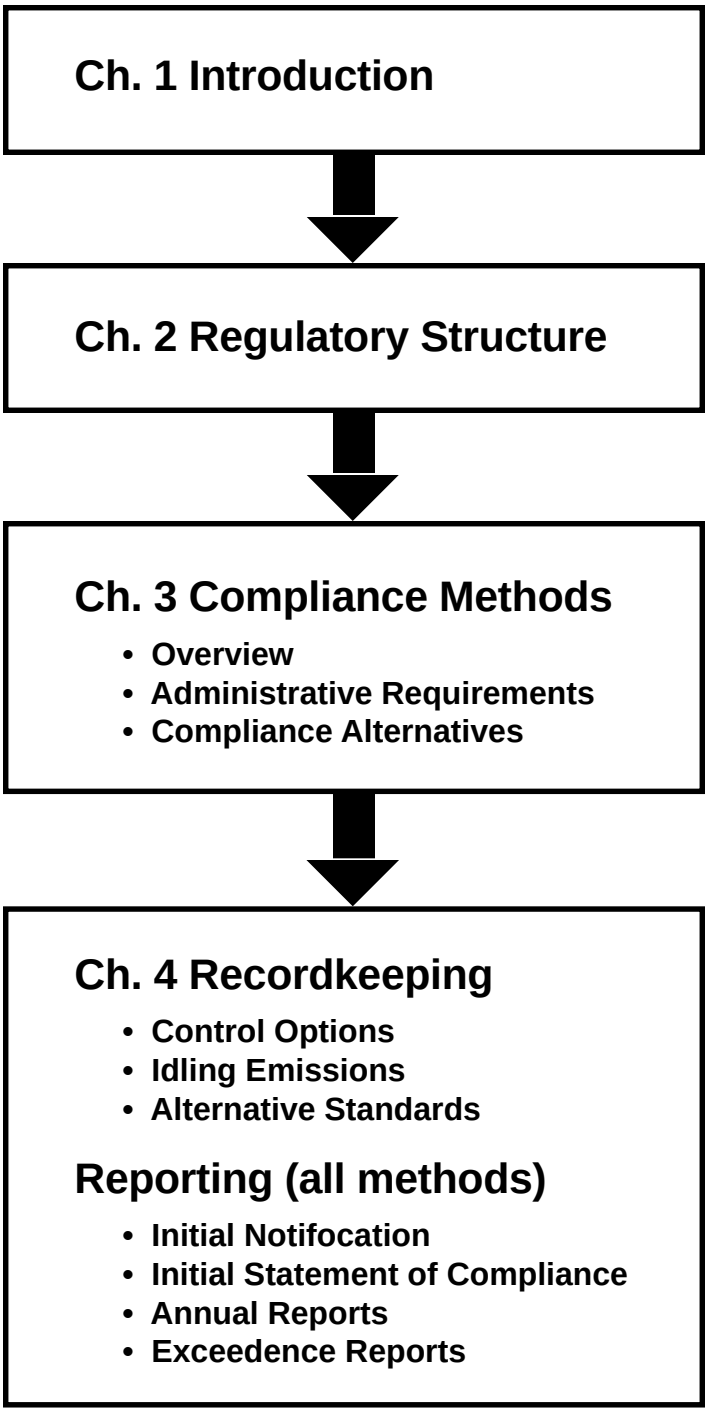
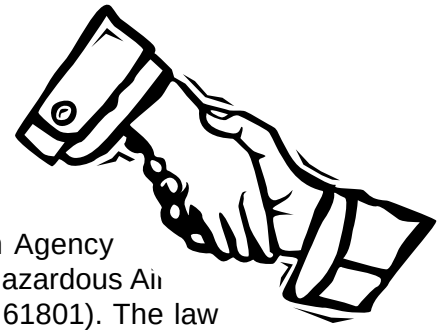


Figure 1 How This Book is Arranged

Chapter 1 Introduction



What is this regulation?

On December 2, 1994, the Environmental Protection Agency (EPA) published the National Emission Standards for Hazardous Air Pollutants for Halogenated Solvent Cleaning (59 CFR 61801). The law falls under the authority of Section 112 of the 1990 Clean Air Act Amendments. You can find the regulation in 40 Code of Federal Regulations Part 63, Subpart T. The regulation focuses on reducing the emissions of selected halogenated solvents used in parts cleaning. The compliance methods center around best operating practices and pollution prevention techniques.

Who is covered?

Owners and operators of degreasers using the following solvents:

- methylene chloride
- 1,1,1-trichloroethane
- chloroform
- perchloroethylene
- trichloroethylene
- carbon tetrachloride

NOTE: Blended cleaning solvents must contain a total regulated solvent content below 5 percent by weight to be exempted from regulation. To determine the solvent content, contact your vendor, use your Material Safety Data Sheets, or use EPA Test Method 18[1]. Appendix C contains worksheets to help you determine the regulated solvent content of your cleaning solution.

When are the deadlines?

Table 1 on the next page summarizes key deadlines for compliance. Other important deadlines appear in Chapter 4 Reporting and Recordkeeping.

[1] Test methods are available from EPA's Office of Air Quality Planning & Standards or their bulletin board system (BBS) at (919) 541-5742.

Table 1 Important Dates for Compliance

Machine Type	Initial Notification	Compliance Deadline	Initial Statement of Compliance
Existing	August 29, 1995	December 2, 1997	May 1, 1998
New	January 31, 1995**	Immediate	150 days after start-up

*You must operate your machines within the provisions of this regulation

**or as soon as practicable before construction or reconstruction if after December 2, 1994.

Existing sources are degreasers for which construction or reconstruction began on or before November 29, 1993.

New sources are degreasers for which construction or reconstruction began after November 29, 1993.

Title V applicability: Users of halogenated solvent cleaners must obtain a Title V permit under 40 CFR Part 70. However, some states may waive the permit requirement. Check with EPA to determine your responsibilities. This manual does not cover Title V. For further information on the CAAA and Title V, please see Appendix D.

Chapter 2 Navigating the Regs

The regulation seeks to reduce emissions of the six halogenated cleaners listed on page five through better operating practices and pollution prevention techniques. As a result, the law offers several compliance techniques.

Your responsibilities for each technique vary depending on your degreaser. The regulation categorizes degreasers in two classes based on machine type: batch vapor and in-line cleaners. See Figures 2 through 6 for examples of each machine.

EPA classifies batch vapor degreasers in two sizes, small and large, based on the machine's solvent/air interface area. Small batch degreasers have a solvent/air interface area less than or equal to 13 ft^2 (1.21 m^2). Large degreasers have an interface area greater than 13 ft^2.

In-line degreasers are either existing or new. They can use either a cold or vapor process to clean parts. Existing in-line degreasers are those for which construction, or reconstruction, began on or before November 29, 1993. EPA classifies all others degreasers as new.

Three primary methods exist for regulatory compliance:

- Control combinations
- Idling emissions
- Alternative standards

The specifics of each method depend on your machine type. Carefully consider your operation before making a decision; then choose the method that best fits your situation. Here's a brief overview of each method.

Control combinations: You may choose combinations of control technologies to reduce solvent releases. Your type of degreaser determines which group of control combinations you use. A set of minimum equipment design standards and operation practices accompany this method. Your reporting and monitoring requirements also depend on which group you choose.

Idling emission standards: This technique combines the minimum equipment design and operating practices with emission limits. You may use additional controls and techniques to meet the limits.

Alternative standards: You reach compliance with this method by meeting halogenated solvent emission limits from each machine as calculated on a three-month rolling average basis. You can use any means necessary to meet the emission limits. However, you might need to adopt several pollution prevention techniques to obtain compliance.

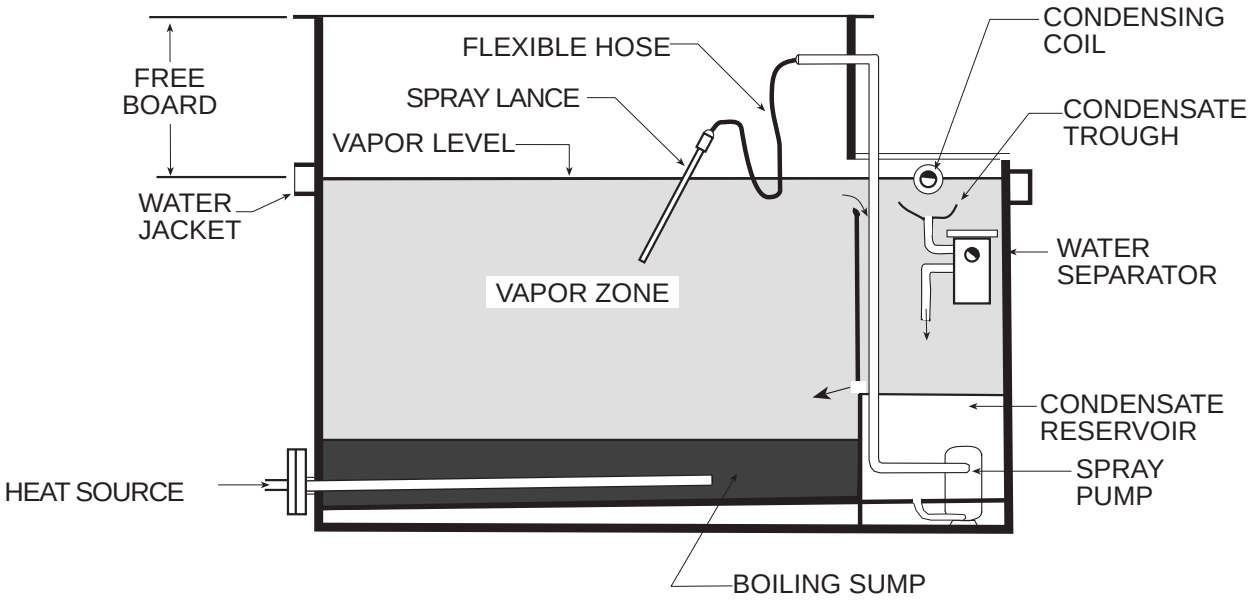


Figure 2 Offset Condenser Vapor-Spray-Vapor Degreaser

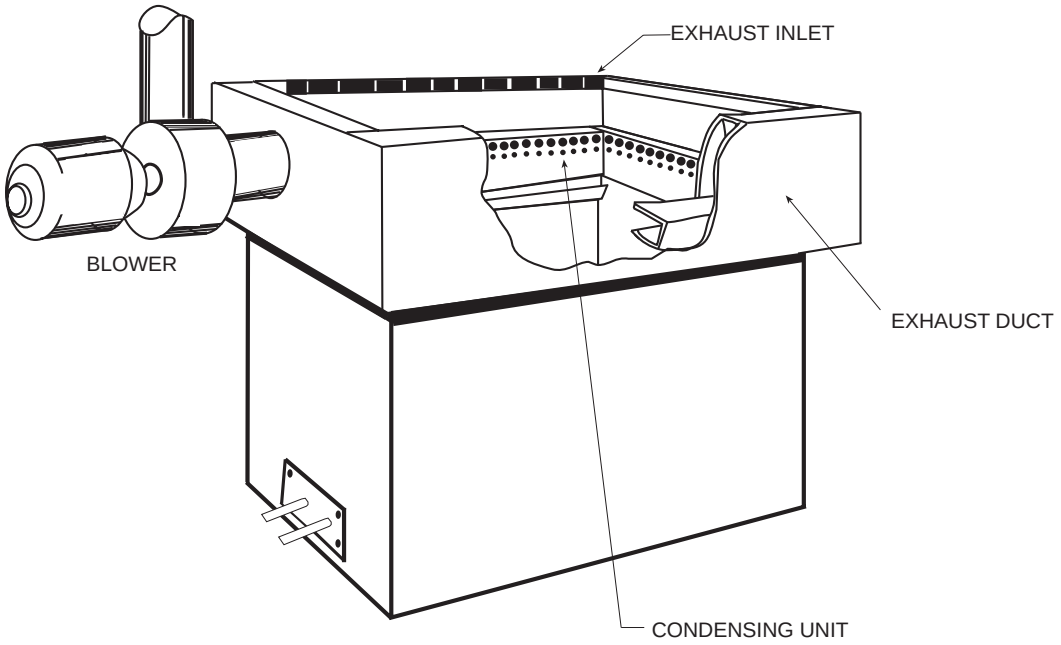


Figure 3 Degreaser with Lip Exhaust

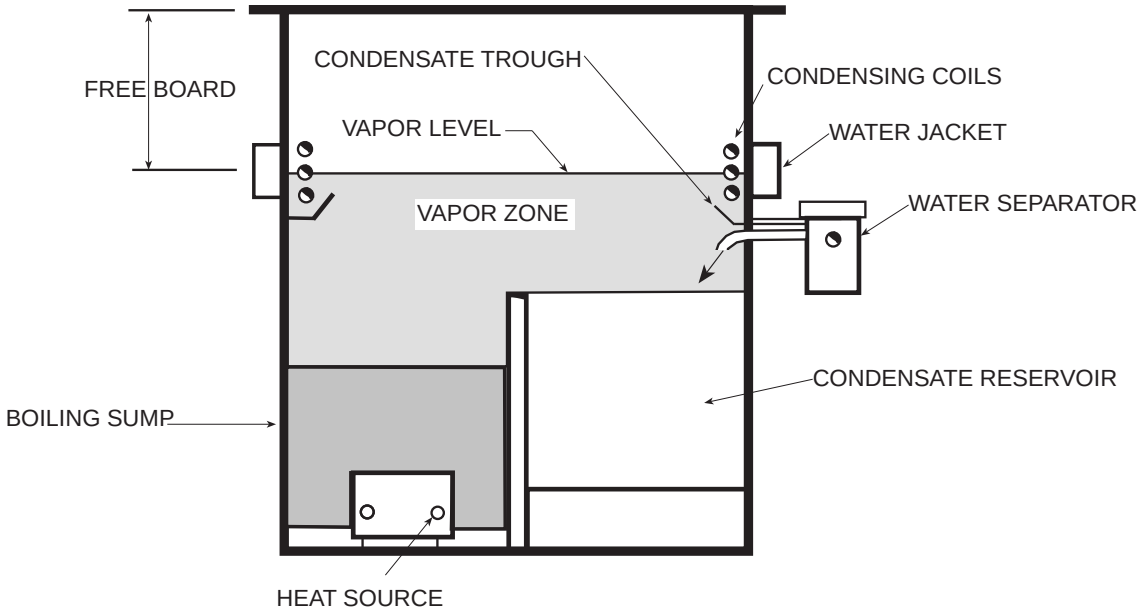


Figure 4 Liquid-Liquid-Vapor Degreaser, 2 Compartment

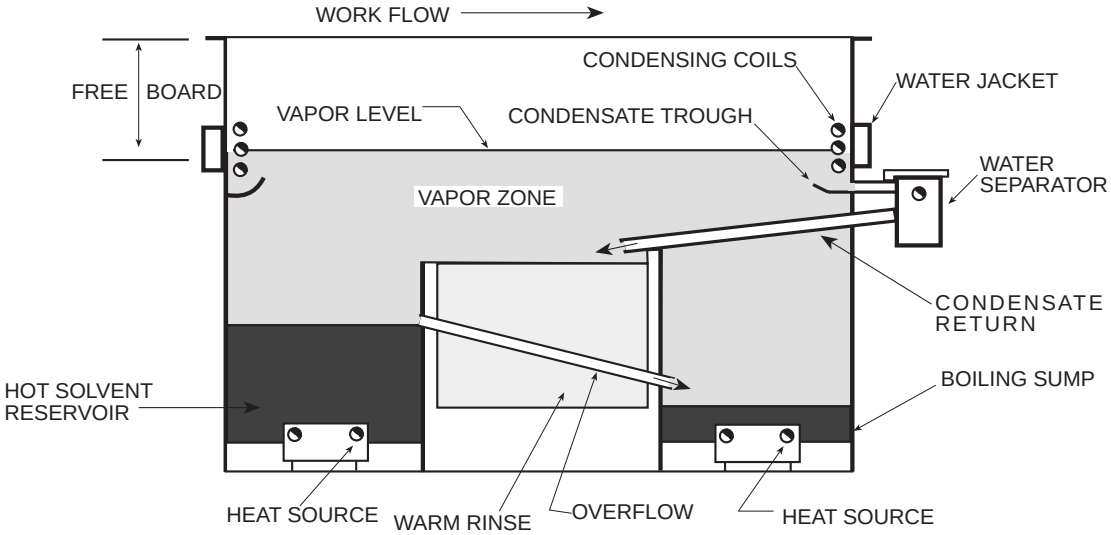


Figure 5 Liquid-Liquid-Vapor Degreaser, 3 Compartment

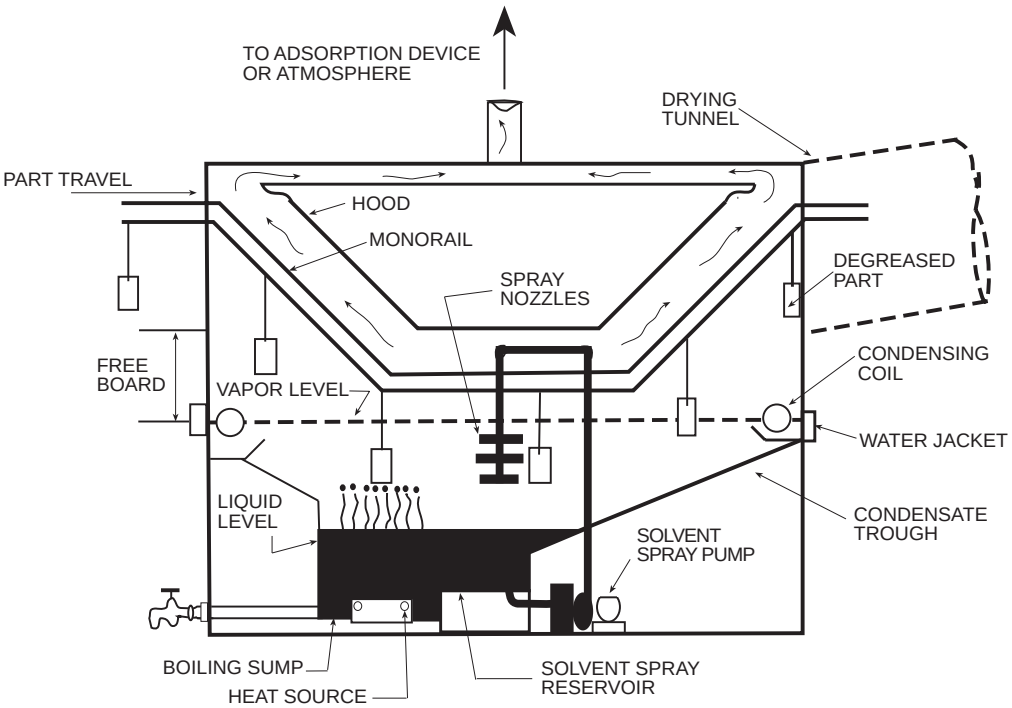


Figure 6 Vapor-Spray-Vapor Monorail Degreaser

NOTE:

EPA allows another route to compliance—the equivalent methods of control. Under it, you can develop your own techniques, using either equipment or workplace practices, to meet compliance. However, EPA or your local air authority must approve your procedures. Your application must include a complete description of the equipment or procedure; the proposed equivalency testing procedure; and the date, time, and location for the equivalency demonstration. Because every situation is unique, this method is not covered in this manual. Submit the application to your regional office, or contact your local air authority for more information. The Small Business Assistance Program in your state can assist you in submitting your application.

Chapter 3 Compliance Methods

This chapter provides the details needed to comply with this regulation. First you will find an overview of the administrative duties and compliance techniques. The next sections describe the details of each method.

Administrative Duties

Administrative duties such as monitoring, recordkeeping, and reporting are included with this regulation. Some of the reporting information is the same (for example, initial notifications) regardless of your compliance method. However, the overall reporting content varies greatly with each method. The four types of reports are:

- Initial notification
- Initial statement of compliance
- Annual report
- Exceedance report

Compliance Alternatives

As mentioned earlier, three primary methods of compliance exist:

- Control combinations
- Idling emissions
- Alternative standards

Each method differs in its techniques to reduce emissions. Table 2 outlines the required techniques used with each method.

Table 2 Required Elements for Each Compliance Method

	Equip. Design	Control Comb.	Operating Practices	Emission Limits
Control Comb.	x	x	x	
Idling Emissions	x	n/a	x	x
Alternative Standards	n/a	n/a	n/a	x

CONTROL COMBINATIONS METHOD

This method requires three items to meet compliance: using a degreaser that meets a minimum equipment design, adopting mandated operating practices, and using a group of control technologies. Equipment design and operating practices

lay the groundwork for reducing emissions. Using a combination of controls helps further minimize your solvent emissions. One appealing characteristic of this method is that it has no emission limits. You are only responsible for using a control group and meeting performance and administrative requirements.

EPA uses seven technologies to make up the control combinations. The combinations consist of either two or three control technologies depending on your degreaser. The technologies range from simple and inexpensive to complex and costly. The seven controls EPA used to create the combinations include:

- Working mode cover
- Carbon adsorber
- Dwell time
- Freeboard ratio of 1.0
- Freeboard refrigeration
- Superheated vapor
- Reduced room draft

Some machine types have more control combinations available. The different combinations give you flexibility in picking a compliance method.

IDLING EMISSIONS

Emission limits are the basis of this method. The emission rate depends on the machine, and as with the control combinations method, you must use the minimum equipment designs and operational practices prescribed by EPA. However, you can use any additional techniques (controls or operating procedures) to meet the limits. But, you must inform EPA of your method and a procedure to monitor its performance.

ALTERNATIVE STANDARDS

Like idling emissions, this method is emissions based. However, this method has no equipment or operational requirements. The only requirement is that solvent emissions, based on a three-month rolling average, be kept below certain limits. The machine type determines these limits. Meeting the emission limits may prove challenging to owners and operators of large degreasers.

Details of Control Combinations

As mentioned, the control combination method consists of three items to meet compliance:

- Installing controls to meet a minimum design requirement
- Adopting certain operating practices, and
- Using a predefined group of control technologies.

Figure 7 is a flowchart you can follow to meet compliance. First, you should meet the required equipment design. Next, train your workers to use the prescribed workplace practices. After implementing workplace practices, choose a control combination and establish a monitoring program to ensure their proper operation. Next, develop a recordkeeping system to track the control's performance. Finally, report the required information to EPA on time.

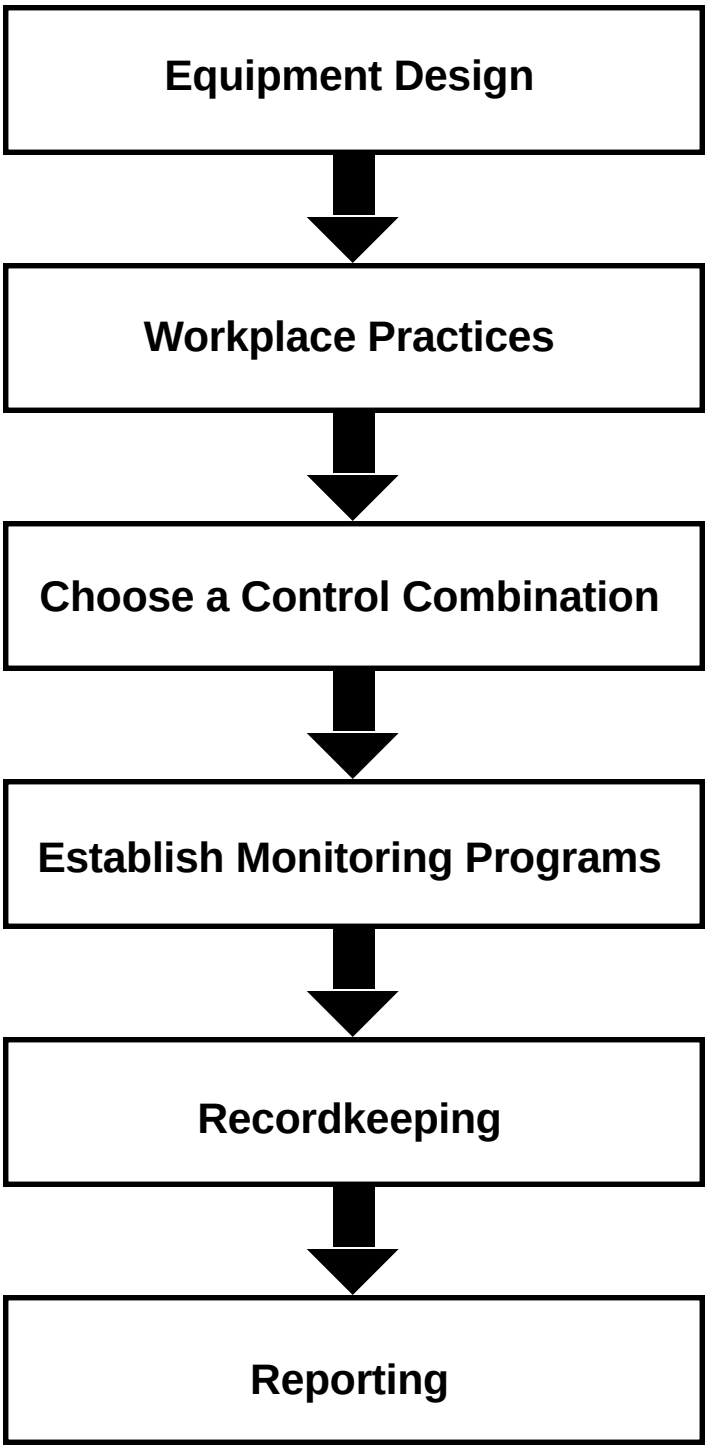


Figure 7 Compliance Steps

MINIMUM EQUIPMENT DESIGN

This section describes the minimum design features your degreaser must have. These requirements apply to both classes of batch vapor and in-line degreasers. New machines may have the equipment in place, while older models may need retrofitting. If your machine already has the equipment, ensure that it can meet performance requirements. These are EPA's requirements:

- An idling and downtime mode cover ***OR reduced room draft;***
- A ***freeboard ratio*** of at least 0.75;
- An ***automated parts handling system*** that moves parts slower than 11 feet per minute (3.4 meters per minute) during the entire cleaning cycle (for example, parts loading through removal);
- An automatic shut-off for the sump heater when the solvent level drops to the sump heater coils;
- A vapor level control device that shuts off sump heat if the vapor level rises above the primary condenser;
- A ***primary condenser*** above the vapor zone;
- A ***carbon adsorber*** if a lip exhaust is used to collect solvent vapors.

NOTE: There are monitoring and recordkeeping requirements if you use a hoist.

REQUIRED WORKPLACE PRACTICES

In addition to the minimum equipment design, EPA requires that users choosing this compliance route adopt certain workplace practices which center around pollution prevention. This list suggests ways to reduce solvent loss, regardless of your compliance method:

- Minimize air flow across the opening of the degreaser by covering the it during idling and downtime ***OR*** reducing room draft;
- Operate open-top batch vapor cleaning machines so the size of parts or part baskets to less than 50 percent of the machine's solvent/air interface ***OR*** reduce the entry speed of the parts or part baskets into the degreaser to less than 3 feet per minute (0.9 meters per minute);
- Conduct spraying operations within the degreaser—ideally, spray within the vapor zone or in a baffled or enclosed area within the machine;
- Place parts so they do not capture or trap solvent—for example, orient parts with cavities down to prevent solvent accumulation. Tip or rotate parts to remove excess solvent trapped in recessed cavities or in blind holes;
- Allow parts baskets or parts to stop dripping before removing from the degreaser;
- Turn on the primary condenser before starting the sump heater;

- Turn off the primary condenser after turning off the sump heater and the solvent vapor layer has collapsed;
- Use threaded or other leakproof couplings while adding or removing solvent from any degreaser. Also, place inlets to the solvent sump below the liquid solvent level;
- Follow manufacturers' recommendations for maintaining each degreaser and its controls. The EPA must approve any alternative maintenance practice;
- Ensure that all degreaser operators can pass the appropriate sections of EPA's written test (see Appendix E). An inspector may request that degreaser operators take the test during an inspection;
- Collect and store all waste solvent, still bottoms, and sump bottoms in closed containers. The containers may allow for pressure relief, but liquid solvent should not drain from the container;
- Avoid cleaning sponges, fabric, wood, and paper products in a degreaser.

AVAILABLE CONTROL COMBINATIONS

This section presents the control combinations you may use. As mentioned, no emission limit exists with this compliance method. However, properly using each control group will reduce halogenated solvent emissions.

You must know two characteristics of your degreaser to ensure that you pick from the correct pool of control groups. First, know whether you have a batch vapor or in-line degreaser. Second, if you use a batch degreaser, you should know its solvent/air interface area. This is the surface area where the solvent condensate meets the air. If you use an in-line machine, you need to know whether EPA considers it new or existing.

Tables 3 through 6 provide a matrix of the control options available for each degreaser classification. The tables should help you identify the technologies contained in each control group. Following the tables, you will find details of each control technology, including operating and monitoring requirements.

Appendix F contains forms to help you track the parameters that require monitoring. The forms provide guidance only and may not apply to your specific situation.

Table 3 Small Batch Vapor (solvent/air interface area of 13 ft^2 or less)

	Control Groups									
Control Technology	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Working-mode cover	X		X							
Freeboard ratio of 1.0	X			X		X		X		X
Freeboard refrig. device		X	X		X	X	X		X	
Superheated vapor	X	X		X						X
Reduced room draft				X	X			X		
Dwell time							X	X		
Carbon adsorber									X	X

Table 4 Large Batch Vapor (solvent/air interface area of > 13 ft^2)

	Control Groups						
Control Technology	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Working-mode cover			X				
Freeboard ratio of 1.0	X			X		X	
Freeboard refrig. device	X	X	X		X	X	X
Superheated vapor	X		X	X	X		X
Reduced room draft		X		X	X	X	
Dwell time		X					
Carbon adsorber							X

Table 5 Existing In-Line

	Control Groups			
Control Technology	**1**	**2**	**3**	**4**
Freeboard ratio of 1.0	X	X		
Freeboard refrig. device		X	X	
Superheated vapor	X			
Dwell time			X	X
Carbon adsorber				X

Table 6 New In-Line

	Control Groups		
Control Technology	**1**	**2**	**3**
Freeboard refrig. device	X	X	
Superheated vapor	X		X
Carbon adsorber		X	X

Freeboard refrigeration devices

A freeboard refrigeration device (also called a chiller) is a set of condenser coils in the freeboard region that creates a chilled ***air blanket*** to condense the solvent vapor and prevents its escape.

The freeboard refrigeration device must create a cool air zone which is 30 percent or less of the solvent's boiling point. For example, if your solvent boils at 100° F, your freeboard refrigeration device must cool the air blanket to 30° F or less. Table 7 lists the minimum temperatures needed for pure solvents.

Table 7 Temperature Requirements for Freeboard Refrigeration Devices for Regulated Solvents

Solvent	Boiling Temp. (F)	Req. Blanket Air Temp. (F)
Methylene chloride	104	31.2
1, 1, 1 trichloroethane	165	49.5
Trichloroethylene	189	56.7
Perchloroethylenne	250	75.0
Carbon tetrachloride	168	50.0
Chloroform	143	43.0

If you use a blended cleaning solution of regulated halogenated solvents and other chemicals, use the boiling point provided by the manufacturer on the material safety data sheets.

Check and record the temperature of the chilled region weekly using a thermometer or thermocouple. Measure the temperature in the center of the air blanket while the machine is idling.

7 Weekly

Freeboard Ratio of 1.0

The freeboard ratio is the freeboard height divided by the smaller interior dimension (length, width, or diameter) of the degreaser. For batch cleaners, the freeboard height is the distance from the solvent/air interface to the top of the idling degreaser. Freeboard height on in-line machines is the distance from the solvent/air interface to the bottom of either the entrance or exit, whichever is lower. Figures 2 through 6 show the freeboard region for both batch vapor and in-line degreasers respectively.

Superheated Vapor

Superheated vapor degreasers heat the solvent vapor above its boiling point to facilitate parts drying and minimize solvent drag-out.

Degreasers equipped with superheated vapor devices must:

- Maintain the solvent vapor at least 10° F above the solvent's boiling point;
- Use the manufacturer's method for determining the dwell time in the superheated vapor zone;

7 Weekly

- Ensure the parts remain in the superheated vapor zone for the entire dwell time;
- Measure and record the temperature at the center of the superheated vapor zone weekly using a thermometer or thermocouple.

Dwell Time

Dwell time is the time parts are held in the freeboard area so that some residual solvent may drain back into the degreaser. This technique reduces solvent drag-out and evaporative losses. Each part will require different dwell times due to its shape and material. As a result, you must determine the dwell time for every unique part you clean if you use this control method.

EPA has developed a procedure to determine the proper dwell time:

1. Use parts or parts baskets that are at room temperature.
2. Clean parts in the degreaser per standard operating procedures.
3. Determine the time for the part(s) or parts basket to cease dripping once placed in the freeboard region.
4. The proper dwell time for parts to remain in the freeboard area is no less than 35 percent of the time determined in step 3.

EXAMPLE:

Plant XYZ separately cleans two parts, A and B, in an open-top batch vapor degreaser using methylene chloride. To obtain compliance, XYZ chooses a control combination that uses dwell time. Thus, the company must determine the proper dwell time for each part type or parts basket.

First, XYZ must clean parts A, which are at room temperature, in the vapor degreaser. After the cleaning cycle, an operator places the wet parts into the freeboard area and starts a timer. When the parts stop dripping, the operator stops the timer. The elapsed time (for example, 10 minutes) is multiplied by 35 percent to determine the proper dwell time.

$$\text{proper dwell time} = 10 \text{ minutes} \times 35 \text{ percent}$$
$$= 3.5 \text{ minutes}$$

30 Monthly

Thus, the proper dwell time for A parts is 3.5 minutes. This is the minimum time the parts must remain in “dwell.” The same procedure is repeated for B parts. If XYZ decides to clean both parts A and B together, they must use the longer dwell time.

Important information about dwell time:

- Document the test used to determine dwell time;
- Measure dwell time monthly to assure you’re using the proper time.

Reduced Room Draft

Reduced room draft is a method to decrease the air flow across the freeboard area. This minimizes turbulence inside the degreaser. Two methods for reducing room draft are controlling room parameters (i.e., redirecting fans, closing doors and windows, etc.), or either fully or partially enclosing the degreaser. Whatever technique you choose, you must keep the air flow across the freeboard area **or** inside the machine to less than 50 ft/min (15.2 m/min). EPA developed the following procedures for each method to determine the air velocity:

Controlling room parameters

- Determine maximum wind speed with an air velocity meter on each of the four corners of the degreaser. Measure the windspeed within 6 inches above the freeboard area
- Record the maximum reading for each corner
- Average the values obtained at each corner to determine the average wind speed
- Lower the velocity if the average wind speed is greater than 50 ft/min. (for example, redirecting fans), and
- Monitor weekly the room parameters established during the initial compliance test to achieve the reduced room draft of less than 50 ft/min.

7 Weekly

Enclosures

- Determine the maximum windspeed inside the enclosure with an air velocity meter
- On a monthly basis:
  - ◊ Monitor the air flow inside the enclosure, and
  - ◊ Inspect the enclosure for cracks, holes, and/or other defects.

30 Monthly

Carbon Adsorbers

Carbon adsorption is a method of controlling solvent emissions by passing the exhaust from a degreaser through activated carbon. EPA discourages this method because it is a treatment technology. In addition, carbon adsorption can produce other potentially hazardous waste streams, like spent carbon beds saturated with halogenated solvent. As a result, additional waste management costs can occur. You should consider all factors and options before using this control technology.

The allowable limit for the solvent concentration in the carbon adsorber exhaust is 100 parts per million (ppm) by volume. If the concentration exceeds 100 ppm, adjust the desorption schedule, or replace the carbon bed if it is not a regenerative system. Additional operating requirements include:

- Ensuring that the carbon adsorber bed is not bypassed during desorption
- Locating the lip exhaust so the degreaser's cover closes below the lip exhaust level.

7 Weekly

With this control you must measure and record the solvent concentration in the exhaust of the carbon adsorber weekly. Test the concentration with a colorimetric detector tube. The measurement procedure should meet the following criteria:

- Sample gas at exhaust vent of solvent cleaning machine
- Ensure that vapor degreaser is in working mode and venting to the carbon adsorber
- Be sure colorimetric detector tube is accurate to +/- 25 ppm by volume
- Follow manufacturer's instructions when using colorimetric detector tube
- Provide a sampling port for monitoring within exhaust outlet of the carbon adsorber. The port should be at least 8 stack or duct diameters downstream from any flow disturbance such as a bend, expansion, contraction, or outlet; downstream from no other inlet; and 2 stack or duct diameters upstream from any flow disturbance such as a bend, expansion, contraction, inlet or outlet.

Covers

Covers keep the solvent vapors inside the degreaser by protecting its openings from air movements. Many different covers exist for use including rolltop, sliding, and biparting. Covering a degreaser is one of the cheapest and easiest ways to reduce solvent losses.

30 Monthly

Covers for a degreaser can be independent or part of its design. Any cover must seal the cleaner and prevent solvent vapors from escaping. When using a cover, you must inspect it monthly for cracks and to ensure proper operation. EPA recognizes three types of cover: idle, working, and downtime-mode.

Idling-mode cover: any cover that shields the degreaser openings during the idling mode. You can use an idling-mode cover as a working-mode cover if that definition is also met.

Working-mode cover: any cover that protects the degreaser openings from outside air disturbances during parts cleaning. Working mode covers are opened only during parts entry and removal. You can also use a cover that meets this definition as an idling-mode cover if that definition is also met.

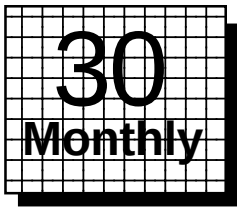
Downtime-mode cover: a cover used when the degreaser is off. It must completely cover the openings of the degreaser

Hoists

A hoist is not an available control method in a control combination. It's required per the mandatory equipment design. The following monitoring and reporting requirements are associated with hoist use:

- Calculate hoist speed by measuring the time it takes for the hoist to travel a measured distance and report it in meters per minute. To convert from feet to meters, multiply the distance in feet by 0.305

- Check the hoist speed monthly unless:
  - ◊ hoist speed does not exceed 11 feet/minute for one year—If so, you may measure hoist speed quarterly;
  - ◊ you can demonstrate that hoist speed cannot exceed 11 feet/minute. Then you can measure the speed quarterly.



Details of the Idling Emissions Method

This method has a limit on the quantity of regulated solvents emitted from the degreaser while the machine is idling. Figure 8 shows the steps required to meet compliance with this method. Table 8 lists the emission limits for each regulated degreaser.

Table 8 Idling Emission Rates for Each Degreaser Type

Degreaser Type	Emission Idling Rate (lbs/hr/ft^2)
Small and large batch	0.045
Existing and new line	0.021

Although this regulatory method is emissions oriented, it still requires the minimum equipment design and operational methods used in the control combinations method. If these techniques do not lower your emissions, you may use any additional controls or procedures necessary to meet the limit.

Your emission limit depends on the area of the degreaser's solvent/air interface. Once you determine the area, multiplying it by the appropriate emission factor gives the maximum hourly emission rate of solvent that the degreaser may emit.

In addition to determining your idling emissions rate you must:

- Prove you can meet emission limits using EPA's Reference Method 307
- Identify and monitor the operating parameters used to meet compliance. If you use a control from the Control Combination section, you must adhere to that control's monitoring requirements. If not, you must supply EPA with equivalent information on your parameter(s), and
- Operate the degreaser within the parameter limits. When a parameter is not met, an exceedance has occurred. Follow the exceedance guidelines listed in Chapter 4, Reporting.

Remember, with this compliance method you must:

- Monitor the controls used to meet emission limits
- Use the equipment design and operating practice guidelines.

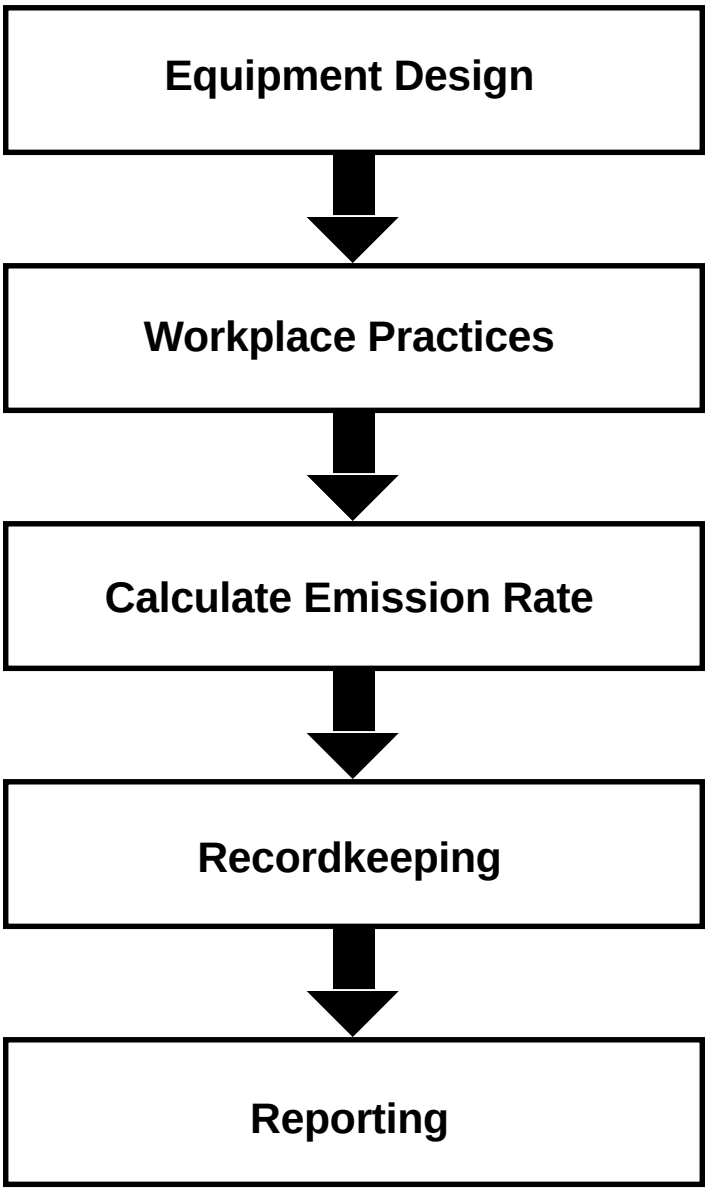


Figure 8 Idling Emissions Method

Details of the Alternative Standards Method

The alternative standard method limits the solvent emissions from your degreaser without requiring a minimum equipment design or workplace practices. You obtain compliance by using any technology or workplace practices you wish to meet the limits. You must also monitor and report the halogenated solvent emissions from your degreaser.

As mentioned, no mandatory equipment standards or workplace practices apply to this method. EPA developed this method to allow owners/operators a route to compliance if they have trouble using the other methods. Figure 9 is a flowchart of the steps required to use the alternative standards. Appendix G contains a worksheet to help you calculate your emissions.

The method for determining your emissions is based on a solvent material balance. In other words:

solvent in = solvent out

"Solvent in" can be virgin, reclaimed, or filtered cleaning solution. "Solvent out" is the amount evaporated during use plus the quantity contained in the solid waste produced during clean-outs.

The emission limit is based on a three-month rolling average. To calculate this value, determine your machine's solvent losses every month; then average it with the previous two months. This requires detailed records on solvent additions, deletions, and clean-out waste during each month.

Like the other methods, your equipment determines your regulatory obligation. This compliance method divides all degreasers into two categories:

- Batch or in-line vapor (BIV) degreasers with a solvent/air interface;
- Batch vapor degreasers without a solvent/air interface.

Older BIV have solvent/air interfaces. This is the area where the concentrated solvent vapor meets the air. Newer batch cleaners may use a vacuum to create a solvent vapor during the cleaning cycle. These batch units are completely enclosed and require a different calculation method to determine emission rates.

BASICS FOR DETERMINING DEGREASER EMISSIONS

The alternative standards require certain procedures regardless of your degreaser type. You must do the following before calculating your emissions:

- Place clean solvent in the degreaser on the first operating day of each month. Clean solvent may be either virgin, recycled, or filtered;
- Determine a fill line that you will always bring the solvent level to when replenishing the degreaser. On the first operating day of the month, bring the solvent level to the fill line with clean solvent.

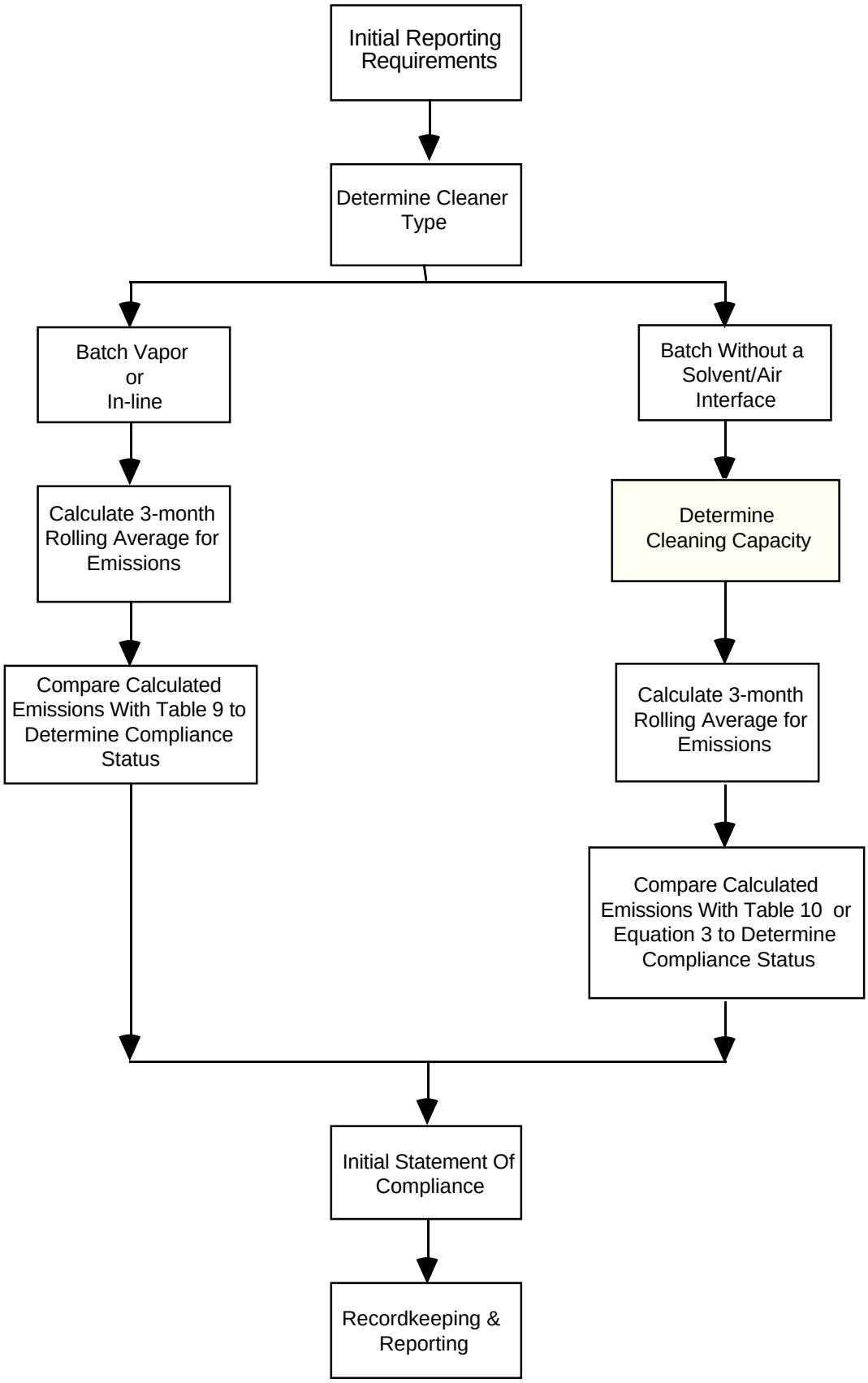


Figure 9 Alternative Standards

BIV with a solvent/air interface

The emission limits center around your degreaser type (batch, existing, or new in-line). Table 9 provides the three-month rolling average for emission limits. Using the material balance described above, EPA suggests you use the following methods for determining your emission rates:

- Maintain a log of all solvent additions or removals for each solvent cleaning machine;
- Use the information from the solvent log to calculate the solvent emissions (E) for one month. EPA provides the following formula for this calculation

EQUATION ONE:

$$E = \frac{SA - LSR - SSR}{S/A}$$

$$\text{where } E = \frac{\text{weight}}{\text{area}} = \text{solvent emissions for one month}$$

SA	=	"clean" solvent added into to degreaser during month (weight)
LSR	=	liquid solvent removed during month (weight)
SSR	=	solvent contained in solid waste from equipment cleaning during month (weight)
S/A area	=	solvent/air interface area (area)

Of these variables, SSR warrants further discussion. EPA allows two methods for determining solvent content in the solid waste from the degreaser clean-outs. First, you can use EPA Reference Method 25d. You, or an analytical lab, may perform the test. EPA also lets you use engineering calculations (for example, estimations) to determine solvent content. If you use your method, be sure to document the procedure. Whatever technique you choose, you must include it in the initial compliance report.

Once you've determined your monthly emission rate for three consecutive months, calculate the rolling average (EA). If this value is below the emission limit for your machine, you are in compliance.

The formula for the rolling average (EA) is:

EQUATION TWO:

$$E = \frac{E_1 + E_2 + E_3}{3}$$

where EA = the three-month rolling average taken over preceding 3 months

E_1 = halogenated HAP solvent emissions for month one from Equation 1.

E_2 = halogenated HAP solvent emissions for month two from Equation 1.

E_3 = halogenated HAP solvent emissions for month three from Equation 1.

EXAMPLE:

You choose to use the alternative standards to meet compliance. You have a small open-top vapor degreaser which has a solvent/air interface area of 12 square feet. In June, you begin recording solvent additions and deletions. During June, you:

- Removed 150 lbs of solid waste containing an estimated 75 lbs of solvent (SSR);
- Added 400 lbs of clean solvent (SA);
- Removed 100 lbs of spent solvent (LSR);
- Added 125 lbs on July 3 (the first working day of the month) to bring the solvent level to the fill line (SA).

Using Equation 1, you may calculate the solvent emissions for June as:

$$E = \frac{(400 \text{ lbs} + 125 \text{ lbs}) - 100 \text{ lbs} - 75 \text{ lbs}}{12 \text{ ft}^2} = 29.2 \ \frac{\text{lbs}}{\text{ft}^2}$$

During the months of July and August, you calculate your monthly emissions as 25.7 lbs/ft^2 and 27.6 lbs/ft^2, respectively. Now you can determine your three-month rolling average with Equation 2:

$$EA = \frac{29.2 \ \frac{\text{lbs}}{\text{ft}^2} + 25.7 \ \frac{\text{lbs}}{\text{ft}^2} + 27.5 \ \frac{\text{lbs}}{\text{ft}^2}}{3 \text{ month}} = 27.5 \ \frac{\text{lbs}}{\text{ft}^2 \bullet \text{mo.}}$$

You are under the emission limit of 30.67 lbs/ft^2/month, so you are in compliance. At the end of September, calculate the three-month rolling average using emissions from July, August, and September. This method is used for the entire year.

Batch without solvent air/interface

These machines use a vacuum in the cleaning chamber to process the parts. Therefore, instead of basing emissions on the solvent/air interface area, it revolves around the ***cleaning capacity***. See Appendix H for help on determining your cleaning capacity. This value is the maximum volume of parts the machine can clean at one time.

If your machine has a cleaning capacity less than or equal to 104 ft^3, then you may use either the values in Table 10 ***OR*** calculate the machine's limit as:

EQUATION THREE:

$$ME = 330\,(vol^*)^{0.6}$$

where ME = monthly emissions in kg/month

vol = cleaning capacity of the degreaser (M^3)

* to convert from kg/month to lbs/month, multiply kg/month by 2.2046

If your machine capacity is greater than 104 ft^3 (2.95 m^3), you must calculate your emission limits using Equation 3. The three-month rolling average is calculated with Equation 2 above.

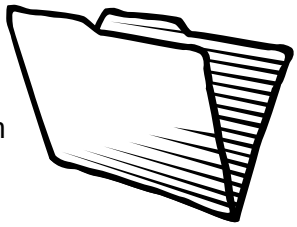
Table 9 Emission Limits for Batch Vapor and In-Line Solvent Cleaning Machines With a Solvent/Air Interface

Solvent cleaning machine	3-month rolling average monthly emission limit (lbs/square foot/month)
Batch vapor solvent cleaning machines	30.67
Existing in-line solvent cleaning machines	31.28
New in-line solvent cleaning machines	20.24

Table 10 Emission Limits for Cleaning Machines Without Solvent/Air Interface

Cleaning capacity (cubic feet)	3-month rolling average monthly emission limit (lbs/month)	Cleaning capacity (cubic feet)	3-month rolling average monthly emission limit (lbs/month)
0.0	0.0	53.0	928.1
1.8	121.3	54.7	945.8
3.5	183.0	56.5	965.6
5.3	233.7	58.3	983.3
7.1	277.8	60.0	1,000.9
8.8	317.5	61.8	1,018.5
10.6	352.7	63.6	1,036.2
12.4	388.0	65.3	1,051.6
14.1	418.9	67.1	1,069.2
15.9	449.7	68.9	1,086.9
17.7	480.6	70.6	1,102.3
19.4	509.3	72.4	1,119.9
21.2	535.7	74.2	1,135.4
23.0	562.2	75.9	1,150.8
24.7	586.4	77.7	1,168.4
26.5	612.9	79.4	1,183.9
28.2	637.1	81.2	1,199.3
30.0	659.2	83.0	1,214.7
31.8	683.4	84.7	1,230.2
33.5	705.5	86.5	1,245.6
35.3	727.5	88.3	1,261.0
37.1	749.6	90.0	1,276.5
38.8	769.4	91.8	1,289.7
40.6	791.5	93.6	1,305.1
42.4	811.3	95.3	1,320.6
44.1	831.1	97.1	1,333.8
45.9	851.0	98.9	1,349.2
47.7	870.8	100.6	1,364.6
49.4	890.7	102.4	1,377.9
51.2	908.3	104.2	1,393.3

Chapter 4 Recordkeeping & Reporting



This chapter discusses the recordkeeping and reporting requirements associated with this regulation. Remember, the compliance method you choose determines your responsibilities. Therefore, the requirements for each compliance method are discussed separately.

Recordkeeping

CONTROL COMBINATIONS AND IDLING EMISSION

With the control combination or idling emission method, you must maintain certain records on equipment performance, control test procedures, and test results. Either electronic or written records are acceptable. You must keep some information for as long as you own the machine while you must keep other information for only five years.

Keep this information for as long as you own the machine:

- Owners manuals for each degreaser and control device. If unavailable, keep written operating and maintenance procedures;
- The installation date for each degreaser and its respective control devices. If unsure of the date, substitute a letter certifying that the degreaser and its controls were installed on or before November 29, 1993, ***OR*** a letter certify that the degreaser and its control devices were installed after November 29, 1993;
- If using dwell as a control, keep the test methods and results from dwell time tests for each part;
- If using idling emissions standards, keep the test methods and results from the initial emission rate tests;
- The halogenated solvent content for the cleaner used in each degreaser. Your vendor can supply you with this information.

Maintain these records for five years:

- Monitoring results from each control device;
- Any actions taken to comply with the control options or idling emissions standard. This may include written or documented verbal orders for replacement parts, repairs, and monitoring procedures;
- Estimates of the annual solvent consumption for each degreaser;
- If using a carbon adsorber, the dates and results from the weekly tests to determine solvent concentration in the carbon adsorber exhaust.

ALTERNATIVE STANDARDS

Users of the alternative standards must keep these records for five years:

- Dates and quantity of solvent added to each degreaser;
- Solvent content of wastes removed from each degreaser;
- Methods for determining the rolling three-month average emissions, and the emission rate for each degreaser;
- Methods used to determine cleaning capacity for each degreaser without a solvent/air interface.

Reporting

There are four different reports you must submit regardless of your degreaser type or compliance method. These reports are the “initial notification,” “initial statement of compliance” and “annual report.” Appendix I contains sample forms which you can use to model your reports.

INITIAL NOTIFICATION

This report informs EPA that you use one or more degreasers. The content of the initial notification depends on your machine type and its age (for example, is your machine existing or new).

Existing degreaser

For existing machines, the report is due by August 29, 1995, and must contain the following information where applicable.

- Name and address of each owner and each degreaser;
- Description of the degreaser machine including:
  - ◊ type (batch, in-line);
  - ◊ solvent/air interface area or cleaning capacity;
  - ◊ existing controls;
- The installation date for degreaser and its respective control devices. If unsure of the date, substitute a letter certifying that the degreaser and its controls were installed on or before November 29, 1993, ***OR*** a letter certify that the degreaser and its control devices were installed after November 29, 1993;
- Anticipated method of compliance (control options, idling emissions, or alternative standards);
- Estimated annual consumption of halogenated solvents.

New degreaser

Deadlines for initial notifications depend on the date your “new” degreaser went, or goes, into service. If you began constructing or installing the degreaser on, or

before, December 2, 1994, your initial compliance report was due by January 31, 1995. It is due as soon as practicable after December 2, 1994. Include this information on the initial notifications for new degreaser:

- Brief description of each degreaser;
- Anticipated method of compliance for each degreaser;
- Estimated annual consumption of halogenated solvent.

INITIAL STATEMENT OF COMPLIANCE

You must submit an initial statement of compliance after submitting your initial notification. This notice informs EPA of your intended compliance method. For existing sources, the due date is May 1, 1998. For new degreasers the due date is 150 days after start-up. The content of this report varies with the compliance method.

Controls Combinations and Idling Emissions

You must report different information depending on whether you use control combinations or idling emissions. You should file a separate compliance statement for each degreaser even if you use the same method for both. Regardless of how you reach compliance, provide these five items:

1. Name and address of the owner(s);
2. Physical location of each degreaser;
3. The control equipment used for each solvent cleaning machine;
4 For each control, the parameters that are monitored and the monitoring results for the first month after the compliance date;
5. If applicable:
   - Steps taken to reduce room draft (for example, close doors or windows);
   - The date and results of the weekly measurement of halogenated solvent concentration in the carbon adsorber exhaust.

For idling emissions standard only, include items 1 through 5 and:

6. The results from the initial emissions test from Method 307;
7. Information on the monitoring method, monitoring frequency, and exceedance limits for any controls used to meet compliance. If using controls listed in the regulation, you should use the prescribed monitoring methods and frequencies;
8. Certify that the initial emissions test was performed on the exact model used in the facility. You, the vendor, or a third party may perform the initial emissions test;
9. If the degreaser vendor or a third party performed the emissions test include:
   - Person(s) or company performing the test;
   - Name and serial number of the degreaser;

- Date of the emissions test;
- Diagram of the degreaser;
- Justification that the solvent emissions from the in-house degreaser are equal to or less than the unit used in the test.

Alternative Standards

Supply this data where appropriate on the initial compliance report when using the alternative standard:

- Name and address of the degreaser owner or operator;
- Physical location of degreaser;
- The solvent/air interface area for each degreaser;
- The cleaning capacity and method for its determination;
- The first three-month rolling average for emissions.

ANNUAL REPORTS

These reports contain information on degreaser usage during the calendar year (for example, January to December). It is due February 1 of the following year. For example, if you used your degreaser the last nine months of 1999, the annual report is due February 1, 2000. The report content varies with the compliance method you choose. However, EPA allows you to include all methods in one report to reduce paperwork.

Control Combinations and Idling Emissions

If you use the control combinations or idling emissions method to comply, your annual report must include:

1. A signed statement from a company official (owner or his designee) certifying that degreaser operators have been properly trained, and can pass a written exam on its operation and respective control devices. Appendix D contains the EPA exam used by inspectors;
2. An estimate of the annual solvent consumption for each degreaser during the reporting period.

Alternative Standards

The annual report for each degreaser with which you use the alternative standard must include:

- The solvent/air interface ***OR*** cleaning capacity of each degreaser used with alternative standards;
- The average monthly solvent consumption during the reporting period for each degreaser;
- The estimated three-month rolling average solvent emissions.

EXCEEDANCE REPORTS

Exceedance reports are periodic statements filed for each machine to the EPA Administrator stating:

- Actions taken to maintain compliance;
- Exceedances and the associated corrective action;

Exceedance reports are in addition to your annual reports, and are due semiannually. However, if you have a particular type of exceedance, they become due quarterly. EPA may also decide that more frequent reporting is necessary for your operation.

An exceedance is different for each compliance method. For the control options and idling emissions method, an exceedance occurs when a control does not meet a certain operating parameter. For alternative standards, an exceedance occurs when the emission limit is surpassed.

For the control options and idling emissions method, we have divided Exceedances into two categories—minor and major. Table 11 lists the minor and major exceedances. Different requirements exist for each type of exceedance.

Minor

You do not have to report minor exceedances if corrected within 15 days of discovery. However, include the corrective action taken on the semiannual exceedance report. If you do not correct a minor exceedance within the 15-day limit, it becomes a major exceedance, and you are required to begin filing quarterly exceedance reports.

Major

If you have a major exceedance, you must correct the problem and report it on the next exceedance report. You must begin reporting quarterly until you have operated the degreaser for one calendar year without an exceedance or convinced the Administrator to reduce the reporting frequency.

Table 11 Minor and Major Exceedances

Minor	Major
Temperature in chilled air blanket exceeds 30% of the solvent's boiling point	Operating parameters allow a room draft to exceed 50 ft/sec
Air flow across the freeboard top **or** within the solvent cleaning machine exceeds 50 ft/sec	Working mode cover does not completely cover the degreaser openings when in a cleaning cycle
Working- and/or idling-mode covers become defective (e.g. cracks or holes)	Idle mode cover does not completely cover the degreaser when idling
Superheated vapor zone is less than 10° F above the solvent's boiling point.	Parts are not held in dwell long enough
Concentration or organic solvent exceeds 100 ppm in the carbon adsorber exhaust	Manufacturers dwell time exceed while using superheated vapor
	Carbon adsorber bed is bypassed during desorption
	Lip exhaust located below the cover

Glossary

Air blanket is the layer of air inside the solvent cleaning machine freeboard located above the solvent/air interface. The center line of the air blanket is equidistant in between the sides of the machine.

Automated parts handling system is a mechanical device that carries all parts and parts baskets at a controlled speed from the initial loading of soiled or wet parts through the removal of the cleaned or dried parts. Automated parts handling systems include, but are not limited to, hoists and conveyors.

Batch cleaning machine is a solvent cleaning machine in which individual parts or sets of parts are introduced into the solvent cleaning machine. An open-top vapor cleaning machine is a type of batch cleaning machine. A solvent cleaning machine, such as a ferris wheel cleaner that cleans multiple batch loads simultaneously and is manually loaded, is a batch cleaning machine.

Carbon adsorber is a bed of activated carbon into which an air-solvent vapor stream is routed and which adsorbs the solvent on the carbon.

Cleaning capacity for a cleaning machine without solvent/air interface, is the maximum volume of parts that can be cleaned at one time. In most cases, the cleaning capacity is equal to the volume (length x width x height) of the cleaning chamber.

Dwell is the technique of holding parts within the freeboard area but above the vapor zone of the solvent cleaning machine. Dwell occurs after cleaning to allow solvent to drain from the parts or parts baskets back into the solvent cleaning machine.

Freeboard ratio is the ratio of the solvent cleaning machine freeboard height to the smaller interior dimension (length, width, or diameter) of the solvent cleaning machine.

Primary condenser is a series of circumferential cooling coils on a vapor cleaning machine through which a chilled substance is circulated or recirculated to provide continuous condensation of rising solvent vapors and, thereby, create a concentrated solvent vapor zone.

Reduced room draft is decreasing the flow or movement of air across the top of the freeboard area of the solvent cleaning machine. Methods of achieving a reduced room draft include, but are not limited to, redirecting fans and/or air vents to not blow across the cleaning machine, moving the cleaning machine to a corner where there is less room draft, and constructing a partial or complete enclosure around the cleaning machine.

Superheated vapor system is a system that heats the solvent vapor, either passively or actively, to a temperature above the solvent's bioling point. Parts are held in the superheated vapor before exiting the machine to evaporate the liquid solvent on them. Hot vapor recycle is an example of a superheated vapor system.

Appendix A

COLD HALOGENATED SOLVENT CLEANING

Cold Halogenated Solvent Cleaning Overview

On December 2, 1994, the EPA published in the Federal Register final National Emission Standards for Halogenated Solvent Cleaning. The rules apply to cleaning machines using:

- *methylene chloride*
- *1,1,1-trichloroethane*
- *perchloroethane*
- *chloroform*
- *trichloroethylene*
- *carbon tetrachloride*

Owners and operators of vapor or in-line cleaning machines must achieve emission control standards based on maximum achieveable control technology.They also must comply with on-going monitoring, recordkeeping, and reporting requisites.

EPA based the standards for batch cold cleaning machines on generally available control technology. These standards require readily implemented controls, simple work and operational practices, minimal reporting and no record keeping.

A cold cleaning machine is a device that uses a nonboiling listed solvent to clean or dry the surfaces of parts placed therein.

EPA's preferred compliance option requires:

- use of tightly fitting cover kept closed except during part entry or removal
- a layer of water at least 1.0 inch thick floating on the solvent surface.

Sources using the water-cap option have no other work or operating practices requirements. In lieu of a water-cap, sources also can comply by using:

- an 0.75 freeboard ratio and a cover kept closed except during part entry or removal , or
- a remote-reservoir and a cover kept closed except during parts cleaning.

Sources using either of these options must perform specified work practices:

- Collect and store all waste solvent in closed containers.
- Do part flushing only in the machines freeboard area.
- Drain cleaned parts in the freeboard area for 15 seconds, or drip-free, whichever takes longer.
- Never exceed the machine's maximum fill line.
- Wipe up spills immediately. Store wipe rags in a closed container.
- Do not permit splashing when parts are cleaned using an agitated bath.
- Assure the machine is not exposed to drafts > 132 fpm when the cover is open.
- Do not clean sponge, fabric, wood, or paper parts in the machine.

All cold cleaning sources-must submit an "initial notification report" and a "compliance report" to:

EPA Region IV
Director, Air Toxics Division
345 Courtland St., NE
Atlanta, GA 30365

The initial notification was due August 29, 1995. Information required includes:

- Name and address of the owner/operator.
- The address of the cleaning machine(s).
- A brief description of each cleaning machine, including the machine type, and existing controls.
- The date of each machines installation, OR a letter certifying the machine and its control devices were installed before/after November 29, 1993.
- The anticipated compliance approach.
- An estimate of annual solvent consumption for each machine.

The compliance report is due May 1, 1998. This report requires the following information:

- Name and address of the owner/operator.
- The address of the cleaning machine(s).
- A statement, signed by the owner/operator, that the machine(s) for which the report is/are being submitted is/are in compliance.
- The approach used to secure compliance.

Appendix B

REDUCE METHYL CHLOROFORM EMISSIONS

Reduce Methyl Chloroform Emissions for Environmentally Sound Vapor Degreasing

by James A. Mertens
The Dow Chemical Co., Midland, MI

The stratospheric ozone protection provisions of the US Clean Air Act Amendments of 1990 regarding methyl chloroform (MCF or 1,1,1-trichloroethane) pose a challenge to many companies with metal cleaning operations. The mandated production scale-down and eventual phaseout of the widely used solvent has sent metal finishers on a long and difficult search for alternative solvents and processes. Unfortunately, it appears that there are no commercially available alternatives as effective, economical or safe as MCF.

For those metal cleaners who depend on the effectiveness, safety, and low toxicity of MCF and its exemption from regulations controlling volatile organic compounds (VOCs), the first step that should be considered is emission reduction.

Table I. Overview of Methyl Chloroform Legislation

Montreal Protocol	*Clean Air Act Amendments of 1990*
	1991: 100% of base
	1992: 100% "
1993: 100% of base	1993: 90% "
	1994: 85% "
1995: 70% of base	1995: 70% "
	1996: 50% "
	1997: 50% "
	1998: 50% "
	1999: 50% "
2000: 30% of base	2000: 20% "
	2001: 20% "
	2002: 0-10%* "
	2003: 0-10%* "
	2004: 0-10%* "
2005: 0% of base	2005: 0% "

All dates are effective January 1 of the year listed, base year is 1989

*Maximum volume of 10% for EPA-approved essential uses only

The fact is, the graduated production phase-out period mandated by the act—from January 1991 to January 2005 (see Table I for schedule details)—allows solvent availability to users for up to 11 years and, for certain essential applications, possibly 14 years. During this time, metal cleaners can adopt techniques that greatly reduce solvent emissions and waste and eventually approach total elimination of emissions. This practice will help them save solvent and the resulting solvent replacement costs (plus excise tax). It also makes sense, considering the increasing scrutiny that emissions will be receiving from regulatory agencies.

In addition, for those metal cleaners using the related chlorinated solvent trichloroethylene (TCE), emission reduction is especially important. TCE is classed by the Environmental Protection Agency (EPA) as a VOC which contributes to smog generation, and consequently its use is restricted under most state and local environmental regulations. With successful reduction of emissions and the corresponding containment of solvent vapors, many operations may consider using trichloroethylene, as well as the other chlorinated solvents, perchloroethylene or methylene chloride, as alternatives.

CONTAINMENT OF SOLVENT VAPORS

Industry's challenge to minimize solvent vapor emissions will mean, among other things, finding ways to contain vapors in the degreasing process, capturing and reusing fugitive vapors, recycling as a means of minimizing solvent waste, and environmentally safe disposal of solvent sludge. For many companies, this will require taking a good look at the vapor degreasing process.

The vapor degreaser has evolved over the years from a very simple piece of equipment to a comprehensive process that is continually improving as emission reduction is emphasized. The early degreasers were designed to maintain a vapor zone, but were not efficient in controlling solvent loss through diffusion to the ambient air. More recent degreaser designs conserve solvent better through several methods of containment, such as higher freeboards, improved cooling capabilities, and automatic covers. Today, even greater solvent containment can be achieved through modifications to these improved degreasers and associated processes.

The principal factors influencing solvent vapor losses are poor heat balance, moving air currents, and improper plant operating procedures. Significant saving can be achieved by getting any one of these parameters under control. The following operating guidelines can serve as a checklist for a metal cleaner who wants to reduce emissions.

IMPROVING HEAT BALANCE

REDUCE HEAT:

High heat does not provide improved cleaning. Use the least amount of heat required to keep the solvent at a slow boil and to give adequate vapor production.

ADJUST COOLING:

An adequate supply of cold water is needed to maintain the vapor zone at the midpoint of the cooling coils. Water cooled systems should be 50°F (10°C) at the inlet and not allowed to go above 90°F (32°C) at the discharge.

THE STOP AND GO TECHNIQUE

This procedure was developed to reduce solvent loss and lower solvent concentrations in the ambient air near a vapor degreaser.

1. Lower the work load into the vapor zone slowly. Otherwise an excessive vapor wave formation can push vapor out of the degreaser.
2. The vapors collapse as the work load enters the vapor zone.
3. Whenever the vapor level drops two to four inches, stop the load until the vapors stabilize or start to recover.
4. Then, lower the load further until the vapors drop another two to four inches.
5. Once the work load is covered by the vapors, it need not be lowered any further. The further it is from the boiling sump, the better the vapor recovery. The work load should never sit on top of the heating elements.
6. Remove the work load in increments of two to four inches, with pauses to allow the vapors to be entrapped in the freeboard area. This decreases vapor drag-out.
7. Once the work load has cleared the vapor zone, it should remain in the freeboard area until all parts are dry and no solvent drips from the work or the basket.

This "stop and go" method prevents solvent vapors from being pushed out of the degreaser by the piston effect of the work load. It allows maximum vapor recovery with shorter cleaning cycles.

CHECK THE WATER JACKET:

Proper water flow and temperature on the outside of the degreaser should be verified. This provides cooling for the upper surfaces of the degreaser and keeps hot vapor from migrating up the side walls from convection currents.

CONSIDER COLD TRAPS:

This is an upper set of very cold coils that cool the air above the vapors. Properly used, cold traps provide a dense blanket of cold air that helps reduce vapor diffusion. Frequently these are below freezing. It is best if a separate condensation trough is provided, as a considerable amount of water is condensed on these coils. This should incorporate a separate water separator in series with the main water separator.

PREVENTING AIR CURRENTS

USE COVERS ON OPEN TOP DEGREASERS:

Especially during idle times, this is possibly the single most important conservation step you can take. Proper use of covers can reduce solvent loss up to 55%. Sliding covers are particularly helpful, since they do not cause turbulence when moved, as do hinged covers.

AVOID DRAFTS OVER THE DEGREASER:

Fans, air conditioners, heaters, windows, doors, general plant air movement and equipment movement can blow the vapor-air mixture out of the degreaser. Situate the degreaser to minimize natural drafts or use baffles to prevent the vapors from being upset. Drafts around an open top degreaser can increase losses by up to 30%.

EXTEND THE FREEBOARD:

Units with freeboard heights that are 75 to 100% of the width of the degreaser can use up to 40% less solvent than units with lower ratios, such as 50%. Many new degreasers are now at 125 to 160% freeboard.

SPRAY IN THE VAPOR ZONE:

Spraying above the vapor zone not only generates a vapor-air mixture directly, which is immediately lost, but falling droplets of solvent also disrupt the vapor interface causing more vapor-air mixing. Spraying below the vapor zone can achieve up to a 5% reduction in solvent loss.

REDUCE EXHAUST VELOCITIES:

If vapor emissions are controlled with lip vent hood exhausts, be sure the exhaust is not too forceful. Otherwise it can cause turbulence in the vapor. Use the minimum exhaust velocity that provides proper vapor control in the work area.

ELIMINATE WIND TUNNELS:

Some semi-enclosed machine designs tend to channel and reinforce air currents through the machine, especially if power exhausted. Rearranging the air movement in the room can help to eliminate this wind tunnel effect. Baffles can also be installed to minimize or eliminate wind tunnel effects.

MODIFYING THE PROCEDURE

MOVE THE WORK SLOWLY:

Rapid part or basket movement disrupts the vapor zone and causes mixing with air. Control the hoist speed to less than 11 feet per minute of vertical travel and ensure the proper conveyor speed. The lower the speed the better, with three feet per minute being optimum. (See box for instructions in the "stop-and-go" technique.)

AVOID SOLVENT CARRY-OUT:

Solvent that does not drain properly from parts is lost immediately to evaporation outside the degreaser. Adjust the positioning in the baskets or racks to allow easy and complete drainage. Part rotation or movement as the parts are removed from the liquid helps to reduce drag-out.

BRING PARTS UP TO TEMPERATURE BEFORE REMOVAL:

The cleaning cycle isn't complete until parts have reached the temperature of the vapor, so that condensation has ceased. If condensation is still forming, solvent drag-out will increase.

USE PROPERLY SIZED BASKETS:

Large baskets that fill the area of the degreaser opening create a piston action when entering and exiting. This forces vapor out, which creates more vapor-air mixing. The basket should have an area of 50% or less of the degreaser opening.

USE ONLY CLEAN OR NONPOROUS MATERIALS:

Avoid introducing fabrics (shop rags, gloves, etc.) and wood into the degreaser. Do not use items such as ropes or wooden spacers or covers. These can collect solvent and release the vapors into the air as they dry out.

REPAIR LEAKS:

Leaks are difficult to detect because of the rapid evaporation of liquid solvent seepage. Careful inspection

should be performed routinely, especially in hidden spots.

UPGRADE YOUR DEGREASING EQUIPMENT:

To improve the efficiency of your vapor degreaser, the following devices can be useful:

- Automatic slide covers
- Higher freeboards
- Refrigerated freeboard chillers
- Carbon absorption lip exhaust
- Programmable transport systems

COLD CLEANING IMPROVEMENTS

It is more difficult to reduce emissions from cold cleaning operations because of the nature of the process. Where possible, metal finishers should consider converting these operations to vapor degreasing. Emissions can be minimized in cold cleaning, however, through certain economical improvements. Here are some suggestions:

1. Use covers over the cold cleaning tank to minimize evaporation.
2. Use a coarse spray or solid stream of solvent instead of a fine spray. A fine spray can vaporize too easily.
3. Control ventilation. Rapid air currents can carry vapors away from the tank.
4. Place wipe rags in a closed container and use them again whenever possible. Evaporation from drying rags can cause solvent loss.
5. Minimize open surface area. The less interface between solvent surface and air, the less evaporation.
6. Use a deep tank with a high freeboard to keep vapors inside the tank.
7. Use specially designed containers with automatic lids and drains.
8. Drain parts over the tank to capture as much of the solvent as possible. Parts should remain in the unit until dry so that there is no drag-out of solvent.
9. Don't use compressed air sprays to blow dry parts or to mix cleaning baths. These will just propel vapors into the surrounding air.

Many companies are now offering completely enclosed cold cleaning machines that provide little or no loss of vapor.

EMISSIONLESS DEGREASING

As far fetched as it may sound today, the chief alternative to MCF solvent degreasing processes may eventually be emissionless surface cleaning with solvents. An ideal process in which no solvent vapors are lost through emissions, all solvent is recycled, and solvent residues are either reused or used as a fuel on site, should eventually be available.

This is not an impossible dream. There is an excellent chance that emissionless cleaning will begin to be available on the US market in the next year or two. To begin with, new totally enclosed equipment designs that eliminate the solvent to air interface are being utilized in Europe and should be available in North America in the near future. These cleaning systems can reduce emissions beyond 95% compared with today's open top degreasers. Methods are in the development stage for trapping the remaining solvent emissions before they leave the plant.

Even today, virtually emissionless operation is theoretically possible. Carbon adsorption equipment, for example, when properly designed promises near zero emission. It is costly to operate, however, and few users have been able to approach full solvent loading. One major problem lies in the steam stripping process generally used to remove solvents from the spent carbon.

When used with methyl chloroform, steam can cause removal of the inhibitors from the MCF, which leads to excessive equipment corrosion. Using titanium or Hastalloy metals can reduce the corrosion and extend equipment life. Stripping with super heated steam can avoid these problems, but this must be done carefully because high temperatures can break down methyl chloroform and other chlorinated solvents.

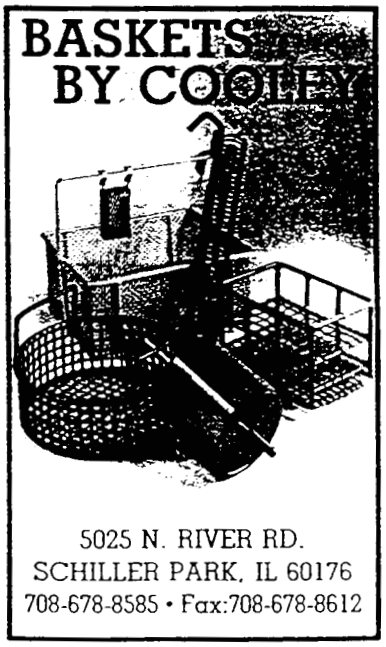
Molecular sieves provide an improvement in the technology of solvent capture, since they are able to separate water from solvent. They are still not 100% efficient, however, when used with chlorinated solvents.

The Dow Chemical Company is currently studying improved means of solvent capture, including the use of advanced adsorbent materials and processes. It is possible that adsorption systems with definite advantages over those currently on the market will be commercially available in a few years.

The probability that emissionless metal cleaning will soon be a reality sheds a new light on the criteria for selecting cleaning solvents. At present, manufacturers are searching for systems that will meet OSHA guidelines for worker exposure and Clean Air Act requirements for emissions; however, these considerations may no longer be relevant once processes are available that provide almost no emissions to the workplace or environment. Metal cleaning specifiers will then be able to concentrate exclusively on the performance of the solvent. **MF**

Biography

Jim Mertens is project leader for chlorinated solvents technical service and development (TS&D) in the chemicals and metals department, Dow Chemical USA. Mertens joined Dow in 1972 in Allyn's Point, CT, as operations supervisor for the eastern division latex product plant. In 1981, he transferred to Midland as a chemist for products/industrial development. The following year he was named a research chemist for new applications development. He moved to formulated products TS&D in 1983, and was named senior development chemist in 1985. Mertens moved to field operations in 1988. He assumed his current position in 1989.



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James A. Mertens

James A. Mertens is a Development Leader with Advanced Cleaning Systems, a business unit of Dow Environmental (Midland, Mich.), and a member of the Technical Service and Development Group (TS&D). His responsibilities include working with customers to develop, design and implement alternative cleaning systems to 1,1,1-trichloroethane and CFC 113.

Mertens earned an M.B.A. at the University of New Haven, Conn., and a Bachelor of Science from St. Bonaventure University in Allegany, N.Y.. He is a member of The United Nations Environment Programme, Solvents, Coatings and Adhesives Technical Options Committee which participates in the technical assessment for The Montreal Protocol. He is also a member of the Technical Advisory Group for the University of Tennessee's Cleaning and Testing Evaluation Project.

He has been with Dow for 23 years, seven years in latex production at the Allyns Point Plant in Connecticut, and 11 years in Chlorinated Solvents TS&D in Midland. He has been involved with Advanced Cleaning Systems since its inception at Dow four and a half years ago. His assignments in TS&D have involved industrial hygiene, coatings, new applications and surface cleaning.

# # #

Appendix C

PERCENT BY WEIGHT SOLVENT DETERMINATION

If you own a solvent cleaning machine in which you use less than 5 percent by weight of the solvents listed above, you need to keep records of that determination on-site (e.g., Material Safety Data Sheets [MSDSs], EPA Test Method 18 results, and/or calculations). Solvent MSDS's are typically available from your solvent supplier.

Stoddard solvents/naphthas generally contain less than 5 percent by weight halogenated solvent and will not typically be subject to this rule. The MSDSs for these solvents should provide sufficient documentation of solvent content.

If you create your own solvent blend, for which the listed solvents are a part, but comprise less than 5 percent by weight of the solvent, you need to show through calculations or MSDSs the weight percent that the listed solvents make up. This is required to demonstrate that the rule does not apply to you. One way you can do this is to do the following calculation:

Step 1: Gather the following information for each blend you make.

- S% = The weight percent of the listed solvents for each solvent added to your blend (in decimal form);
- TW = The total weight of each solvent added to your blend; and
- M = total solvent mass.

Step 2: Multiply the TW by the S% for each of your solvents. The result of this calculation equals WS, the weight of the listed solvents added to the blend for each of the solvents.

$$WS = S\% * TW$$

Step 3: Add the WS for each of the solvents added to your blend. The result of the calculation in Step 3 is TB, the total weight of the listed solvents in your blend.

$$TB = WS_1 + WS_2 + WS_3 + \ldots\ldots$$

Step 4: Divide TB by M. Then multiply by 100. The result of this calculation is the TW% of the listed solvents in your solvent blend.

$$TW\% = TB \div M$$

The other method you can use to determine the weight percent contained in your solvent is by using EPA test method number 18. This test method should be performed by a person qualified in the operation of a flame ionization detector.

Example Calculation

Step 1: Solvent Mixture X

Solvent Mixture Component	TW Total Weight of Component	S% % of Listed Solvent
1 = PCE	20g	0.3
2 = MC	30g	0
3 = TCE	10g	1.0
Total Weight of Solvent Mixture (M)	60g	1.3

Step 2:

TW		S%		WS
20g	x	0.3	=	6g
30g	x	0	=	0
10g	x	1.0	=	10g

Step 3:

$$WS_1 + WS_2 + WS_3 = TB$$
$$6g + 0g + 10g = 16g$$

Sept 4:

$$(TB \div M) \times 100 = TW\%$$
$$(16g \div 60g) \times 100 = 27\%$$

Solvent mixture X contains 27 percent by weight of the listed solvents. Solvent mixture X is therefore considered to be a halogenated solvent and solvent cleaning machines using solvent mixture X <u>are</u> subject to this rule.

HALOGENATED SOLVENT CONTENT RECORDKEEPING FORM

Cleaner Identification Number: _____

Machine Type (circle one): Batch Vapor Batch Cold In-Line

Step 1: Solvent Mixture ____

Solvent Mixture Component	TW Total Weight of Component	S% % of Listed Solvent
1		
2		
3		
4		
4		
6		
Total Weight of Solvent Mixture (M)		

Step 2:

TW		S%		WS
	x		=	
	x		=	
	x		=	
	x		=	
	x		=	
	x		=	

HALOGENATED SOLVENT CONTENT RECORDKEEPING FORM
(Continued)

Step 3:

$$WS_1 + WS_2 + WS_3 + WS_4 + WS_5 + WS_6 = TB$$

Step 4:

$$(TB \div M) \times 100 = TW\%$$

Appendix D

TITLE V OVERVIEW

CLEAN AIR ACT AMENDMENTS OF 1990

TITLE V PERMITS OVERVIEW

Title V is a section of the amendments made in 1990 to the Federal Clean Air Act (CAAA). This section of the amendments will have a significant impact on all 50 states, in that it:

- Requires all states to have a **FEDERALLY ENFORCEABLE** air pollution permit system.

  Presently, operating permit programs are run strictly by the states and are not subject to direct Federal intervention. Under Title V, a state may not issue air operating permits without EPA approval, and must not issue a permit if EPA objects.

- Requires that the program be paid for by emission fees assessed to permit holders.

  *Fees are to be set at a **presumptive minimum** of $25 per ton of pollutant emitted, up to 4000 tons for **each** pollutant covered by the permit. Fees are tied to the consumer price index and are based on 1990 dollars, so they will presumably increase with time.*

One intent of the program is to consolidate the multiple permits that industrial sources hold into a single permit covering an entire facility. The permit application must address all current applicable regulatory requirements as well as all known and anticipated requirements during the length of the permit, which will probably be five years. In addition to identifying applicable requirements, the applicant must identify those that **are not** applicable and ustify that decision to the satisfaction of the regulators.

TO WHOM DOES IT APPLY?

Title V permits are presently required for **major sources**. A ma or source is one which is capable of emitting at least **10 tons per year** of any **single** hazardous air pollutant (HAP), or **25 tons per year** of any **combination** of HAPs, or **100 tons per year** of **any other regulated air pollutant**. These figures may be set at lower levels in some so-called non-attainment areas.

What makes a facility sub ect to regulation under Title V is not actual emissions, but rather the **potential to emit** (PTE). **PTE is defined as the maximum potential emissions from a source calculated as if it were operated at full design capacity for 8760 hours per year.**

The pollutants covered under Title V include the **criteria pollutants** (SO_x, NO_x, VOCs, CO, lead and particulates), plus a list of **189 HAPs** which are specified in CAAA's Title III. Because each state is constructing its own enforcement plan, even more pollutants may be included in some states.

THE PERMIT SHIELD

Title V incorporates a feature called the "permit shield" which is intended to protect the applicant from enforcement actions during the period an application may be pending. Once an application is received by the state agency, **and the agency deems it complete**, the application is **eligible** to be covered by the "permit shield". What this means is that the **applicant must request the permit shield in his application** -- granting it is not automatic. The permit shield will ensure that the applicant can keep operating under existing permits without fear of enforcement actions based on permit expiration while the application is being processed, which can easily be a period of two years.

TIMING AND DEADLINES

The CAAA requires permits to be submitted within a specific time frame.

- **The clock starts when EPA approves the state's Title V program**. As of December, 1994, the Tennessee program had not been approved by the EPA.

- Within **one year** of the date of EPA approval of Tennessee's plan, all new applications must be submitted to the state.

- Within that same one year period, the state must issue one-third of the permits.

- Another third of the permits must be issued during the second year and the final third, during the third year.

The following is how the Tennessee plan **anticipates** this will be accomplished:

- The state has asked for **volunteers** to commit to filing applications within 120 days so that their applications can be processed and permits issued during the first year. Enough volunteers responded to fill the first group.

- A drawing will determine which companies are in the second group and the third group.

- Although the act places a **limit of five years** on the length of permits, the state will attempt to stagger the flow of future permit applications by assigning varying terms to initial permits during the round of initial applications. It is anticipated that all

renewals will be for five-year terms.

COMPLIANCE AND RESPONSIBILITY

Under the new permits, a permit may be re-opened during its term, so that new requirements can be imposed to reflect changes in Federal regulations or changes in the source being regulated. A renewal application will be more like a new permit than under the present system.

Compliance demonstrations will be required, and the permit will contain detailed procedures for monitoring and/or recordkeeping to demonstrate compliance.

CAAA requires that the application, including the emissions inventory, testing plans, monitoring procedures must be certified by a responsible official of the company, which is defined as a **company officer or the highest ranking operating manager at a specific site.**

The **responsible official is subject to personal civil or criminal penalties**, along with the company, for filing false or misleading information, **even if unintentional.** In addition, EPA can prosecute employees at any level if they are party to a violation.

Monetary penalties for non-compliance are increased, and the possibility of violations is multiplied by the increased monitoring, testing and certification requirements. Penalties can involve civil and criminal prosecutions; EPA can impose administrative penalties up to $100,000 **without going to court**; inspectors can issue spot penalties up to $5000 on field citations.

OPERATIONAL FLEXIBILITY

One facet of Title V is that it allows a facility to define alternate operating scenarios for processes and include them in their permit so long as compliance can be maintained. However, it will be necessary to include **all** alternate operating schemes in the permit, which will greatly complicate the application procedure.

SUMMARY - WHAT CAN I DO NOW?

The CAAA makes it clear that Congress' intent was to give EPA an enforcement tool. Title V is written on the premise that operations under current permitting procedures are not in compliance. The permit will detail all emissions sources, establish limits and prescribe methods by which you will demonstrate that you are in compliance. Several members of the regulatory community have recently said that the procedure that will be used in processing applications is that "the permitee will propose, the regulatory agency will respond". Under this procedure, the burden is on the permit applicant to determine what restrictions are applicable, what restrictions are not, how emissions are to be

controlled, and how **the permitee will demonstrate that he is in compliance** with applicable restrictions.

Until the Tennessee program has been approved by the EPA, the proposed program is sub ect to change. However, any facility which currently has air permits will eventually have to file for a new one. Because Tennessee will pattern all future permits after the Title V permits, it is definite that the starting point will be a complete inventory of all emissions to the atmosphere from the facility. Because this can be a long, arduous process, it is recommended that this step be commenced as soon as time and personnel can be made available.

For up-to-date information on the status of state and local programs, EPA has an electronic bulletin board, updated monthly, which is accessible from a computer with a modem by dialing 919-541-5742 (Technical Assistance Hotline, 919-541-5384).

Appendix E

OPERATOR TEST

Test of Solvent Cleaning Procedures

General Questions

_____ 1. What is the maximum allowable speed for parts entry and removal?

A. 8.5 meters per minute (28 feet per minute).
B. 3.4 meters per minute (11 feet per minute).
C. 11 meters per minute (36 feet per minute).
D. No limit.

_____ 2. How do you ensure that parts enter and exit the solvent cleaning machine at the speed required in the regulation?

A. Program on computerized hoist monitors speed.
B. Can judge the speed by looking at it.
C. Measure the time it takes the parts to travel a measured distance.

_____ 3. Identify the sources of air disturbances.

A. Fans
B. Open doors
C. Open windows
D. Ventilation vents
E. All of the above

_____ 4. What are the three operating modes?

A. Idling, working and downtime
B. Precleaning, cleaning, and drying
C. Startup, shutdown, off
D. None of the above

_____ 5. When can parts or parts baskets be removed from the solvent cleaning machine?

A. When they are clean
B. At any time
C. When dripping stops
D. Either A or C is correct

_____ 6. How must parts be oriented during cleaning?

A. It does not matter as long as they fit in the parts basket.
B. So that the solvent pools in the cavities where the dirt is concentrated.

C. So that solvent drains from them freely.

____ 7. During startup, what must be turned on first, the primary condenser or the sump heater?

A. Primary condenser
B. Sump heater
C. Turn both on at same time
D. Either A or B is correct

____ 8. During shutdown, what must be turned off first, the primary condenser or the sump heater?

A. Primary condenser
B. Sump heater
C. Turn both off at same time
D. Either A or B is correct

____ 9. In what manner must solvent be added to and removed from the solvent cleaning machine?

A. With leak proof couplings
B. With the end of the pipe in the solvent sump below the liquid solvent surface.
C. So long as the solvent does not spill, the method does not matter.
D. A and B

____ 10. What must be done with waste solvent and still and sump bottoms?

A. Pour down the drain
B. Store in closed container
C. Store in a bucket
D. A or B

____ 11. What types of materials are prohibited from being cleaned in solvent cleaning machines using halogenated HAP solvents?

A. Sponges
B. Fabrics
C. Paper
D. All of the above

Control Device Specific Questions

[ ] **Freeboard Refrigeration Device**

_____ 1. What temperature must the FRD achieve?

A. Below room temperature
B. 50°F
C. Below the solvent boiling point
D. 30 percent below the solvent boiling point

[ ] **Working-Mode Cover**

_____ 2. When can a cover be open?

A. While parts are in the cleaning machine
B. During parts entry and removal
C. During maintenance
D. During measurements for compliance purposes
E. A and C
F. B, C, and D

_____ 3. Covers must be maintained in what condition?

A. Free of holes
B. Free of cracks
C. So that they completely seal cleaner opening
D. All of the above

[ ] **Dwell**

_____ 4. Where must the parts be held for the appropriate dwell time?

A. In the vapor zone
B. In the freeboard area above the vapor zone
C. Above the cleaning machine
D. In the immersion sump

ANSWERS

General Questions

1. B
2. A or C
3. E
4. A
5. C
6. C
7. A
8. B
9. D
10. B
11. D

Control Device Specific Questions

1. D
2. F
3. D
4. B

Appendix F

SAMPLE RECORDKEEPING FORMS

HALOGENATED SOLVENT CLEANER NESHAP:

FRD[a] RECORDKEEPING FORM

Cleaning Machine Identification Number: _____

Machine Type (circle one): Batch Vapor In-Line Solvent: _____

FRD Temperature Requirement:

Date/ Initials[b]	Temperature (°F)	Date/ Initials[b]	Temperature (°F)

[a] FRD = Freeboard refrigeration device.
[b] Date of inspection and initials of employee conducting inspection.

HALOGENATED SOLVENT CLEANER NESHAP:

SHV[a] RECORDKEEPING FORM

Cleaning Machine Identification Number: _____

Machine Type (circle one): Batch Vapor In-Line

SHV Temperature Requirement:

Date/ Initials[b]	Temperature (°F)	Date/ Initials[b]	Temperature (°F)

[a] SHV = super-heated vapor.
[b] Date of inspection and initials of employee conducting inspection.

HALOGENATED SOLVENT CLEANER NESHAP:

DWELL DETERMINATION TEST RECORDKEEPING FORM

Cleaning Machine Identification Number: _____

Parts Description:

Date/Initials[a]		Time for Parts to Stop Dripping in Vapor Zone (seconds)	Individual Dwell Times (second)
	Run 1	x 0.35 =	
	Run 2	x 0.35 =	
	Run 3	x 0.35 =	
		Total	/3 = seconds
			= Proper Dwell Time

Cleaning Machine Identification Number: _____

Parts Description:

Date/Initials[a]		Time for Parts to Stop Dripping in Vapor Zone (seconds)	Individual Dwell Times (second)
	Run 1	x 0.35 =	
	Run 2	x 0.35 =	
	Run 3	x 0.35 =	
		Total	/3 = seconds
			= Proper Dwell Time

[a] Date of test and initials of employee conducting test.

HALOGENATED SOLVENT CLEANER NESHAP:

DWELL MEASUREMENT TEST RECORDKEEPING FORM

Cleaning Machine Identification Number: _____

Parts Description: _____

Proper Dwell Time: _____

Date/ Initials[a]	Actual Dwell (seconds)	Date/ Initials[a]	Actual Dwell (seconds)

[a] Date of inspection and initials of employee conducting inspection.

HALOGENATED SOLVENT CLEANER NESHAP:

REDUCED ROOM DRAFT INITIAL WINDSPEED TEST RECORDKEEPING FORM

Cleaning Machine Identification Number: _____

Machine Type (circle one): Batch Vapor In-Line

Reduced Room Draft Requirement: Less than or equal to 15.2 meters per minute (50 feet per minute). **Complete A or B, and C.**

A. For Controlling Room Parameters:

	WINDSPEED (meters or feet per minute)		
	Test 1	Test 2	Test 3
Corner C_1			
Corner C_2			
Corner C_3			
Corner C_4			
Average Windspeed $= C_1+C_2+C_3+C_4/4$			

B. For An Enclosure:

Maximum enclosure windspeed _____ (meters or feet per minute).

C. Description of Room Parameters or Enclosure:

HALOGENATED SOLVENT CLEANER NESHAP:

REDUCED ROOM DRAFT WINDSPEED MEASUREMENTS RECORDKEEPING FORM

Cleaning Machine Identification Number: _____

Machine Type (circle one): Batch Vapor In-Line

If using room parameters, measure windspeed quarterly and check room parameters weekly.
If using an enclosure, measure windspeed and check enclosure monthly.

Date/ Initials[a]	Windspeed (meters or feet per minute)	Date/ Initials[a]	Windspeed (meters or feet per minute)

[a] Date of inspection and initials of employee conducting inspection.

HALOGENATED SOLVENT CLEANER NESHAP:

CARBON ADSORBER RECORDKEEPING FORM

Cleaning Machine Identification Number: _____

Machine Type (circle one): Batch Vapor In-Line

Maximum Allowable Outlet Concentration of the Covered Solvents: 100 ppm

Date/ Initials[a]	Outlet Concentration (ppm)	Date/ Initials[a]	Outlet Concentration (ppm)

[a] Date of inspection and initials of employee conducting inspection.

HALOGENATED SOLVENT CLEANER NESHAP:

COVER RECORDKEEPING FORM

Cleaning Machine Identification Number: _____

Machine Type (circle one): Batch Cold Batch Vapor In-Line

Date/Initials[a]	Opening & Closing Properly[b]		Completely Covers Openings[b]		Free of Cracks, Holes and Other Defects[b]	
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N
	Y	N	Y	N	Y	N

[a] Date of inspection and initials of employee conducting inspection.
[b] Circle appropriate answer: Y = Yes, N = No.

HALOGENATED SOLVENT CLEANER NESHAP:

AUTOMATED PARTS HANDLING - HOIST SPEED RECORDKEEPING FORM

Cleaning Machine Identification Number: _____

Machine Type (circle one): Batch Vapor In-Line

Maximum Allowable Hoist Speed: 3.4 meters per minute (11 feet per minute)

Date/ Initials[a]	(1) Distance Moved (meters or feet)[b]	(2) Time Elapsed (minutes)	Hoist Speed (1) * (2) (meters or feet per minute)	Distance Description[c] (Starting Point/Ending Point)

[a] Date of inspection and initials of employee conducting inspection.
[b] Circle appropriate unit.
[c] e.g., Left Rim/Right Rim

Appendix G

ALTERNATIVE STANDARDS: MONTHLY EMISSIONS WORKSHEET

HALOGENATED SOLVENT CLEANER NESHAP:

OVERALL EMISSIONS LIMIT
MONTHLY EMISSIONS RECORDKEEPING FORM

(For Machines That Have a Solvent-Air Interface Area)

Cleaner Identification Number: _____

Month/Year	SA (1)	LSR (2)	SSR (3)	AREA (4)	Monthly Emissions $\frac{(1) - [(2) + (3)]}{3}$

SA = Amount of halogenated solvent added (kilograms of solvent added [or pounds of solvent added]) that month.

LSR = Amount of halogenated solvent removed (kilograms of solvent removed [or pounds of solvent removed]) that month.

SSR = Amount of halogenated solvent removed from the cleaning machine in solid waste (kilograms of solvent removed [pounds of solvent removed] that month).

AREA = Amount of halogenated solvent removed from the machine in solid waste (kilograms of solvent removed [or pounds of solvent removed]).

Appendix H

CLEANING CAPACITY

If your machine does not have a solvent-air interface area, you need to determine the cleaning capacity (cubic meters [cubic feet]) to determine the appropriate overall emissions limit that would apply to you. This option is available only to machines that do not have solvent air interface. A machine's cleaning capacity can be determined in any of the following ways:

- Check the literature that was provided with your machine at the time of purchase to see if it includes a measurement of the cleaning capacity for your cleaning machine;

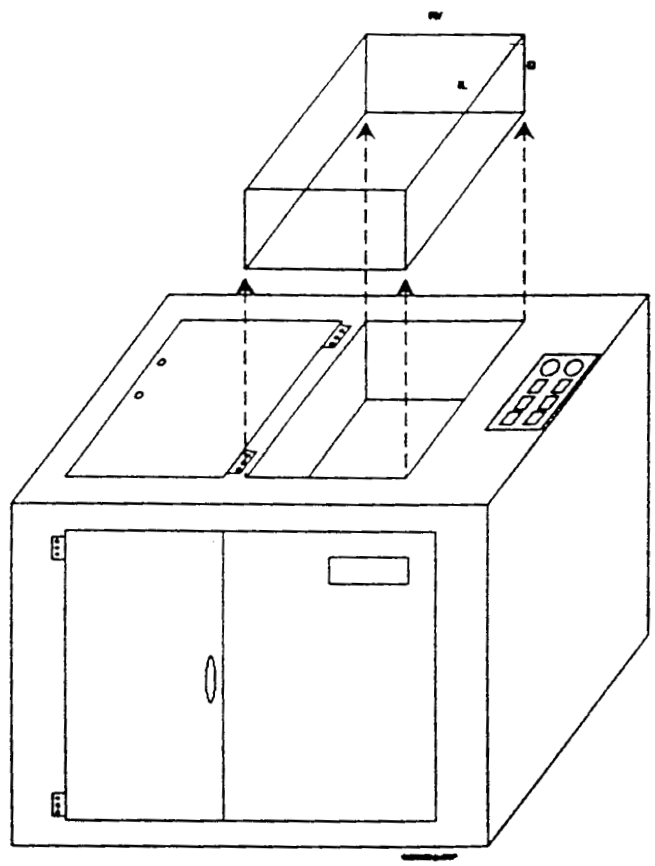
- Ask the manufacturer of your machine for the cleaning capacity;

- Determine the cleaning capacity of your machine from the following information:

  - The internal width (IW) (in meters [or in feet]) of the cleaner tank,

  - The internal length (IL) (in meters [or in feet]) of the cleaner tank, and

  - The depth (D) (in meters [or in feet]) of the cleaner tank.



Solvent Cleaning Machine Cleaning Capacity = IW x IL x D

The cleaning capacity is obtained by multiplying the above numbers together (i.e., CAPACITY = IW * IL * D). The values could be determined from literature received with your machine or provided by the machine manufacturer or by measuring the machine yourself.

Emission limits for machines that do not have a solvent-air interface area are presented in Table B-1. Note that if the cleaning capacity for your machine falls between those presented in Table B-1, the limit for your machine is the lower emissions limit.

Appendix I

SAMPLE REPORTING FORMS

HALOGENATED SOLVENT CLEANER NESHAP:

Compliance Report for Batch Cold Cleaners

PART ONE - General Information

Person Preparing Form:_____Date:_____
Last Name, First Name, Middle Initial

Company Name_____

Mailing Address_____
Number, Street, City/Town, State, Zip Code

Equipment
Location Address_____

Number, Street, City/Town, State, Zip Code

Cleaning Machine Summary

Identification Number	Description

HALOGENATED SOLVENT CLEANER NESHAP:

Compliance Report for Batch Cold Cleaners

PART TWO - Information Required per Machine

(Make copies for additional machines as necessary)

Cleaner Identification Number:_____

Cleaning Machine Type (circle one): Immersion Remote-Reservoir

This batch cold cleaner complies with the rule.

_____ _____

Signature Date

Method of Compliance (circle one):

Cover and Water Layer	Cover and a 0.75 Freeboard Ratio or Greater with Work Practices	Cover with Work Practices

HALOGENATED SOLVENT CLEANER NESHAP

Initial Notification Report for New* Machines
(Application for Approval of Construction or Reconstruction)

PART TWO - Information Required per Cleaning Machine
(Make copies for additional machines as necessary)

---

1. Type of machine intended for construction/reconstruction (check one):

   ___Batch vapor ___Cold in-line ___Vapor in-line

2. Solvent/air interface area_____ square meters (square inches)

3. Intended controls

   ___Freeboard ratio of 1.0
   ___Freeboard refrigeration device
   ___Super-heated vapor
   ___Working-mode cover
   ___Carbon adsorber
   ___Reduced room draft
   ___Dwell
   ___Other_____ Control

4. Proposed construction or reconstruction commencement date_____

5. Expected construction or reconstruction completion date_____

6. Anticipated date of initial startup_____

7. Anticipated compliance approach

   ___Basic equipment standard
   ___Alternative standard
   ___Idling emission standard

8. Annual estimate of halogenated HAP solvent consumption

   _____kilograms/year (pounds/year)

New cleaning machines are cleaners installed after November 29, 1993.

HALOGENATED SOLVENT CLEANER NESHAP:

Initial Statement of Compliance for Machines Complying with the Equipment Standard

PART ONE - General Information

Person Preparing Report_____ Date_____
Last Name, First Name, Middle Initial

Company Name_____

Mailing Address_____
Number, Street, City/Town, State, Zip Code

Intended Equipment
Location Address_____

Number, Street, City/Town, State, Zip Code

Cleaning Machine Summary

Identification Number	Description

HALOGENATED SOLVENT CLEANER NESHAP:

Initial Statement of Compliance for Machines Complying with the Equipment Standard

PART TWO - Information Required per Cleaning Machine
(Make copies for additional machines as necessary)

---

1. Type of machine (check one):

   ___Batch vapor ___In-line

2. Solvent/air interface area_____ square meters (square feet)

3. Equipment Standard Compliance Method chosen

   ___Control combination
   ___Idling emission limit (idling emission limit test report attached)

4. Control equipment used to comply with the rule

   ___Freeboard ratio of 1.0
   ___Freeboard refrigeration device
   ___Super-heated vapor
   ___Working-mode cover
   ___Other

   ___Carbon adsorber
   ___Reduced room draft
   ___Dwell
   ___Other_____
   Control
   ___Other_____
   Control

5. Monitored Parameters and Values:

Control (check all that applies)	Measured Parameter	Compliance Parameter Value
___ Freeboard Refrigeration Device	• Temperature at the center of the air blanket while idling	• ≤ 30 percent of the solvent boiling point
___ Cover (Working mode and idling-mode)	• Use, function and integrity	• Opens and closes properly
		• Closed except during parts entry and removal
		• Closes completely
		• Free of cracks, holes, or other defects
___ Dwell	• Period of time parts are held in the solvent cleaning freeboard area above the vapor zone after being cleaned.	• Determined for each of your parts or parts baskets you clean, or
		• Determined using the most complex part type or parts baskets you clean.
___ Superheated Vapor System	• Temperature at the center of the super-heated vapor zone while idling	• At least 10°F above the solvent's boiling point
___ Reduced Room Draft	• Windspeed - Room parameters (e.g., enclosure*) 1._____ 2._____ 3._____ 4._____	• ≤ 15.2 meters per minute (50 feet per minute) 1._____ 2._____ 3._____ 4._____
*If a full or partial enclosure is used to achieve the reduced room draft for your cleaning machine, attached the initial monitoring test.		
___ Carbon Adsorber	• Working-mode exhaust halogenated solvent concentration (weekly measurement records of the exhaust halogenated solvent concentration attached)	• ≤ 100 ppm
___ Other		

HALOGENATED SOLVENT CLEANER NESHAP:

Initial Statement of Compliance for Machines Complying with the Alternative Standard

PART ONE - General Information

Person Preparing Report_____ Date:_____
Last Name, First Name, Middle Initial

Company Name_____

Mailing Address_____
Number, Street, City/Town, State, Zip Code

Equipment
Location Address_____
Number, Street, City/Town, State, Zip Code

Cleaning Machine Summary

Identification Number	Description

HALOGENATED SOLVENT CLEANER NESHAP

Initial Statement of Compliance for Cleaning Machines Complying with the Alternative Standard

PART TWO - Information Required per Cleaning Machine
(Make copies for additional machines as necessary)

Cleaner Identification Number:_____

1. Type of machine (check one):

   ___Batch vapor ___In-line

2. a) Solvent/air interface area: _____ square meters, or

   b) Cleaning capacity: _____ cubic meters, if your cleaning machine does not have a solvent/air interface area (calculation method and results for this determination attached).

3. The first 3-month average emissions is_____ kilograms per month (calculation sheets are attached).

HALOGENATED SOLVENT CLEANER NESHAP:

Annual Report

PART ONE - General Information

Person Preparing Report_____ Date_____
Last Name, First Name, Middle Initial

Company Name_____

Mailing Address_____
Number, Street, City/Town, State, Zip Code

Intended Equipment
Location Address_____

Number, Street, City/Town, State, Zip Code

Cleaning Machine Summary

Identification Number	Description

HALOGENATED SOLVENT CLEANER NESHAP

Annual Report

PART TWO - Information Required per Cleaning Machine
(Make copies for additional machines as necessary)

Cleaner Identification Number:_____

Check compliance option chosen and fill out appropriate report requirements.

☐ Control Options

All operators of solvent cleaning machines have received training on the proper operation of solvent cleaning machines and their control devices sufficient to pass the required operator test.

_____ _____
Signature Date

Previous Year's Solvent Consumption _____ Mg/yr.

☐ Alternative Standard

Cleaning machine size:

Solvent-air interface area _____ m^2
or
Solvent cleaning capacity _____ m^3

Average monthly solvent consumption _____ kg

Three month rolling average emission estimates: (calculations attached)

1. _____ kg From _____ To _____
Date Date

2. _____ kg From _____ To _____
Date Date

3. _____ kg From _____ To _____
Date Date

HALOGENATED SOLVENT CLEANER NESHAP:

Exceedance Report

PART ONE - General Information

Person Preparing Report_____ Date_____
Last Name, First Name, Middle Initial

Company Name_____

Mailing Address_____
Number, Street, City/Town, State, Zip Code

Intended Equipment
Location Address_____

Number, Street, City/Town, State, Zip Code

Cleaning Machine Summary

Identification Number	Description

DRAFT

HALOGENATED SOLVENT CLEANER NESHAP

Exceedance Report

PART TWO - Information Required per Cleaning Machine
(Make copies for additional machines as necessary)

Cleaner Identification Number:_____

Check appropriate box and answer the requested information.

☐ Exceedance

Exceedance that occurred:_____

Date of occurrence:_____

Actions taken:

_____
_____
_____
_____
_____
_____
_____

Results of actions:_____
_____
_____
_____
_____
_____
_____

☐ No exceedance occurred.

Appendix J

RESOURCES

- **EPA CONTACTS**
- **EQUIPMENT SUPPLIER LIST**

The contact phone number for the EPA Regional Office where your state or territory resides is listed in the following table:

Region	States	Telephone
1	CT, ME, MA, NH, RI, VT	(617) 565-2734
2	NJ, NY, Puerto Rico, Virgin Islands	(212) 264-6819 (212) 264-6679 (NY only)
3	DE, MD, PA, VA, WV, District of Columbia	(215) 597-3237
4	AL, FL, GA, KY, MS, NC, SC, TN	(404) 347-2864
5	IL, IN, MI, WI, MN, OH	(312) 353-8615 (IL and IN) (312) 886-5031 (MI and WI) (312) 886-7017 (MN and OH)
6	AR, LA, NM, OK, TX	(214) 656-7547
7	IA, KS, MO, NE	(913) 551-7960
8	CO, MT, ND, SD, UT, WY	(303) 293-1886
9	AZ, CA, HI, NV, American Samoa, Guam	(415) 744-1143
10	AK, ID, WA, OR	(206) 553-1949

VAPOR DEGREASING EQUIPMENT SUPPLIERS

Baron-Blakeslee Inc.
2001 North Janice Ave.
Melrose Park IL. 60160
312-450-3900

Branson Cleaning Equipment Co.
Parrott Drive
Shelton CT 06484
203-929-7301

Casso-Solar Corp.
P.O. Box 163
U.S. Route 202
Pomona, NY 10970
914-354-2000

Cinncinnati Industrial Machinery Div.
Eagle-Picher Industries Inc.
2027 Hageman St.
Cincinnati OH 45241
513-769-0700

Cooper Co., D.C.
1467 So. Michigan Ave.
Chicago IL 60605
312-427-8046

Corpane Industries
250 Production Ct.
Louisville, KY 40299
502-491-4433

Crest Ultrasonics Corp.
One Scotch Rd.
Trenton, NJ 08628
609-883-4000

Delta Industries
8137 Allport
Santa Fe Springs CA 90670
213-945-1067

Detrex Chemical Industries Inc.
4000 Town Center
Southfield, MI 48075
313-358-5800

Finishing Equipment Inc.
3640 Kennebec Drive
St. Paul MN 55122
612-452-1860

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