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Guidance Document for the Halogenated Solvent Cleaner NESHAP

Sponsored by:

Emission Standards Division
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Disclaimer

This report is not a legally binding document, and is not meant to replace the published regulation titled "National Emission Standards for Hazardous Air Pollutants (NESHAP): Halogenated Solvent Cleaning." This document presents specific aspects of the regulation and may not cover all parts of the regulation. This document is an elaboration of the appropriate legal document(s), and the final authority rests solely in the legal document(s). Refer to the Office of the Federal Register website for the latest regulatory text for this rulemaking: http://www.gpoaccess.gov/fr/index.html

Part 3: Alternatives to Halogenated Solvent Cleaning

Tables

The purpose of this document is to give owners and operators of solvent cleaning machines the information required to determine whether the halogenated solvent cleaning regulation applies to them, and the options available to comply. This guidance document is divided into three parts:

- Determining if you are required to comply with the Federal halogenated solvent cleaner requirements (Part One);
- The available compliance options (Part Two); and
- Alternative cleaning solvents or technologies that can be used in lieu of complying with the standards (Part Three).

Part One of this document contains information to assist you in determining whether the rule affects you.

Part Two of this document provides an overview and step by step instructions on what you need to know and do to comply with the rule. Section 1.0 provides direction on what you need to know about your machine(s) to determine what part of the rule you are subject to and to determine compliance. Section 2.0 presents requirements under the NESHAP if you own or operate a batch vapor or an in-line (vapor or cold) machine; and Section 3.0 presents requirements under the NESHAP if you own or operate a batch cold machine.

Part Three of this document provides information on solvents and cleaning processes that can be used as alternatives to halogenated solvent cleaning. Specifically, Part Three includes the following information:

- Guidance materials and tools available to assist you in determining what alternatives to halogenated solvent cleaning are available.
- A list of factors that should be considered when evaluating halogenated solvent cleaning alternatives.

This document also includes a glossary, unit conversion chart, and numerous appendices. These appendices provide additional information, including:

- Detailed calculations for key compliance issues,
- Blank example forms that can be used to record and report compliance,

- The operator test,
- Work practice requirement posters that can be used in the work place to encourage proper cleaning procedures, and
- The U.S. Environmental Protection Agency (EPA) regional office contact numbers.

PART ONE

Does This Rule Apply to You?

The halogenated solvent cleaner NESHAP rule applies to you if you own or operate a solvent cleaning machine that uses a solvent that contains 5 percent or more by weight of any one or any combination of the following halogenated solvents:

- Carbon tetrachloride (CAS No. 127-18-4),
- Chloroform, (CAS No. 67-66-3),
- Perchloroethylene (CAS No. 127-18-4),
- 1,1,1-Trichloroethane (CAS No. 71-55-6),
- Trichloroethylene (CAS No. 79-01-6), and/or
- Methylene chloride (CAS No. 75-09-2).

This rule applies to you if...

- You are an owner or operator of a solvent cleaning machine; and
- You use a solvent in your machine that contains (in total) 5 percent by weight or more of any of the following regulated solvents: carbon tetrachloride, chloroform, perchloroethylene, 1,1,1-trichloroethane, trichloroethylene, or methylene chloride.

In the rule, the definition of solvent cleaning machine excludes small buckets, pails, and beakers with capacities less than 7.6 liters (2 gallons). Therefore, containers of this type using halogenated solvents are not covered by the requirements of this rule.

Generally, the listed solvents (when used in cleaning operations) are used in amounts much greater than 5 percent by weight. In fact, many operations use the listed solvents in amounts greater than 75 percent by weight. If your halogenated solvent content is greater than 5 percent by weight, no documentation is required to demonstrate the solvent content.

Stoddard solvents and naphthas generally contain less than 5 percent by weight halogenated solvent and will not typically be subject to this rule.

The material safety data sheets (MSDSs) for these solvents should provide sufficient documentation of solvent content.

In a few instances, a solvent may be used that is close to the 5 percent cut-off level. In these cases, documentation such as that explained in Appendix A, is required to demonstrate that your solvent meets this limit. For further guidance on the determination and example record format that can be used for documentation, see Appendix A. Documentation should be kept on-site; no reporting is required.

Halogenated Solvent Cleaning Requirements

PART TWO

1.0

To Determine Your Compliance Options You Need to Know...

Once you have determined that the rule applies to you, you need to identify the available compliance options. The following steps outline what you need to know about your machine(s) to identify your compliance options.

1. Determine the type of solvent cleaning machine(s) you own or operate. There are three basic types of machines covered by this regulation: **batch vapor, batch cold**, and **in-line** (in-line cold, in-line vapor, and continuous web in-line cleaning) machines (see Section 1.1).

2. If your machine is a **batch vapor or in-line machine**, determine the machine's solvent-air interface area. This is necessary because some of the requirements for these machines are dependent on machine size (see Section 1.2).

3. If your machine is a **batch vapor machine** that does not have a solvent-air interface area, you need to determine the machine's cleaning capacity (see Appendix B) to determine your overall emission limit. This is the only compliance option available for these machines. Table 2-1 presents an example worksheet that can be used to assist in keeping track of the determinations made for your machine(s). The following discussion will assist you in filling out this worksheet.

1.1 CLEANING MACHINE TYPE

The rule has different requirements for different types of machines. Cleaning machine types are classified by how parts are processed through the machine (batch vs. in-line), and by whether or not solvent vapor is created in the cleaning process (vapor vs. cold). Cleaning machines are also classified by whether the machine was installed before or after this rule was proposed (existing vs. new). New in-line machines have slightly more stringent requirements than existing in-line machines. The following text illustrates the differences between new machines and existing machines and between the different machine types.

Table 2-1

Compliance Determination Worksheet
(A blank worksheet is included in Appendix C)

Cleaner Identification Number	Use Halogenated Solvent?[a]	New or Existing?		Pick One			Solvent Air Interface Area m^2 (ft^2)	Other[b]
		N	E	Batch Cold	Batch Vapor	In-line		
Line B-2	Yes		X			X	2.5 m^2 (27 ft^2)	
Line B-3	No							
XT-46	Yes	X			X		1 m^2 (10.76 ft^2)	

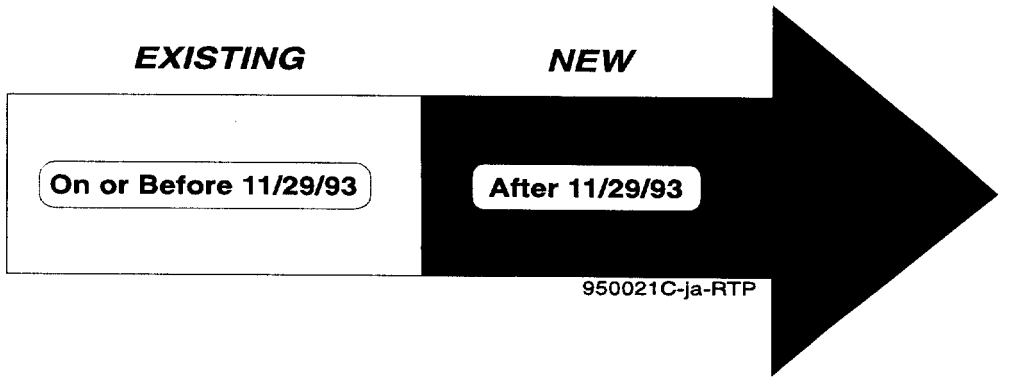
[a] Greater than 5 percent.

[b] Miscellaneous notes (e.g., cleaning capacity if machine is a batch vapor cleaning machine with no solvent air interface, identification that an in-line cleaning machine is a continuous web in-line cleaning machine)..

- Existing vs. New

  Existing: Your batch or in-line cleaning machine is an existing machine if it was installed on or before November 29, 1993.*

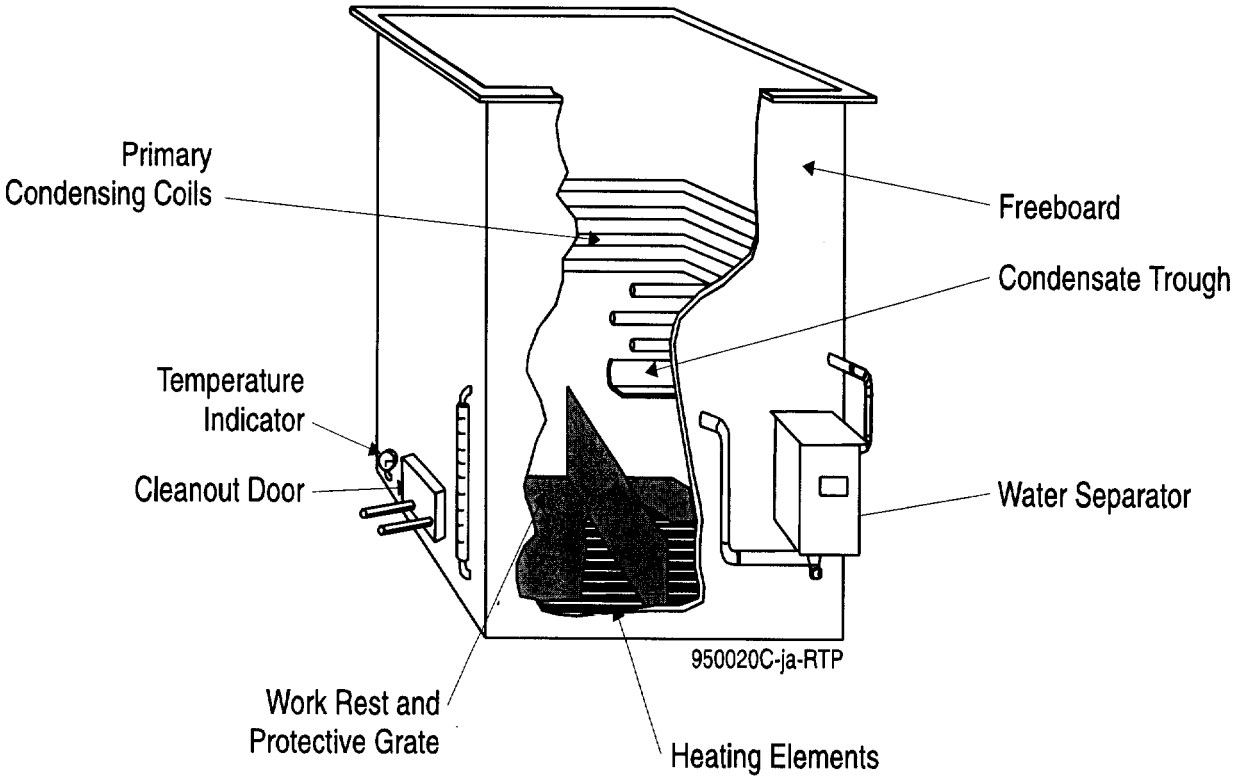
  New: Your machine is a new machine if it was installed after November 29, 1993.



- Batch vs. In-Line

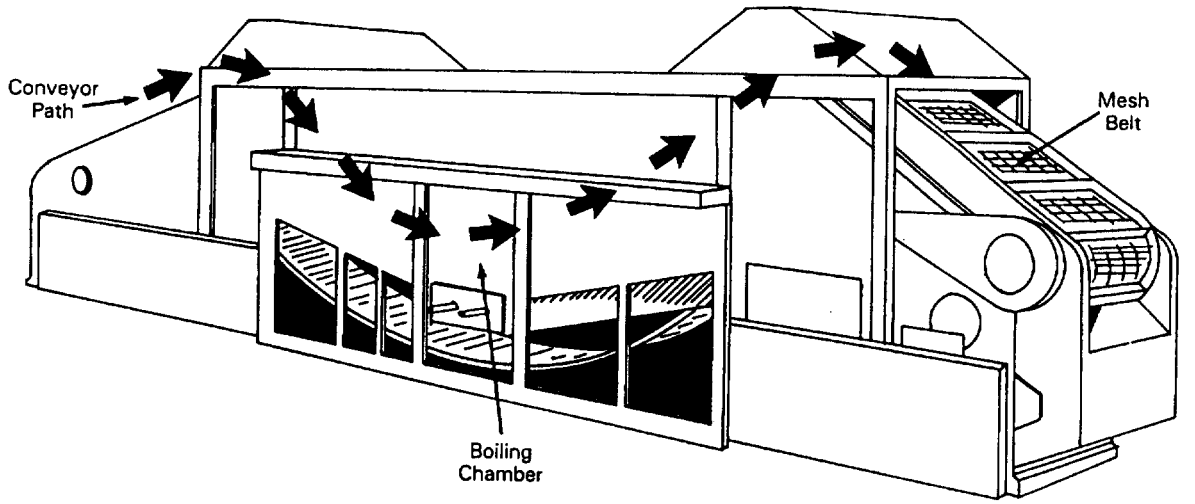
  Batch: Your machine is a batch machine if new parts or baskets of parts are introduced into the machine after the previous parts or baskets of parts are done being cleaned. For example, an "open top vapor cleaner" a machine that cleans multiple batch loads simultaneously and is manually loaded, such as a "ferris wheel" machine, and a "cross-rod" machine that moves parts semi-continuously through the cleaning process are batch machines. The following figure is an example of a batch vapor machine with a cutaway to show internal features. Small buckets, pails, and beakers with solvent capacities less than 7.6 liters (2 gallons) are not considered batch cleaners.

*November 29, 1993 is the date the rule was proposed.



Batch Vapor Cleaning Machine

In-Line: Your machine is an <u>in-line</u> machine if the movement of the conveyor that carries parts is continuous (non-stop). The following figure is an example of an in-line vapor machine.



In-Line Cleaning Machine

- Vapor vs. Cold

  Vapor: Your machine is a <u>vapor</u> machine if it heats the solvent enough to create vapor (the batch and in-line machines illustrated here are <u>vapor</u> machines).

  Cold: Your machine is a <u>cold</u> machine if it does not heat the solvent enough to create vapor. A carburetor cleaning machine is an example of a cold machine.

- Continuous Web vs. Other

  Continuous Web: Your machine is a <u>continuous web</u> machine if it cleans parts such as film, coils, wire, and metal strips at speeds typically in excess of 11 feet per minute. Parts are generally uncoiled and cleaned such that the same part is simultaneously entering and exiting the solvent application area prior to being recoiled or cut.

Other: Your machine is an in-line machine that is not a continuous web cleaning machine.

Example:

You own a new batch vapor machine...

NEW: If the machine was installed after November 29, 1993,

BATCH: Parts are introduced into your machine after the previous parts are done being cleaned, and

VAPOR: Vapor is created in the process (i.e., solvent is heated to create vapor).

1.2 CLEANING MACHINE SIZE

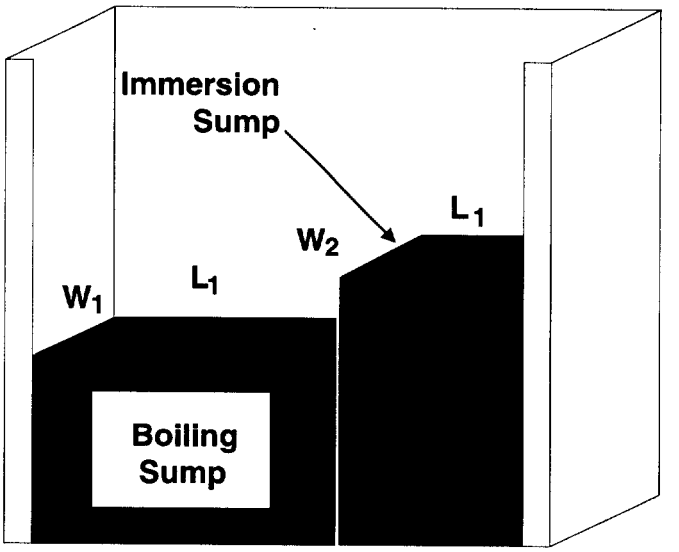
The size of your machine is important if you have a batch vapor, or in-line machine. You do not need to determine the size of your machine if you have a batch cold machine. For batch vapor machines the compliance options available depend on machine size. If you have a batch vapor or in-line machine and decide to comply with an overall emission limit (i.e., alternative standard) you will also need to know your machine size.

In this rule the size of the machine is the solvent-air interface area.

The solvent-air interface for a vapor machine is the location of contact between the concentrated solvent vapor layer and the air. In a vapor machine, the vapor layer is formed when the primary cooling coils condense the rising solvent vapor. This typically occurs at the midline of the primary condenser coils. For a cold machine, it is the location of contact between the liquid solvent and the air.

The solvent-air interface area of your machine(s) 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 solvent-air interface area for your machine;
- Ask the manufacturer of your machine(s) for the solvent-air interface area of your machine model;
- Calculate the solvent-air interface area (SA) by multiplying the width (W) (in meters [or feet]) by the length (L) (in meters [or feet]) of each sump and totalling the areas of all sumps (see Figure). Dimensions can be measured or obtained from literature.



$L = L_1 + L_2$

$W = W_1 + W_2$

L x W = Solvent Air Interface Area

Calculation of the Solvent-Air Interface

The solvent-air interface area for your batch and in-line machine(s) is equal to the surface area of all of the cleaning tanks of your cleaner(s). For an in-line machine, you may not be able to directly measure your machine's solvent-air interface area. In such cases, you will need to rely on the manufacturer or literature supplied by the manufacturer for the appropriate information.

If your machine does not have a solvent-air interface area, you need to determine the machine's cleaning capacity. A machine that does not have a solvent-air interface would be one that does not expose the cleaning solvent to the ambient air during or between the cleaning of parts. An example of a machine that does not have a solvent-air interface is a vacuum-to-vacuum machine. These machines are comprised of a processing chamber capable of withstanding both full vacuum and pressure. These systems operate in a closed loop, therefore, solvent is not exposed to the air outside of the machine at any time.

For a machine that does not have a solvent-air interface area, the cleaning capacity of your machine(s) will likely be available from your vendor or in the literature that was provided with your machine at the time of purchase. See Appendix B for guidance on determining your machine's cleaning capacity, if unknown, and for the solvent emission limits that are applicable to your machine(s) under the overall emission limit option.

2.0

Batch Vapor or In-Line Machine Requirements

There are three compliance options for batch vapor and in-line machines (see Figure 2-1).

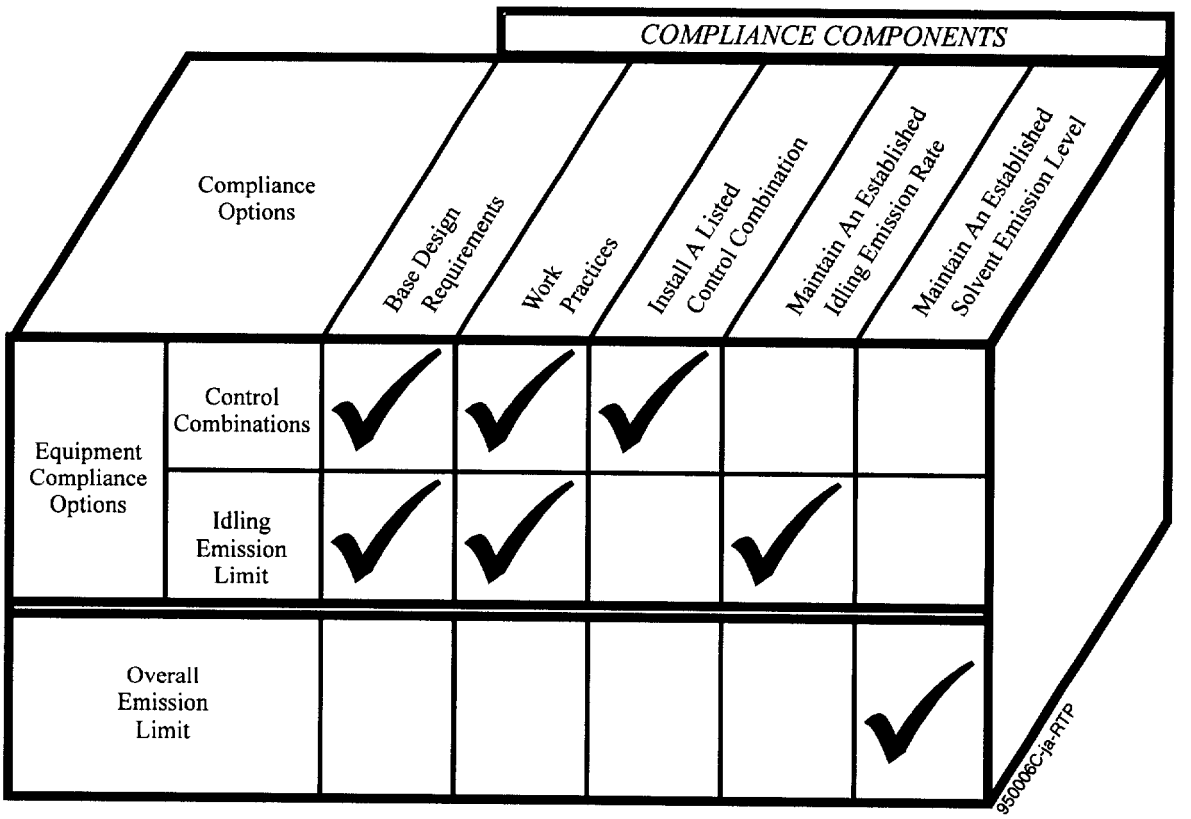


Figure 2-1. Batch Vapor and In-Line Machine Compliance Options

The first two compliance options, control combinations and an idling emission limit, require that your machine meet base design requirements. If you choose control combinations, you will need to install a list of specific controls. If you choose to maintain an idling emission standard, you are allowed to establish your own control scenario. These options both require monitoring control equipment and adherence to specified work practices. These options are described in Section 2.1.

The third compliance option is an overall emission limit (i.e., alternative standard). The overall emission limit does not specify base design, equipment, equipment monitoring, or work practice requirements. This overall emission limit standard allows the flexibility to install the equipment and implement the work practices that you choose, provided you meet the specified emission limit. This option is discussed in Section 2.2.

All three of the compliance options require some form of recordkeeping discussed in Sections 2.1.3, 2.1.5 and 2.2.3; and reporting, discussed in Section 2.3.

Remember: The compliance options for this rule are on a machine basis, rather than a facility basis. Therefore, the same compliance option does not have to be chosen for all of your machines. You can choose the compliance option that is best for each of your machines.

2.1 EQUIPMENT COMPLIANCE OPTIONS

If you choose the equipment compliance option, you must meet the base design requirements described in Section 2.1.1, follow the work practices described in Section 2.1.4, and meet additional emission control equipment requirements. You can comply with the additional emission control equipment requirements in one of two ways:

1. Use a combination of controls specifically listed in the regulation; or

2. Comply with an idling emission limit that is measured while your machine is idling.

If you choose the control combination option, you must control beyond the base design requirements by meeting one of the control combinations in Section 2.1.2. If you choose the idling emission limit option, you must control beyond the base requirements by installing controls that enable your machine to meet the idling emission limits cited in Section 2.1.2.

Finally, if you choose either of the equipment compliance options, you must comply with the applicable recordkeeping requirements, described in Sections 2.1.3, and 2.1.5, and reporting requirements, discussed in Section 2.3.

2.1.1 Base Design Requirements

Each batch vapor and in-line machine complying with either of the **equipment compliance options** must have **ALL** of the following base equipment:

A Cover or a Reduced Room Draft

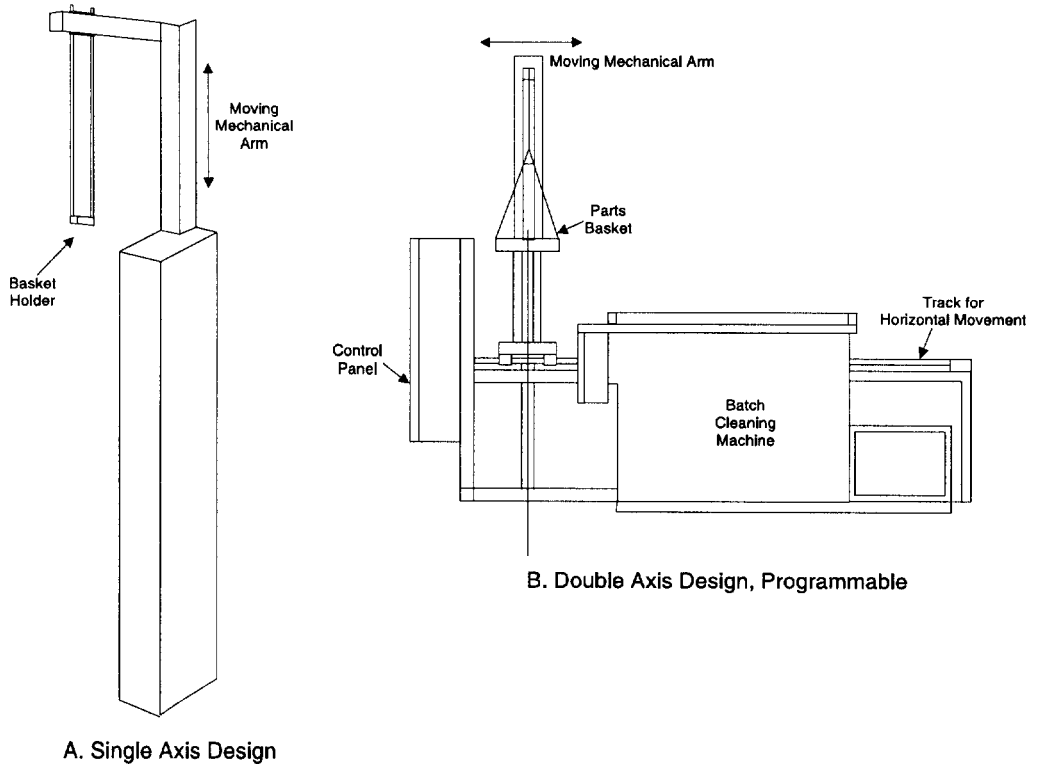
The machine must have a manual or working-mode cover that completely covers the machine openings. The cover must be periodically inspected to ensure that it remains free of cracks, holes, and other defects. The cover must be closed at all times except: when parts are being cleaned, when the solvent has been removed from the machine, or when maintenance or monitoring is being performed that requires the cover to not be in place. If you do not have a cover on your machine, measures must be taken to reduce the room draft (as described in Section 2.1.3).

Minimum Freeboard Ratio

A freeboard ratio of 0.75 or higher is required (except for continuous web cleaning machines that do not have an exposed sump). The freeboard ratio for your machine is the height of the freeboard divided by the smallest interior freeboard width. For example, if the height of the freeboard is 1.8 meters (5.9 feet) and the freeboard is 2 meters (6.6 feet) by 4 meters (13.2 feet) interior dimension, the freeboard ratio would be 1.8 meters/2 meters (5.9 feet/6.6 feet) or 0.9. If you have a continuous web cleaning machine that has a remote reservoir (or does not have an exposed sump), your machine does not need to meet a freeboard ratio requirement.

Automated Parts Handling

All machines must have an automated parts handling system that handles parts from initial loading to removal of cleaned parts. Examples include: motorized single-axis hoists, motorized double axis hoists, and fully programmable hoists. Except for parts being cleaned in a continuous web cleaning machine, you can move your parts at a maximum speed of 3.4 meters per minute (11 feet per minute). Manual hoists can be used if you can demonstrate that the hoist can never exceed 3.4 meters per minute (11 feet per minute). This could be demonstrated to your regulatory authority or permitting authority by showing that the gearing of the hoist makes it physically impossible to move it fast enough to exceed 3.4 meters per minute (11 feet per minute). Although computerized or fully automated hoists or conveyors would satisfy the automated parts handling requirement, these sophisticated systems are not specifically required. Continuous web cleaning machines are required to meet other specific requirements, including that the system be operated and maintained to eliminate visible carry out of solvent on your continuous web product by using a squeegee system or air knife system.



Single and Double Axis Hoists

To determine the hoist speed, measure the time (in minutes) that it takes for the hoist to move parts or a parts basket a measured vertical distance (i.e., moving parts into or out of the machine) (in meters). The hoist's speed is then calculated by dividing the distance travelled by the amount of time it took to travel that distance. For example, if the measured time for your hoist to go from a point 1 meter (3.3 feet) above the freeboard to a point at the fill line is 45 seconds (0.75 minutes), and the distance between these points is 2 meters (6.6 feet), then the speed of your hoist is:

2 meters / 0.75 minutes = 2.7 meters per minute
6.6 feet/0.75 minutes = 8.8 feet per minute

Hoist monitoring must be conducted monthly. After a year of required monthly monitoring without an exceedance, the monitoring frequency can be reduced to quarterly. However, if an exceedance occurs while monitoring quarterly, you must return to a monthly monitoring schedule until another year of compliance without an exceedance is demonstrated. If you can demonstrate to your regulatory authority that the hoist cannot exceed a speed of 3.4 meters per minute (11 feet per minute), quarterly monitoring is allowed including the first year.

See Appendix C for a sample recordkeeping form that can be used for the hoist monitoring procedure.

Liquid and Vapor Level Indicators

Each machine must be equipped with a vapor level control device that shuts off the sump heat in a vapor cleaning machine if the vapor level rises above the height of the primary condenser. The vapor level indicator is required to prevent the overflow of solvent vapor out of the machine. There are no specific monitoring requirements for this indicator; however, it must be kept operational at all times.

Primary Condenser

All vapor cleaning machines must have a primary condenser. A primary condenser consists of a series of circumferential cooling coils on a machine through which chilled liquid or gas is circulated or recirculated to provide continuous condensation of rising solvent vapors. A primary condenser must be maintained to create a controlled vapor zone. See the Glossary for an illustration of primary condenser coils for a batch vapor cleaning machine. Cold cleaning machines are not required to have a primary condenser.

Lip Exhaust Control

Some owners and operators of solvent cleaning machines rely on lip exhausts to meet OSHA requirements. Use of a lip exhaust without any controls, while reducing worker exposure on the one hand, dramatically increases the overall solvent emissions to the air. Therefore, if lip exhausts are used on solvent cleaning machines, the rule requires that emissions be routed to, and controlled by, a carbon adsorption unit. Each carbon adsorption unit should be operated and maintained such that it meets the requirements described in Section 2.1.3.

2.1.2 Equipment Combinations and Idling Emission Limits

If choosing to comply with the equipment compliance options: in addition to meeting the base design requirements and work practices, you will need to ensure an additional level of control. As mentioned previously, you can do this in one of two ways:

- Pick from an established list of control combinations (Table 2-2, 2-3, or 2-4); or
- Demonstrate that your own controls meet an established idling emission limit.

Control Combinations

The established list of control combinations are listed in Tables 2-2, 2-3 and 2-4 for batch vapor and in-line machines (Table 2-4 presents control combinations for continuous web in-line cleaning machines. In order to comply with the equipment combination option for a given cleaning machine you must first locate that cleaning machine's type in Tables 2-2, Table 2-3 or Table 2-4. Then you must select one of the control combinations listed for that particular cleaning machine type and ensure that all of the controls marked for that control combination are installed on that particular machine. Example scenarios follow Table 2-2 , and Tables 2-3 and 2-4. The requirements for each control are described in Section 2.1.3.

The control combinations for batch vapor machines are separated into two groups based on solvent-air interface area. Therefore, if you have a batch vapor machine you must determine the

machine's size using the procedure described in Section 1.2 of this part in order to determine the control combinations that are allowable. There are 10 control combination options available for batch vapor machines that are less than or equal to 1.21 square meters (13 square feet) in size, and 7 control combination options available for batch vapor machines that are greater than 1.21 square meters (13 square feet) in size.

The control combinations for in-line machines are separated into four groups based on whether they are continuous web or not continuous web in-line cleaning machines, and their installation date. Therefore, if you have an in-line cleaning machine you need to determine whether you own a continuous web cleaning machine and the date the machine was installed. Once the in-line cleaning machine type and installation date is determined, you can choose from the control combinations available for your machine. There are four control combinations allowable for in-line machines (both continuous web in-line cleaning machines and other in-line cleaning machines) that were installed on or before November 29, 1993 (existing machines). There are three control combinations allowable for in-line machines (both continuous web in-line cleaning machines and other in-line cleaning machines) that were installed after November 29, 1993 (new machines).

Equivalency: The methods of control in Tables 2-2, 2-3, and 2-4 are not the only controls that you can use when complying with the rule under the control combination option. Other controls can be used if you can demonstrate that they can achieve the same overall emission reduction as the control combinations presented in the tables. For more information on how to demonstrate this equivalency, contact your state or local air pollution control agency or the EPA Regional Office where your state or territory resides (see Appendix J for contact numbers). In general, however, it may be easier for you to simply comply with the idling emission limit discussed below.

Table 2-2

Control Combinations for Batch Vapor Cleaning Machines

Batch Vapor Cleaning Machine Size	Option or Control Combination Number	Controls						
		Working Mode Cover	1.0 Freeboard Ratio	Super-Heated Vapor	Freeboard Refrigeration Device	Reduced Room Draft	Carbon Adsorber	Dwell
Solvent-air Interface Area Less than or equal to 1.21 square meters (13 square feet)	1	√	√	√				
	2			√	√			
	3	√			√			
	4		√	√		√		
	5				√	√		
	6		√		√			
	7				√			√
	8		√			√		√
	9				√		√	
	10		√	√			√	
Solvent-air Interface Area Greater than 1.21 square meters (13 square feet)	1		√	√	√			
	2				√	√		√
	3	√		√	√			
	4		√	√		√		
	5			√	√	√		
	6		√		√	√		
	7			√	√		√	

Example:

If your batch vapor cleaning machine is 1 square meter (10.76 square feet) in size, one of the 10 control combinations in the first half of Table 2-2 can be chosen. If your machine already has a freeboard refrigeration device and a 0.75 freeboard ratio, you might choose to comply with control option #6 by increasing the freeboard ratio of the machine to 1.0. Alternatively, you might choose to comply with control option #7 by holding parts in the freeboard area longer (dwell).

Table 2-3

Control Combinations for In-Line Cleaning Machines (Except Continuous Web Cleaning Machines)

In-Line Cleaning Machine Type	Option or Control Combination Number	Controls				
		1.0 Freeboard Ratio	Super-Heated Vapor	Freeboard Refrigeration Device	Carbon Adsorber	Dwell
Existing Machines	1	√	√			
	2	√		√		
	3			√		√
	4				√	√
New Machines	1		√	√		
	2			√	√	
	3		√		√	

Table 2-4

Control Combinations for Continuous Web In-Line Cleaning Machines

Continuous Web Cleaning Machine Type	Option or Control Combination Number	Controls			
		1.0 Freeboard Ratio	Super-Heated Vapor/Part	Freeboard Refrigeration Device	Carbon Adsorber
Existing Machines	1	√	√		
	2	√		√	
	3			√	
	4				√
New Machines	1		√	√	
	2			√	√
	3		√		√

Example:

If your in-line machine is not a continuous web cleaning machine, and was installed in December of 1993, one of the three control combinations in the second half of Table 2-3 can be chosen. If your machine already has a carbon adsorber exhaust system you could choose to comply with control option #2 by adding a freeboard refrigeration device. Similarly, if your in-line machine is a continuous web cleaning machine and was installed in December of 1993, one of the three control combinations in the second half of Table 2-4 can be chosen.

Idling Emission Limits

As an alternative to the listed control combinations, you can choose to comply with the idling emission limit option. To do this, you are required to meet an emission limit that is measured while the machine is idling (i.e., turned on, but not actively cleaning parts). For batch vapor machines this idling emission rate is 0.22 kg per hour per square meter (0.045 pounds per hour per square foot) of solvent-air interface area. For in-line cleaning machines this idling emission

rate is 0.10 kg per hour per square meter (0.021 pounds per hour per square foot) of solvent-air interface area.

It is expected that manufacturers will provide the idling emission rate for the machines they manufacture as a service to their customers. If this service is not provided, you must use Test Method 307 to determine the idling emission rate for your machine. Idling emissions are to be measured under idling conditions (e.g., cover on) (see Appendix H for the regulation and Test Method 307). A blank example calculation form is included in Appendix D for your convenience. This form is not required; any recordkeeping format incorporating the required documentation would be acceptable.

2.1.3 Individual Control Requirements

For each of the controls that are used to comply with the control combination or idling emission limit option, there are specific design, monitoring, and recordkeeping requirements. These requirements are presented in Table 2-5 and are further explained in the following text. The design requirements are necessary to define the controls and ensure that each control is capable of fulfilling its intended purpose. The monitoring requirements, which involve periodic checks of key equipment parameters, are necessary to make sure the equipment is working properly. Recordkeeping is necessary to document the results of installation, monitoring, and determination results. Additional information regarding the monitoring and recordkeeping requirements for each control device is presented below. If you use a control not included in Table 2-5 to comply with the idling emission limit, you must submit design, monitoring and recordkeeping requirements to your regulatory agency for approval. This information must be submitted with your idling emission standard test report.

Carbon Adsorber (In Conjunction With a Lip Exhaust/As Part of a Carbon Adsorption System)

The rule requires that a carbon adsorber achieve an outlet concentration of no more than 100 ppm of the covered solvents. Compliance with this requirement must be determined by measuring and recording the concentration of the halogenated solvents in the exhaust of the carbon adsorber with a colorimetric detector tube. This test needs to be done while the machine is in the working mode (i.e., actively cleaning parts).

The colorimetric detector tube must be designed to measure a concentration of 100 parts per million by volume of solvent in air to an accuracy of within 25 parts per million by volume. You must follow the manufacturer's particular instructions for the use of their detector. The samples must be taken at a point where the air flow is unobstructed. According to the rule, the sampling port must be within the exhaust outlet of the carbon adsorber that is easily accessible and located 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. If the concentration exceeds 100 ppm, adjust the desorption schedule or replace the canister so that the exhaust concentration of halogenated solvent is brought below 100 ppm. If concentrations exceed 100 ppm after 15 days, you need to submit an exceedance report (see Section 2.3.4 of this part).

As an alternative to meeting an exhaust solvent concentration limit, if you own a continuous web cleaning machine, you can comply with the new or existing source requirements by venting the exhaust from the enclosed cleaning chamber through a properly operated and maintained carbon adsorption system that achieves an overall solvent control efficiency of 70 percent.

Appendix C contains an example recordkeeping form for the documentation of carbon adsorber exhaust solvent concentrations.

Table 2-5

Control Combination Device Requirements

Control Device	Compliance Requirements	Recordkeeping Requirements[a]	Violation	
			Immediate[b]	If Not Corrected Within 15 Days[c]
Carbon Adsorber (and Lip Exhaust)	• The exhaust solvent concentration cannot exceed 100 ppm. • The carbon bed cannot be by-passed during desorption. • The lip exhaust must be located above the cover. • Measure the exhaust concentration of the covered solvents **weekly**.	• The exhaust concentration (in ppm) of the covered solvents.		• If the exhaust concentration of the covered solvent exceeds 100 ppm.
Dwell	• Determine the dwell time for parts to be cleaned. • Ensure that parts are held in the freeboard area above the vapor zone for the determined dwell time. • Measure the actual dwell time of parts **monthly**.	• Determined dwell time (in seconds) and time measurement calculations.[d] • Measured dwell time (in seconds).	• If a proper dwell is not determined and maintained.	

Table 2-5 (Continued)

Control Device	Compliance Requirements	Recordkeeping Requirements[a]	Violation	
			Immediate[b]	If Not Corrected Within 15 Days[c]
Freeboard Ratio of 1.0	• Ensure and obtain certification from the manufacturer that the freeboard height is greater than or equal to the width of the interior freeboard.	• The freeboard ratio (height of freeboard divided by the smallest interior freeboard width). • Any modifications to the freeboard ratio.	• If the freeboard ratio is less than 1.0.	
Freeboard Refrigerati on Device	• Air in freeboard must be no greater than 30 percent of the solvent boiling point (in °F). • Measure air blanket temperature above the vapor zone (at center) **weekly** while machine is idling.	• Results of temperature measurement.		• If temperature requirement is exceeded.
Idling-Mode Cover	• Cover must be closed. • Inspect cover **monthly**.	• Results of inspection.	• If cover is not in place when idling.	• If the cover has cracks, holes, or other defects.

[a]All records are to be retained for 5 years unless otherwise noted.
[b]Immediate violation if parameter is exceeded.
[c]violation if not corrected within 15 days.
[d]Retain for lifetime of machine.

Table 2-5 (Continued)

Control Device	Compliance Requirements	Recordkeeping Requirements[a]	Violation	
			Immediate[b]	If Not Corrected Within 15 days[c]
Reduced Room Draft	• Windspeed in room or within enclosure must be less than or equal to 15.2 meters per minute (50 feet per minute). • If controlling room conditions: - Establish room conditions during initial test and quarterly thereafter (must be redone **immediately** if conditions change). - Monitor room conditions **weekly**.	• Windspeed measurement • Room conditions	• Not establishing room parameters under which the reduced room draft is achieved. • Room conditions not being maintained as described in compliance report.	• If windspeed exceeds 15.2 meters per minute (50 feet per minute).
	• If using an enclosure: - Measure windspeed in enclosure **initially** and **monthly**, thereafter (must be remeasured **immediately** if the enclosure is modified). - Inspect condition of enclosure **monthly**.	• Windspeed measurement • Enclosure inspection results.		• If windspeed exceeds 15.2 meters per minute (50 feet per minute).

[a]All records are to be retained for 5 years unless otherwise noted.
[b]Immediate violation if parameter is exceeded.
[c]violation if not corrected within 15 days.

Cover (Idling-Mode and Working-Mode)

Solvent cleaning machines typically have a cover. Covers are classified as working-mode covers or idling-mode covers (depending on when the covers can be closed).

An idling-mode cover is a cover that is closed at all times except when the machine is actually cleaning parts. An idling-mode cover should also be closed between loads, if possible. A sliding cover is an example of an idling-mode cover. For continuous web cleaning machines, a continuous web part that completely occupies an entry or exit port when the machine is idle meets the idling cover requirements for continuous web cleaning machines.

A working-mode cover is a cover that can be closed at all times, including when parts are being cleaned. The only time a working-mode cover opens is when parts are entering or exiting the machine. An example of a working-mode cover is a bi-parting cover. However, any cover that can be closed during cleaning qualifies as a working-mode cover. This includes a cover on a machine with a hoist system designed to detach the parts from the hoist during cleaning; this allows the cover to be closed while the parts are being cleaned. Use of a working-mode cover would also satisfy the idling cover requirements in the rule.

If the compliance option you choose includes the use of a cover, every month you must, (1) inspect whether the cover is opening and closing properly during the proper operating modes, (2) whether the cover completely covers the cleaning machine(s) openings when closed , and (3) whether the cover is free of cracks, holes, or other defects. See Appendix C for an example recordkeeping form that can be used to document your monthly cover inspection results.

Dwell

Dwell time is the period of time that parts are held in the machine freeboard area above the vapor zone after they are cleaned. A dwell time is used to ensure that liquid solvent on and in the part either vaporizes within the machine confines or drains back into the machine rather than into the work area. It also allows any vapor trapped within parts to flow back into the machine. There are two alternatives for implementing the dwell:

1. You can determine and use the appropriate dwell time for each of the parts or parts baskets that you clean; or

2. You can determine and use the maximum dwell time using the most complex part type or parts basket.

The method for determining the proper dwell time is based on the primary cleaning time; the primary cleaning time is the time required for a room temperature part to stop dripping when placed in the vapor zone (i.e., amount of time it takes to reach the vapor zone temperature). Once the part stops dripping, cleaning stops unless other cleaning actions (e.g., dipping the part in the liquid solvent) occur.

The dwell time is determined as follows:

1. Measure (with a clock or stopwatch) the amount of time it takes for the parts or parts baskets to cease dripping once placed in the vapor zone. This is the primary cleaning time. (Remember, parts must be at room temperature before placing them in the vapor zone.)

2. The dwell time must be no less than 35 percent of the primary cleaning time determined above.

Example:

If your part or parts basket stops dripping after 2 minutes (120 seconds) in the vapor zone, then the proper dwell time for that part or parts basket would be equal to:

120 seconds * 0.35 = 42 seconds

To monitor the dwell time, you must measure and record the actual dwell time monthly. In addition, records of tests required to determine the appropriate dwell time must be kept. An example recordkeeping form that can be used to document the dwell time for a part or parts basket is provided in Appendix C.

Freeboard Refrigeration Device (FRD)

A FRD chills the air immediately above the vapor zone forming a cool air blanket that slows the diffusion of solvent out of the machine. The rule requires that a FRD have enough cooling capacity to cool the air in the freeboard area of the machine to a temperature that is no greater than 30 percent of the boiling point (in degrees Fahrenheit) of the solvent being used. An example calculation for determining the maximum required FRD temperature for a solvent with a boiling point of 100 degrees Fahrenheit follows:

100 degrees Fahrenheit x 0.3 = 30 degrees Fahrenheit
(maximum FRD temperature)

Therefore, if you are using a solvent with a boiling point of 100 degrees Fahrenheit your FRD must cool the air in the freeboard area of the machine to at least 30 degrees Fahrenheit.

Table 2-6 lists the temperature that a FRD must achieve for each of the solvents covered by the rule.

Table 2-6

Freeboard Refrigeration Device Temperature Requirements

Solvent	Boiling Point °F	Maximum Allowed Air Blanket Temperature	
		°F	°C
Methylene Chloride	104	31	0
Trichloroethylene	189	57	14
1,1,1-Trichloroethane	165	50	10
Chloroform	143	43	6
Carbon Tetrachloride	168	50	10
Perchlorothylene	250	75	24

°F = degree Fahrenheit
°C = degree Celsius

The temperature measurement must be made weekly at the center of the air blanket above the vapor zone during the idling mode. This measurement can be accomplished by attaching a thermometer or a thermocouple to the parts basket or hoist hook and lowering it into the machine so that it is in the center of the air blanket above the vapor zone. This is done when the machine is turned on but not processing parts.

A blank recordkeeping form that can be used to document the maximum allowed freeboard air temperature and the weekly measurement of this temperature can be found in Appendix C.

Reduced Room Draft (RRD)

When using the RRD control technique, roomdrafts must not exceed 15.2 meters/minute (50 feet/minute). A variety of techniques can be used to reduce room drafts. Methods to reduce room drafts include, but are not limited to:

- Redirecting air vents and/or fans so that they do not blow into, across, or through the machine,
- Moving the machine to an area with less cross-ventilation, permanently closing doors or windows, or
- Enclosing the machine.

Any method can be used as long as the requirements for RRD are met and maintained.

Windspeed measurements are to be taken by doing the following:

Step — Determine the direction of the wind by rotating a velometer (or similar windspeed measuring device) within six inches above the top of the freeboard area of your machine until the maximum speed is located.

Step — Orient the velometer in the direction of the wind at each of the four corners of your machine and record the reading for each corner.

Step — Total the values obtained at each corner and divide the total by four. The result is the average windspeed. Record the average windspeed.

To ensure that the RRD requirement is met continuously, the rule requires that the room conditions established during the test be maintained. See Appendix C for an example recordkeeping form for the RRD measurements.

Example:

Your measurements indicate that the windspeed near your solvent cleaning machine is 30 meters per minute (100 feet per minute). This is twice the allowable reduced room draft windspeed. Looking at the room parameters you notice that most of the wind is coming from an air vent. You redirect the air vent, close the windows in the room, and remeasure the windspeed. This time the windspeed is 14 meters per minute (45 feet per minute), which is below the reduced room draft windspeed of 15.2 meters/minute (50 feet/minute). As part of establishing your RRD you now must write down the room conditions that allowed you to achieve the RRD. For instance, the vent must be directed away from the cleaning machine and the windows must be closed. If the door was opened during the test, the door can be open or closed. Each month you would make sure that these parameters stay the same.

If a full or partial enclosure is used to achieve the reduced room draft for your machine(s), you need to conduct an initial windspeed monitoring test and, thereafter, measure and record the wind speed within the enclosure monthly. The wind speed within the enclosure can be measured by slowly rotating a velometer (or similar wind measuring device) inside the entrance to the

enclosure until the maximum windspeed is located. Along with your windspeed measurements, you also need to monitor and record the maintenance of the enclosure monthly.

Super-Heated Vapor (SHV)/Part (SHP) System

Super-heated vapor systems create super-heated solvent vapor within the vapor zone. Parts are held within the SHV. The SHV heats the parts and evaporates liquid solvent on the parts before they are withdrawn from the cleaning machine. The rule requires that a SHV system heat solvent vapor at the center of the SHV zone to at least 10 degrees Fahrenheit above the solvents' boiling point. Table 2-7 lists the minimum temperature that a SHV system must achieve in the super-heated vapor zone for the solvents covered by the rule.

If you use a SHV system to comply with the rule, you need to follow the manufacturer's specifications for determining the minimum proper dwell time within the SHV and make sure parts stay within the SHV for at least that long. The temperature at the center of the super-heated vapor zone can be measured by attaching a thermometer or thermocouple to the hoist hook or parts basket and then introducing it into the center of the super-heated vapor zone of the machine. Appendix C contains a blank recordkeeping form that can be used to document the measured vapor zone temperature.

Table 2-7

Super-Heated Vapor Temperature Requirements

Solvent	Boiling point		Minimum Allowed SHV Temperature	
	°F	°C	°F	°C
Methylene Chloride	104	40	114	46
Trichloroethylene	189	87	199	93
1,1,1-Trichloroethane	165	74	175	79
Chloroform	143	62	153	67
Carbon Tetrachloride	168	76	178	81
Perchloroethylene	250	121	260	127

°F = degrees Fahrenheit
°C = degrees Celsius

2.1.4 Work Practices

Each operator of a machine complying with the equipment compliance option must implement the following work practices. A one page summary of these work practices that can be used as a reminder poster in the work place is included in Appendix E for your convenience.

Maintain Equipment as Recommended by the Manufacturer

To make sure that the machine and its associated controls are working properly you are required to maintain the equipment as recommended by the manufacturers of the equipment. Alternative maintenance practices can be used if they have been demonstrated to the approved permitting authority's satisfaction to achieve the same or better results as those recommended by the manufacturer. For additional information on how to demonstrate equivalency contact your State or local air pollution control agency.

Minimize Air Disturbances in the Machine and the Room

You are required to control air disturbances in and around the machine to reduce solvent losses. To achieve this, cover(s) must be in place at all times except when: the machine is cleaning parts, when the solvent has been removed from the machine, or when maintenance or monitoring is being performed that requires the cover(s) not to be in place. If a cover cannot be used, air disturbances must be controlled by RRD measures described in Section 2.1.3.

Minimize Air Disturbances Due to Parts Movement

Solvent vapor can be pulled or pushed out of the machine when the parts basket or part enters the machine. The solvent vapor loss is greatest when a "piston effect" is created. This occurs when the parts introduced into the machine are close in size to the solvent-air interface area. To reduce these solvent vapor losses you are required to do at least one of the following.

- Limit the size of parts or baskets in open-top batch vapor cleaning machines to less than 50 percent of the solvent-air interface area. For example, a machine that has a solvent-air interface that is 4 meters (13.12 feet) long and 4 meters (13.12 feet) wide has a solvent-air interface area of 16 square meters (172.13 square feet). Therefore, the parts basket cannot have an area greater than 50 percent of 16 square meters (172.13 square feet), or 8 square meters (86.07 square feet); or,

- Introduce the parts basket or part at a speed of 0.9 meters per minute (3 feet per minute) or less.

Minimize Solvent Loss Due to Spraying Operations

If your cleaning process involves solvent spraying, you must make sure that the spraying is done within the vapor zone. Alternatively, the spraying can be performed within a section of the machine that is not directly exposed to the ambient air (i.e., a baffled or enclosed area of the machine). This will help prevent splashing and spraying of the solvent outside of the machine.

Reduce the Pooling of Solvent On and In Parts

Orient your parts so that the solvent drains from them freely. If your parts have cavities or blind holes, tip or rotate them before removing the parts from the machine. These measures will help reduce the carry out of solvent on the parts. Only remove parts if solvent dripping has stopped.

By giving parts adequate time to drain, the amount of solvent that is carried out of the machine on the parts can be greatly reduced. Under this work practice, it is expected that you should wait till most of the solvent has drained and dripping has stopped. This work practice is not as stringent as a dwell, which requires a longer draining period, as discussed in Section 2.1.3.

Proper Startup and Shutdown Procedures

Improper start-up and/or shutdown procedures can cause unnecessary solvent losses. You are required by the rule to use proper procedures. When starting a machine you need to turn on the primary condenser before you turn on the sump heater. This will allow the chilled layer of air that confines the solvent vapors to the machine to form before solvent vapor is created.

Likewise, when shutting down a machine you need to turn off the sump heater to allow the solvent vapor layer to collapse before turning off the primary condenser. The vapor layer collapses soon after the sump heater is turned off. You can ask the vendor of your machine for an acceptable time between turning on or off the primary condenser and superheater for your machine(s) or you can observe the layer collapse (on an open-top) by watching the "wet line" on the side of the inside wall.

Proper Solvent Transfer Procedures

Large amounts of solvent can be lost due to leaks and spills during the transfer of solvent from the solvent tanks to the machine and from the machine to the waste tanks. The rule requires that solvent added or drained from any machine be transferred using threaded or other leak-proof couplings during filling. The rule also requires that the end of the pipe or hose introducing or withdrawing the solvent be located beneath the liquid solvent surface (i.e., submerged filling) in the sump.

Store Solvent Waste in Closed Containers

The responsibility for limiting cleaning solvent emissions and/or releases does not end when the solvent is removed from the machine. The rule requires that waste solvent, still bottoms, and sump bottoms be collected and stored in closed containers once the solvent is removed from the machine. These closed containers can contain a device that allows pressure relief, but should not allow liquid solvent to drain from the container.

Do Not Clean Absorbent Materials

Absorbent materials soak up solvent and carry it out of the machine where it is later emitted. Therefore, the rule (with exceptions) does not allow cleaning of absorbent materials such as sponges, fabric, wood, and paper products in a machine. This requirement does not apply to cloth rollers used in the cleaning process inside a continuous web cleaning in-line machine, but does apply to the rollers once they are removed from the machine. This requirement does not

apply to cleaning absorbent materials in PCB-laden transformers, in compliance with a permit issued under the Toxic Substances Control Act (TSCA).

Take and Pass a Solvent Cleaning Procedures Test

To ensure that each operator has adequate knowledge of solvent cleaning operating procedures, each operator of a solvent cleaning machine must complete and pass applicable sections of a solvent cleaning procedures test. This test will be given during inspections by your regulatory agency. The solvent cleaning procedures test and answers are presented in Appendix E.

2.1.5 General Recordkeeping Requirements

Recordkeeping is required to ensure that installation, monitoring, and applicable results are documented and retained. Records are kept to aid you in preparing reports and are reviewed during compliance check inspections conducted by your regulatory agency. The rule requires that you maintain paper or electronic records (i.e., computer disk) of the following for the lifetime of the machine:

- **Owner's manuals** for each machine and piece of control equipment. If unavailable, written maintenance and operating procedures can be substituted.

- Records documenting the **installation date** of your machine(s). If this date is not known, you can maintain a letter certifying that the machine(s) were installed prior to, or on, November 29, 1993, or after November 29, 1993. November 29, 1993, is the date that this rule was proposed. This date is important because any machine installed on or before this date is considered an "existing source" and any machine installed after this date is considered a "new source." In this rule, some existing and new sources have slightly different compliance requirements.

The rule requires that you maintain a record of your solvent consumption estimates for each of your machines in paper or electronic form (i.e., computer disk) for 5 years, regardless of the compliance option you choose. Appendix C contains an example recordkeeping form that can be used to document your solvent consumption estimates. Specific recordkeeping requirements based on the control compliance option chosen are presented in Sections 2.1.3 and 2.1.5.

2.2 OVERALL EMISSION LIMIT

Rather than complying with one of the equipment compliance options presented in Section 2.1, you could elect to comply with an overall emission limit (i.e., alternative standard). This option allows you the flexibility to establish your own emission reduction strategy provided you comply with the overall emission limit. Applicable overall emission limits are based on your cleaning machine type and size. If you comply with the limit specified for your machine, you do not have to follow any additional equipment monitoring or work practice requirements. In addition, operators of machines complying with this option are not subject to the solvent cleaning procedures test presented in Section 2.1.4.

This option is generally easiest to comply with when a machine is either already well-controlled or infrequently used. During the 3 years before compliance, you may want to measure the solvent emissions from your "existing " machines to see if this option is feasible for your situation.

2.2.1 Determining Your Overall Emission Limit

To determine the 3-month average monthly emission limit for your machine(s), you need to multiply the solvent-air interface area ("size") of the machine by the applicable limit specified in Table 2-8 (see example).

If your machine does not have a solvent-air interface area, your emission limit is based on your machine's cleaning capacity. An emission limit based on a machine's cleaning capacity is not a compliance option for a machine with a solvent-air interface area. See Appendix B for applicable emission limits based on a machine's cleaning capacity. Records of the cleaning capacity determination for each of your machines without a solvent-air interface are to be maintained on site in paper or electronic form (i.e., computer disk) for the lifetime of the machine. Appendix C contains an example recordkeeping form that can be used to document this determination.

Table 2-8

Overall Emission Limit

Machine Type	3-Month Average Monthly Emission Limit (kg/m^2 x month)[a]	3-Month Average Monthly Emission Limit (lbs/ft^2 x month)[b]
Batch vapor	150	30.7
Existing in-line	153	31.4
New in-line	99	20

[a] m^2 = The total surface area of all cleaning tanks for a particular machine (i.e., solvent-air interface area).

[b] ft^2 = The total surface area of all cleaning tanks for a particular machine (i.e., solvent-air interface area).

Example:

If you own or operate a batch vapor cleaning machine with a solvent-air interface area of $10m^2$ ($108\ ft^2$) the monthly emission limit is calculated as follows:

$$10\ m^2 \times 150\ kg/m^2 \times month = 1{,}500\ kg/month$$

or

$$108\ ft^2 \times 30.7\ lb/ft^2 \times month = 3{,}316\ lb/month$$

Example:

If you own or operate a vacuum to vacuum cleaning machine with no measurable solvent-air interface, you must use the procedure in Appendix B to determine the cleaning capacity. If the cleaning capacity has been measured to be $5.5\ m^3$, you must find the corresponding emission limit in Table B-1. Which in this case is 918 kg/month (2,024 lb/month).

2.2.2 Calculating Your 3-Month Rolling Average Emissions

Compliance with the overall emission limit option (i.e., alternative standard) is demonstrated by determining the 3-month rolling average monthly emissions for each cleaning machine for which you have chosen this compliance option. The steps to calculate this value for each machine are outlined below.

Step

On the first operating day of each month, gather the following information for each machine for the preceding month.

SA - The amount of halogenated solvent (i.e., C, CT, MC, PCE, TCA, TCE) added (kilograms [or pounds] of solvent added) to the machine that month (including any solvent added to bring the solvent level up to the fill line).

- The solvent level should be returned to the same level at the beginning of each month before calculations are made. This is typically done by filling the tank to a marked solvent fill line.

- The solvent in the machine should be clean. The rule specifically states that the solvent does not have to be new solvent. However, all metal and dirt should be removed from the machine. This will ensure that the solvent emissions calculated for the machine are accurate.

LSR - The amount of halogenated solvent removed (kilograms [or pounds] of liquid solvent removed) from the machine that month.

- The amount of solvent removed means the amount of solvent intentionally removed from your machine during the month. It does not mean that you need to remove (or drain) the solvent from your machine every month.

SSR - The amount of halogenated solvent removed (kilograms [or pounds] of solvent removed) from the machine in solid waste.

- This information can be obtained by using the EPA test method 25D-Determination of the Volatile Organic Concentration of Waste Samples (56 FR 33544). This test method requires the use of a flame ionization detector (FID) or an electrolytic conductivity detector (ELCD). The use of this equipment should not be attempted by someone unfamiliar with their operation.

- Alternatively, this information can be obtained from engineering calculations.

AREA - The solvent-air interface area of the machine, in square meters (or square feet). A description of how to determine the solvent-air interface is provided in Section 1.2 of this part.

Subtract the sum of LSR and SSR from SA. Then, divide this by AREA. The result is E_1, the monthly emissions (kilograms of solvent emitted per square meter of solvent-air interface area [or pounds of solvent emitted per square foot of solvent-air interface area]) for that given month.

$$\frac{SA - (LSR + SSR)}{AREA} = E_1$$

Step

Add the solvent emissions (E_1) determined in Step 1 to the emissions calculated for the 2 previous months (E_2 and E_3) to obtain E_{SUM}, the total solvent emissions for the last 3 months (kilograms per square meter [or pounds per square foot]).

$$E_1 + E_2 = E_3 = E_{SUM}$$

- E_1 - Monthly emissions (kilograms per square meter [or pounds per square foot]) for the current month.
- E_2 - Monthly emissions (kilograms per square meter [or pounds per square foot]) from the previous month.
- E_3 - Monthly emissions (kilograms per square meter [or pounds per square foot]) from two months prior.
- E_{SUM} - Total solvent emissions for the last 3 months (kilograms per square meter [pound per square foot]).

Step

Divide E_{SUM} by three. The result is EA, the 3-month rolling average monthly emissions (kilograms of solvent emissions per square meter of solvent-air interface area [pound of solvent emissions per square foot of solvent-air interface area]) for that month for each machine.

$$\frac{E_{SUM}}{3} = E_A$$

- E_A = The 3-month rolling average monthly emissions (kilograms of solvent emissions per square meter of solvent-air interface area [or pounds of solvent emissions per square foot of solvent-air interface area]).

2.2.3 Overall Emission Limit Recordkeeping

The overall solvent emission limit (i.e., alternative standard) option has no associated monitoring and has less recordkeeping requirements than the equipment options (i.e., equipment combinations and idling emission limit options). If you choose to comply with the overall solvent emission limit option you must maintain the following records on site in paper or electronic form (i.e., computer disk) for 5 years:

- Records of the dates and amounts of solvent added to the machine.
- The amount of solvent in the wastes removed from the machine.
- Calculation sheets showing how the monthly emissions and the 3-month rolling average monthly emissions were determined (See Appendix C for example calculation recordkeeping forms).

2.3 REPORTING REQUIREMENTS

Regardless of the selected compliance option, you are required to submit periodic reports. The reports are necessary to inform your regulatory agency that this rule applies to you and that you are complying with the rule. Information for all machines subject to the rule can be included in a single report. The types of reports specifically required by this rule are:

- An initial notification report;
- Initial statement of compliance report;
- Annual compliance reports;
- An exceedance report (required only when an exceedance occurs); and
- An equivalency determination report (required only if you want to request a procedure or equipment equivalency).

Since you are subject to this rule, you also have General Provision reporting requirements. See the final rule in Appendix I for a table of General Provision requirements that apply to this rule. It is beyond the scope of this document to provide example forms for these requirements.

Each owner and operator of cleaning machines covered by this rule must submit the appropriate reports as described in this section. Some of the information requested in the reports (e.g., name, address, etc.) are facility specific, but **most of the information requested in the reports is machine specific**. This is because compliance with the rule is determined on a per machine basis, not on a per facility basis. Therefore, as indicated later in this section, **you may need to provide different information in your reports for machines complying with different options**. Differences also exist between the reports required for new and existing cleaning machines. These differences generally do not affect the content of the report, but do affect the **timing** of the report. The following example illustrates the different requirements for a new and existing machine required to complete an initial notification and initial compliance report.

Example reporting forms are included in Appendix F for your convenience. These forms are not required; any report format incorporating the required information would be acceptable.

2.3.1 Initial Notification Report

The initial notification report is used to notify the appropriate regulatory authority that the rule applies to you. It also provides some preliminary facility and machine information. The schedule for submitting the report is dependent on the type and status (i.e., new versus existing) of the machine.

- A report for existing machines is due by August 29, 1995.

Example:

For example, lets say you have two batch vapor cleaning machines, A and B. Cleaning machine A is an existing machine for which you have chosen the equipment combination compliance option. Cleaning machine B is a new machine (constructed on January 26, 1995, startup beginning on February 15, 1995) for which you have chosen the overall emission limit compliance option.

Initial Notification Report

For machine A, the initial notification report is due by August 29, 1995, for machine B, it is due by January 26, 1995. The type of information that you provide in the initial notification reports will be identical for each machine, except that for machine A, you have to certify that it is an existing machine, and for machine B, you must provide information on the date of construction and startup.

Initial Statement of Compliance

For machine A, the initial statement of compliance report is due by December 2, 1997, for machine B it is due by July 15, 1995. The content of the two reports differ due to the different compliance options chosen. The report for machine A will contain information on the controls used and the monitoring parameters to be measured. The report for machine B will contain information on the solvent air-interface area and the 3-month rolling average monthly emission calculation.

- A report for new machines, where construction or reconstruction and initial startup had not begun before December 2, 1994, is due as soon as possible before startup, but no later than January 31, 1995.
- A report for new machines, where construction or reconstruction began after December 2, 1994, is due as soon as possible before starting construction or reconstruction of the machine.

The content of the initial notification report is slightly different for existing and new batch vapor and in-line cleaning machines as indicated below. The initial notification report should include the following information:

- Your name and address;
- The address (i.e., physical location) of your solvent cleaning machine(s);
- A description of your solvent cleaning machine(s), including type (i.e., batch vapor, in-line vapor, in-line cold), solvent-air interface area, and existing controls;
- The anticipated compliance approach for each of your machine(s) (i.e., control combinations, idling emission limit, or the overall emission limit),
- An estimate of annual halogenated HAP (i.e., C, CT, MC, PCE, TCA, TCE) solvent consumption for each machine;
- Identification of the relevant standard;
- Whether you are an area or major source (see Glossary for a definition of major and area source); and
- If the report is for an existing machine, installation date or certification letter indicating that your machine(s) and its control devices were in-place before November 29, 1993.
- If the report is for a new machine, you need to submit the following, if applicable,
  - A notification of intention to construct,
  - The expected date of construction or reconstruction commencement,
  - A notification of the date when construction or reconstruction commenced,
  - The expected completion date of the construction or reconstruction, and
  - The anticipated date of initial startup of machine.

Example initial notification report forms are included in Appendix F for your convenience.

2.3.2 Initial Statement of Compliance Report

The initial statement of compliance report is used to demonstrate to the appropriate regulatory authority that your machines are in compliance with the rule. It includes information on the control option chosen and the necessary demonstration measurements.

- An existing machine must to be in compliance with the rule by December 2, 1997, and an initial statement of compliance report is due no later than May 1, 1998.
- A new machine must be in compliance with the rule at startup or December 2, 1994, whichever is later. The initial statement of compliance report for a new machine is due no later that 150 days after startup or May 1, 1995, whichever is later.

The content of the initial statement of compliance report differs depending on the compliance option you choose.

If you choose to comply with the control combination or idling emission limit equipment standard, the initial statement of compliance report should include the following information for each machine:

- Your name and address;
- The address (i.e., physical location) of your machine(s);
- A list of the control equipment used on your machine to comply with the rule;
- For each piece of control equipment on your machine that is required to be monitored, a list of parameters that are to be monitored and the values of these parameters measured on or during the first month after the compliance date;
- If you use reduced room draft as a control option you need to report the conditions that must be maintained to comply with the windspeed requirement (e.g., enclosure, closed doors, closed windows);
- If you choose to comply with the idling emission limit you need to submit an idling emission limit test report for tests of idling emissions (this test report can come from the vendor or manufacturer of your machine [Section 2.1.2 of this part presents a discussion on the idling emission limit option]); and
- If you use a carbon adsorber as a control option you need to submit a report of the weekly measurement of the halogenated HAP solvent concentration in the carbon adsorber exhaust for your machine.

An initial statement of compliance report form is included in Appendix F for your convenience.

If you choose to comply with the alternative standard (i.e., overall emission limit), the initial statement of compliance report should include the following information for each machine:

- Your name and address;
- The address (i.e., physical location) of your machine(s);
- The solvent-air interface area for each machine, or for a machine without a solvent-air interface area, a description of the results and method used to determine the cleaning capacity of your machine(s); and
- The results of the first three-month rolling average monthly emissions calculation.

An initial statement of compliance notification report form is included in Appendix F for your convenience.

2.3.3 Annual Compliance Report

Everyone complying with the rule must submit an annual report. This report is due before February 1 of the year following the year your report covers. If you chose to comply with the control combination or idling emission limit options this report must contain the following information:

- A statement, signed by you (the owner or operator) or someone you designate, stating that, "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 test required."
- A solvent consumption estimate for the reporting period for each of your machines (i.e., over the course of the reported year).

If you chose to comply with the alternative standard (i.e., overall emission limit) option, this report must to contain the following information:

- The size (solvent-air interface area or cleaning capacity) and type (e.g., batch vapor cleaning machine) of each machine.
- The average monthly solvent consumption for each machine.
- The three-month monthly rolling average solvent emission estimates calculated each month for each machine.

An example annual report form is included in Appendix F for your convenience.

2.3.4 Exceedance Report

Exceedance reports are required for all machines. An exceedance report states whether any exceedances in monitored parameters have occurred and what actions were taken to correct any exceedances. An exceedance report is required every 6 months if there is not an exceedance, and every 3 months if there is an exceedance. If an exceedance did not occur the report would consist of a statement certifying that there were no exceedances. Your regulatory agency may decide that you need to submit this report more frequently.

The frequency of the exceedance report increases to quarterly after an exceedance occurs. The first quarterly report must be submitted in the quarter during which the exceedance occurred. The quarterly exceedance report should contain the following information:

- If you have had an exceedance of a monitored control equipment parameter or solvent emissions limit, the reason for the exceedance and the corrective actions taken must be reported.
- If you have had no exceedances of a monitored control equipment parameter or solvent emissions limit, or a piece of your machine's equipment has not needed to be repaired, or adjusted, such information shall be stated in your report. An example exceedance report form is included in Appendix F for your convenience.

After an exceedance, the frequency of reporting can be reduced to every six months if you meet the following requirements:

- Your machine has not had an exceedance for a year.
- You continue to comply with all of the monitoring and recordkeeping requirements for your machine.
- Your regulatory authority agrees to a reduction to a 6-month frequency.

2.3.5 Equivalency Request Report

If you want to use different equipment or procedures than those specified in the rule, you can apply for approval from your regulatory authority. In order to obtain approval you will need to demonstrate that the alternative equipment or procedures that you want to use are equivalent to those specified in the rule. For existing machines, you need to submit this application/report no later than June 3, 1996, in order to obtain an equivalency approval prior to the required compliance date. For new machines you need to submit this application/report and receive approval of that application prior to startup of your machine.

3.0
Batch Cold Cleaning Machine Requirements

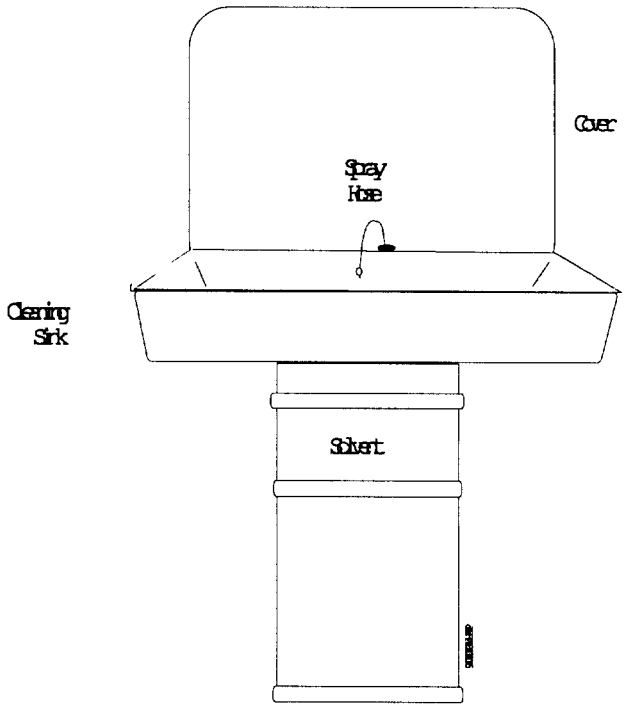
Batch cold cleaning machines must meet control equipment options and work practice requirements, except for machines with a water layer, which are exempt from work practices. The compliance options for this rule are on a per cleaning machine basis rather than a per facility basis. Therefore, the same compliance option does not have to be chosen for all of your machines.

Section 3.1 discusses the different types of cold cleaning machines. Section 3.2 presents the control equipment options and work practices required under the rule. Section 3.3 presents the monitoring, recordkeeping, and reporting requirements for batch cold cleaning machines.

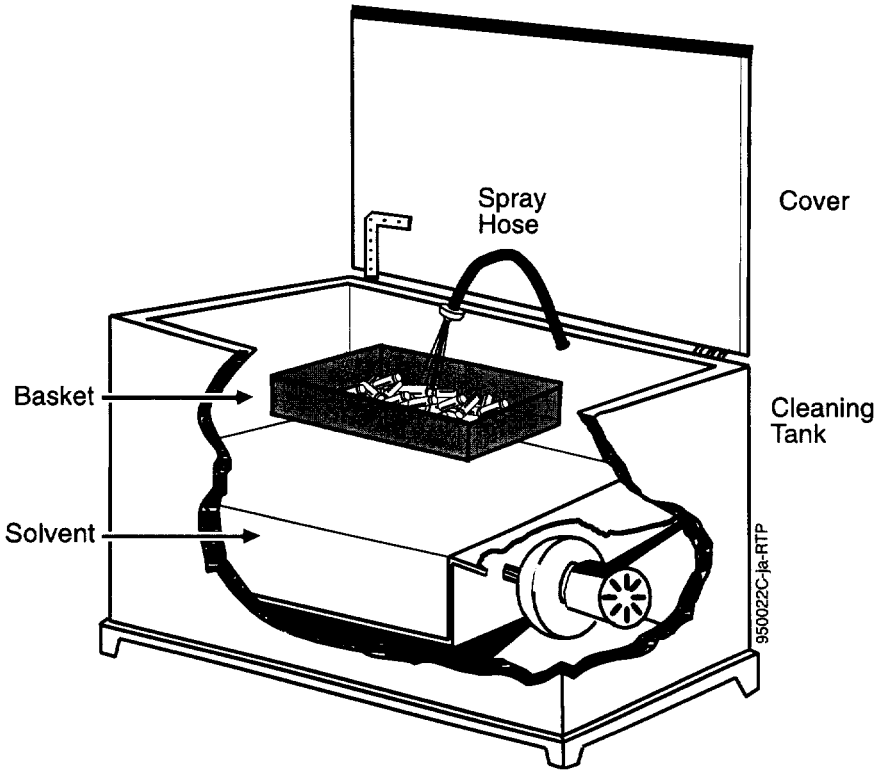
3.1 WHAT TYPE OF BATCH COLD CLEANING MACHINE DO YOU HAVE?

The two different types of batch cold machines covered by the rule are immersion and remote reservoir.

- Your machine is a remote reservoir batch cold cleaning machine if solvent is sprayed onto the parts in a sink-like work area and drains back into an enclosed container through a small drain (see Figure).



Remote Reservoir Cleaning Machine



Immersion Cleaning Machine

- Your machine is an immersion batch cold cleaning machine if parts are cleaned by immersing them in the solvent (see Figure). Note that an immersion machine may store solvent in a remote reservoir, but still considered an immersion machine if parts are immersed in the solvent. Small buckets, pails, and beakers with solvent capacities less than 7.6 liters (2 gallons) are not considered to be immersion cold cleaning machines.

3.2 CONTROL EQUIPMENT OPTIONS AND WORK PRACTICES

There are two control equipment combinations to choose from for an immersion cold cleaning machine, and one option equipment control for a remote reservoir cold cleaning machine.

If you have an immersion cold cleaning machine you must ensure that one of the following control equipment combinations is in place:

Cover and a 2.5 cm (1 in.) water layer

or

Cover and a 0.75 freeboard ratio or greater

If you have a remote reservoir cold cleaning machine you must ensure that it has a cover.

Table 2-9

Work Practice Requirements for Batch Cold Machines

Comply with the following work practices (machines with a water layer are exempt from work practices).

1. Store solvent waste in closed containers.
2. Flush parts in freeboard area.
3. Minimize the pooling of solvent on and in parts.
4. Do not fill machine above fill line.
5. Clean up spills immediately.
6. Store wipe rags in closed containers.
7. Do not agitate solvent to the point of causing splashing.
8. When cover is open, control room drafts.
9. Do not clean absorbent materials.

If you comply with the rule by using a cover and a 0.75 freeboard ratio or greater (for an immersion cold cleaning machine), or a cover (for a remote reservoir cold cleaning machine), you also need to comply with work practices (See Table 2-8).

3.3 MONITORING, REPORTING AND RECORDKEEPING REQUIREMENTS

An initial notification report and compliance report are required for batch cold cleaning machines. However, there are no additional monitoring, recordkeeping, or reporting requirements. Information to be included in these reports is presented below. Example reporting forms are included in Appendix G for your convenience. These forms are not required; any report format incorporating the required information would be acceptable.

3.3.1 Initial Notification Report

The initial notification report provides preliminary facility and cleaning machine information, and is used to notify the appropriate regulatory authority. The schedule for submitting the report depends on the status of the machine (i.e., new versus existing).

- A notification report for existing batch cold machines is due no later than August 29, 1995.

- A notification report for new batch cold machines, where construction or reconstruction and initial startup had not begun before December 2, 1994, is due as soon as possible before startup, but no later than January 31, 1995.

- A notification report for new batch cold machines, where construction or reconstruction began after December 2, 1994, is due as soon as possible before starting construction or reconstruction of the machine.

The initial notification report needs to include the following information for each cleaning machine:

- Your name and address;

- The address (i.e., physical location) of your machine;

- A description of your cleaning machine type (i.e., immersion batch cold cleaning machine, remote reservoir batch cold cleaning machine), solvent-air interface area, and existing controls;

- The installation date of your machine;

- Your anticipated equipment control combination compliance approach; and

- An estimate of annual halogenated solvent consumption for each machine.

3.3.2 Compliance Report

The Compliance Report is used to demonstrate to the appropriate regulatory authority that your machines are in compliance with the rule. It provides the control option chosen and a statement of compliance.

- The compliance report for existing machines is due no later than May 1, 1998.

- The compliance report for new machines is due no later than 150 days after startup or May 1, 1995, whichever is later.

The compliance report should include the following information for each cleaning machine:

- Your name and address;

- The address (i.e., physical location) of your machine;

- A statement, signed by you, stating that your batch cold machine is in compliance with the rule; and

- The method of compliance you chose for your machine.

Alternatives to Halogenated Solvent Cleaning

PART THREE

1.0

Introduction

Some owners or operators of halogenated solvent cleaners may decide to switch to alternative cleaning techniques rather than comply with the halogenated solvent cleaning NESHAP. In some cases, the decision to seek out an alternative solvent (for purposes of this document alternative means "non-halogenated") or cleaning process is an easy one. This is true in cases where solvents will no longer be available or will be available at a greatly increased cost due to restrictions or prohibitions on their manufacture (see Section 2.0 below). In other cases, alternatives are sought to meet a corporate objective to remove a particularly hazardous solvent from use. These corporate objectives are usually instituted for one or more of the following reasons:

- To reduce worker exposure;
- To reduce the cost of the storage, handling, management, and disposal of hazardous wastes;
- To comply with regulations; and
- To foster a positive public image.

No matter what the reason is for the search for an alternative solvent or cleaning process, the basic questions are the same - What are the alternatives, and what alternative should be chosen? Of course, due to differences in processes, cleaning needs, and other factors, the answers to these questions are not going to be the same for everyone. Luckily, you are not the first to ask these questions and therefore there are many alternatives out there covering a variety of applications and there are also many sources available that can help you choose among them. The information in this section is provided to help answer these questions and to show where you can go to find out more about alternative solvents.

2.0

Regulations to Consider

Many regulations exist that may limit or influence your choice of alternatives. Some regulations restrict or prohibit the manufacture of particular cleaning solvents, whereas other regulations control the use of solvents and the disposal of the waste they generate. Table 3-1 presents a list of some of the regulations, and corresponding Code of Federal Regulation citations, that you should consider when evaluating the availability and appropriateness of particular alternatives for your cleaning application needs. This list is not intended to be comprehensive, but rather to provide a starting point by including the regulations that are most likely to impact your decision. These regulations are briefly discussed in the following text.

Table 3-1

Statute/Regulation Citations

Statute/Regulation	Citation[a]
New Source Performance Standard (NSPS)	40 CFR Part 60
National Emission Standard for Hazardous Air Pollutants (NESHAP)	40 CFR Parts 61 and 63
New Source Review (NSR)	40 CFR Parts 51 and 52
Protection of Stratospheric Ozone • Montreal Protocol	40 CFR Parts 9 and 82
Protection of Stratospheric Ozone • Significant New Alternatives Policy (SNAP)	40 CFR Parts 4 and 82
Acid Deposition Control (Acid Rain Program)	40 CFR Part 72
Pollution Prevention Act (PPA)	16 U.S.C. 13101-13109
Clean Water Act (CWA)	40 CFR Parts 108 to 503
Occupational Safety and Health Act Standards	29 CFR Part 1910
Resource Conservation and Recovery Act (RCRA)	40 CFR Parts 260 - 280

[a] Citations for CFR are as follows : (Title Number) CFR (Part Number).
Citations for U.S.C are as follows: (Title Number) U.S.C. (Section Number).

CFR = Code of Federal Regulations; published by the Office of the Federal Register. For sale by the U. S. Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-9328

U.S.C= United States Code; law statutes through Acts of Congress.

2.1 CLEAN AIR ACT

The Clean Air Act (Act) mandates the protection and enhancement of the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of the nation's population. One of the primary goals of the Act is to encourage pollution prevention. Note that the Significant New Alternatives Policy Program - Title VI, New Source Performance Standards, National Emission Standards for Hazardous Air Pollutants, Prevention of Significant Deterioration, State Implementation Plans, Acid Deposition Control, and the Halogenated Solvent Cleaning NESHAP are all mandated under the Act.

2.1.1 New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants

New source performance standards (NSPS) are standards developed to control emissions of criteria or designated pollutants. Emissions are controlled by source category. Standards apply to new, constructed, and modified sources for criteria and designated pollutants; and existing sources for designated pollutants. Criteria pollutants include nitrogen oxides (NOx), small Particulate Matter (PM 10), and volatile organic compounds (VOC). A number of VOC are cleaning solvents (e.g., glycol ethers, Stoddard solvent, xylene). You need to evaluate alternatives to determine whether their use would trigger the applicability of an NSPS. If an NSPS is triggered by any of your chosen alternatives, you need to consider the applicable NSPS requirements.

National emission standards for hazardous air pollutants (NESHAP) are standards developed to control emissions of Section 112(b)(1) listed hazardous air pollutants (HAP). Emission standards are currently developed or scheduled to be developed for 174 categories of sources that emit HAP. This list can be amended and revised. Standards apply to new, reconstructed, modified, and existing sources. The halogenated solvent cleaner NESHAP is one of these NESHAP. If subject to the Aerospace Manufacturing and Rework Industry NESHAP, for example, your choice in alternatives may be influenced. A brief description of the proposed Aerospace Manufacturing and Rework Industry NESHAP follows:

- The proposed NESHAP for the Aerospace Manufacturing and Rework Industry affects processes within an aerospace manufacturing and rework facility that release air toxics and VOC; these processes include cleaning operations, primer operations, topcoat operations, depainting operations, and chemical milling maskant operations. All aerospace manufacturing and rework facilities classified as a major source would be required to meet control requirements. Under the proposed rule, flush cleaning operations would require the use of one of the cleaning agents included on a list of approved solvents identified in the proposed rule or meet a specified vapor pressure limit.

Note that it is recommended that both NSPS and NESHAP be considered prior to making an alternative cleaning solvent determination. See Table 3-1 for citations for these rulemakings.

2.1.2 New Source Review (Including Prevention of Significant Deterioration-PSD)/State Implementation Plans

The New Source Review (NSR) program requires control of new and modified major sources of criteria, and regulated pollutants in attainment and nonattainment areas. Control requirements are determined on a case-by-case determination. Evaluation as to whether a potential alternative

would trigger NSR needs to be considered when choosing your alternatives. However, since the amount of VOC (the most likely pollutant to be emitted) increase that would trigger NSR is large (i.e., 40 tons) and only applies to major sources, it is very unlikely that NSR would be triggered.

2.1.3 Protection of Stratospheric Ozone (Montreal Protocol)

Several programs, such as Title VI of the Act, are designed to protect the stratospheric ozone layer. The terms "Montreal Protocol" and "the Protocol" mean the Montreal Protocol on Substances that Deplete the Ozone Layer, a protocol to the Vienna Convention for the Protection of the Ozone Layer. This rule lists a number of chlorofluorocarbons, a few halons, carbon tetrachloride, 1,1,1-trichloroethane, and a number of hydrochlorofluorocarbons that have successfully met production and consumption phase-out requirements under the Protocol. Note that the list of these substances should be evaluated to determine whether any of your considered alternatives are on the list. See Table 3-1 for the citation for this rule.

2.1.4 Protection of Stratospheric Ozone (Significant New Alternatives Policy [SNAP])

The Significant New Alternatives Policy (SNAP) program is directed toward fulfilling the general policy contained in section 612 of identifying substitutes that can serve as replacements for ozone depleting substances, evaluating their effects on human health and the environment, and encouraging the use of those substitutes believed to present lower overall risks relative both to the ozone depleting compounds being replaced and to other substitutes available for the same end-use. Several rules and notices have expanded lists of acceptable and unacceptable substitutes, and they are available for online reading or for downloading. In addition, there are a number of general information fact sheets available, as well as sector-specific information.

For details of the SNAP program, refer to the following web page:
http://www.epa.gov/docs/ozone/snap/regs/index.html

2.2 POLLUTION PREVENTION ACT OF 1990

The Pollution Prevention Act (PPA) of 1990 recognizes the acknowledged preference that pollution be prevented or reduced at the source whenever feasible; and that when pollution cannot be prevented or recycled it should be treated in an environmentally safe manner. Under the PPA, disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe way. Therefore, it is important that you evaluate whether a substitute prevents or reduces pollution when making a decision on an alternative. See Table 3-1 for the citation for this rule.

2.3 CLEAN WATER ACT

The Clean Water Act (CWA) mandates the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters. The CWA has mandated programs for preventing, reducing, or eliminating the pollution of navigable waters and ground waters and improving the sanitary condition of surface and underground waters. Discharges of any sewage, industrial wastes, or substance that may adversely affect such waters are regulated. Under the CWA, both conventional (e.g., biochemical oxygen demand, suspended solids, acidity and alkalinity) and nonconventional (e.g., toxicity) characteristics of effluent are regulated. It is important that you evaluate the characteristics of your alternatives carefully to ensure that direct discharges or discharges to a publicly owned treatment works are not subject to effluent limits or pretreatment requirements. See Table 3-1 for a reference to provisions under this Act.

2.4 OCCUPATIONAL SAFETY AND HEALTH ACT

The Occupational Safety and Health Act (OSHA) mandates safe and healthful working conditions for every working man and woman in the Nation, thereby preserving human resources. Under the Occupational Safety and Health Act, permissible exposure and explosion limits for a number of chemical compounds are required to be followed in the work place. Contact, handling, and respiratory protective gear may also be required. When evaluating alternatives, ensure that your alternatives meet the appropriate explosion and exposure limits and that workers are properly protected to ensure worker safety. In choosing among your alternatives, you may decide that the safety risk associated with some of the compounds regulated under OSHA outweighs the cleaning benefits. See Table 3-1 for the citation to the provisions under this Act.

2.5 RESOURCE CONSERVATION AND RECOVERY ACT

The Resource Conservation and Recovery Act (RCRA) mandates that the generation of hazardous waste be reduced or eliminated wherever possible. Waste that is generated must be treated, stored, or disposed of in such a way as to minimize the present and future threat to human health and the environment. When evaluating alternatives, ensure that, if your chosen alternative is regulated under RCRA, you must follow all waste handling and reporting requirements. Note that the burden associated with waste handling and reporting requirements mandated under RCRA may be an impetus for you to choose an alternative not regulated under RCRA. See Table 3-1 for a reference to this rule.

2.6 FIRE CODES/INSURANCE ISSUES

Another consideration when evaluating your alternatives is whether your choice of alternatives will affect or trigger fire code regulations. You may also need to reevaluate your insurance based on the alternative you choose. For example, if your alternative choice is highly flammable, special protective measures may be required and you may need to increase or adjust your fire insurance.

3.0

Identifying Alternatives

Before looking for alternative cleaning processes, you should have a clear picture of your current cleaning requirements. The discussion in Section 3.1 will help you to define these requirements. Identifying alternatives that meet these requirements can be made easier by utilizing existing guidance materials and information sources discussed in Section 3.2 and Section 3.3.

3.1 DEFINE YOUR CLEANING REQUIREMENTS

The first step in identifying alternative solvents and/or cleaning processes is to clearly define your cleaning needs. The following are some questions that you should answer:

- What are you cleaning?
  - What size?
  - What is the part configuration (e.g., blind holes)?
- Why are you cleaning it?
  - What is being removed?
  - Is the solvent also drying the part or being used as a defluxing agent?
- How clean does it have to be?
  - Do you have to meet military specifications?
  - Are there other specifications that must be met?
  - Can the specifications be changed?
- What is the previous/next process?
  - Does it really need to be cleaned at this point? In other words, is the part already clean? Or, are you cleaning the part before a process step where it does not matter whether it is clean or not? Or, can the process steps be reordered or modified to eliminate cleaning steps?
  - Is there a process time restriction?
  - Does the cleaning need to be in-line or batch?
  - Are parts cleaned on a regular basis or infrequently?

Some companies have found it useful to put this information into a table or a matrix. This way they have a brief summary of their current cleaning needs that they can refer to quickly when evaluating alternatives. Table 3-2 is an example of a table that can be used to summarize your

Table 3-2

Example Cleaning Requirements Table

Requirement/Description	Fill in For Each Part/Cleaning Process
Part	
Name	Engine Can
Type	Assembly
Size	One foot long
Material	Nickel
Volume	0.5 cubic foot
Shape (blind holes?)	Blind holes and seams
Coating	No
Cleaned Regularly or Infrequently	Regularly
Used in a Clean Room	No
Need to be Dry	Yes
High Dollar Value	Yes
Ultrasonics Harmful	No
Sensitive to High Atmospheric Pressure	No
Sensitive to High Temperature	No
Contaminant	
Type	Metal fines, oils
Water Soluble	No

Table 3-2 (Continued)

Requirement/Description	Fill in For Each Part/Cleaning Process
Current Cleaning Process	
Chemistry	Methyl chloroform
Equipment	Vapor degreaser
Water Supply	Tap
Cleanliness Specification	Yes, client specified. Non-military
Cleaning Time Restriction	Yes. In-line process.
Following/Previous Process	Shipping/Final sanding
Production Rate/Batch vs. In-line	High Volume/In-Line

cleaning requirements. A blank cleaning requirement form is included in Appendix H. This form is not required, but has been created for your convenience.

Once you have identified your cleaning needs the next step is to identify alternatives that fit those needs. It should be noted that many of the companies that have substituted alternatives for their cleaning solvents or processes have found that there are generally no universal answers or one-for-one replacements. In other words, if you have five different cleaning machines that use TCA to clean several different types of parts, you may not find one alternative that is suitable for cleaning all of them. It may take a combination of several different technologies to fulfill your cleaning requirements.

3.2 IDENTIFYING ALTERNATIVES USING SAGE

One possible way to identify alternatives that meet your cleaning needs is to use the Solvent Alternatives GuidE (SAGE). The SAGE is an interactive database developed by the Surface Cleaning Program at Research Triangle Institute in cooperation with the U.S. EPA Air Pollution Prevention and Control Division. SAGE can provide you a list of candidate replacements for your current solvent. The output of SAGE is a scored list of possible replacements, which is generated based on information you provide at the various menu prompts. The criteria used by SAGE to identify alternatives are based on cleaning requirements and do not address adverse health effects. It is suggested that once you have identified an alternative solvent that meets your cleaning needs that you investigate whether it has any adverse health effects.

The SAGE system can be accessed at the following web site: http://clean.rti.org/.

When using SAGE you are prompted, through a series of questions, to describe your current solvent application. The questions include subjects such as the material the part is made of; it's size, shape, and complexity; the contaminant types; the chemistry (solvent) presently used; sturdiness of the part; etc.

After input of the data, SAGE analyzes the application and scores each combination of chemistries and cleaning processes for that specific application. Table 3-3 contains a list of the chemistries and cleaning processes in the SAGE libraries. The alternatives are ranked based on an applicability score, ranging from 0 (poor or no match) to 100 (best match).

You can then design the type of report that you desire. Per your instructions, a detailed report of the technologies and chemistries recommended by SAGE will be printed. You can select the best matches for your application (i.e., those that exhibit an applicability score in the range of 75 to 100) or you can select a broader list that includes descriptions of those technologies that appear less likely to match the application (i.e., those with scores of 74 or less). A vendor list can also be printed.

Within the individual reports are comments about the following considerations you must evaluate to ascertain whether a technology is a likely match for your application:

- General process-related information
- Environmental issues,
- Safety issues, and
- Economics

Table 3-3

Alternative Cleaning Chemistries Described in the SAGE Program

Chemistries in SAGE	
Acetone	Ethyl lactate (lactate esters)
Acidic aqueous chemistries	Neutral aqueous chemistries
Alcohol	N-methyl pyrolidone (NMP)
Alkaline aqueous chemistries	Petroleum distillates
Aqueous chemistry additives (surfactants, builders, etc.)	Pure water
Dibasic ethers (DBE)	Terpenes
Glycol ethers	
Cleaning Processes in SAGE	
Abrasives	Paint stripping
Brushing	PCBA (printed circuit board) cleaning
Carbon dioxide pellets	Plasma cleaning
Carbon dioxide snow	Power washers
Fiberglass mold cleaning	Semiaqueous processes
High pressure sprays	Steam
Immersion cleaning	Supercritical fluids
Laser ablation	Ultrasonics
Low pressure sprays	UV/Ozone cleaning
Megasonics	Wiping
No clean options	Xenon flash lamps

Included in the SAGE database are brief and detailed descriptions for each of these chemistries and cleaning processes. Appendix H contains brief descriptions for each of the chemistries and processes. Appendix H also contains an example of one of the detailed summaries (i.e., for high pressure spray).

3.3 OTHER METHODS OF IDENTIFYING ALTERNATIVES

Other methods of identifying alternative cleaning solvents and processes include vendors and other users.

Vendors are often an excellent source of information on alternatives. Information from vendors is generally restricted to their products and therefore will tend not to be as broad as SAGE. However, many vendors do extensive testing of their solvents and cleaning processes on a variety of applications, and usually will do trial cleaning of your part for free. The EPA maintains a list of solvent vendors that can be obtained by calling the U.S. EPA's Stratospheric Ozone Information Hotline at (800) 296-1996.

Often times there are other companies out there that have or are going through a similar alternative evaluation process. Many companies are more than happy to share their successes.

The following two U.S. EPA publications may provide valuable information that can be used when identifying your alternatives:

- Guide to Cleaner Technologies: Alternatives to Chlorinated Solvents for Cleaning and Degreasing; and
- Guide to Cleaner Technologies: Cleaning and Degreasing Process Changes.

4.0

Choosing Between Different Alternatives

The process of deciding which of the identified alternatives will be used is a highly variable and generally user-specific process. However, there are some factors that should be considered that are common to most situations. Below is a list of these factors, some of which have already been discussed.

Regulations - Look at Section 2.0 of this part and determine whether the alternative is covered under one of these regulations. This should include a consideration of the water impacts.

Training - Will the alternative require extensive training of cleaning personnel? If so, this cost and time should be accounted for in you estimates.

Maintenance - What type of maintenance will the alternative require? Will there be more or less down time?

Production Rate - How will the alternative affect your production rate? Decreased productivity should be included in your cost estimates.

Odor - Does the alternative have a strong odor? This might require additional ventilation or other modifications.

Compatibility - Is the new solvent or process compatible with the materials you are cleaning? For example, aqueous solvents may cause rust damage on your parts or a high pressure spray may damage delicate parts.

Safety - Is the new system safe to operate? Consider flammability, odors, harmful fumes, physical dangers, etc. Don't trade one hazard for another.

Cost - As mentioned above many factors play a role in the overall cost of an alternative. Many companies have found that switching to alternatives can result in a cost savings over a number of years.

Recoverability - Can the solvent/cleaning media be recovered and reused or recycled?

Proven in Industry - Is the technology only a prototype or has it been proven in industry for similar applications? If so, contact other users.

As mentioned previously, some vendors will test clean your parts so you can evaluate the cleaning efficiency of their cleaning chemistry or process. Some corporations have conducted their own lab tests and shop tests to evaluate the potential alternatives that they have identified. Some companies have found it useful to create a matrix or table summarizing the pros and cons of each potential alternative. If staff is available, it might be beneficial to form a multi-disciplinary team to address requirements for alternative cleaners, to oversee the field evaluations, and to document that the process or chemistry changes are implemented. Many corporations have indicated that satisfactory substitutes are known for almost all cleaning requirements.

GLOSSARY

Glossary

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

Air knife system means a device that directs forced air at high pressure, high volume, or a combination of high pressure and high volume, through a small opening directly at the surface of a continuous web part. The purpose of this system is to rmove the solvent film from the surfaces of the continuous web part.

Area source, as defined in 40 CFR Part 63, Subpart A, means any stationary source of hazardous air pollutants that is not a major source as defined here (see major source definition).

Automated parts handling system means a mechanical device that carries all parts and parts baskets at a controlled speed from the initial loading of soiled parts through the removal of the cleaned parts. Automated parts handling systems include, but are not limited to, hoists and conveyors. See part Two, Section 2.1.1, for an illustration of an automated parts handling system.

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

Clean liquid solvent means fresh unused solvent, recycled solvent, or used solvent that has been cleaned of soils (e.g., skimmed of oils or sludge and strained of metal chips). It was not intended that you should dispose of usable solvent. It was intended that all metal and dirt soils be removed from the machine so that solvent emissions are not underestimated.

Combined squeegee and air-knife system means a system consisting of a combination of a squeegee system and an air-knife system within a single enclosure.

Construction means the on-site fabrication, erection, or installation of an affected source.

Continuous web cleaning machine means a solvent cleaning machine in which parts such as film, coils, wire, and metal strips are cleaned at speeds typically in excess of 11 feet per minute. Parts are generally uncoiled, cleaned such that the same part is simultaneously entering and exiting the solvent application area of the solvent cleaning machine, and then recoiled or cut. For the purposes of Subpart T, all continuous web cleaning machines are considered to be a subset of in-line solvent cleaning machines.

Cover means a lid, top, or portal cover that shields the solvent cleaning machine openings from air disturbances when it is in place and is designed to be easily opened and closed without

disturbing the vapor zone. Air disturbances include, but are not limited to, lip exhausts, ventilation fans, and general room drafts. Types of covers include, but are not limited to, sliding, biparting, and roll-top covers.

Downtime mode means the time period when a solvent cleaning machine is not cleaning parts and the sump heating coils, if present, are turned off.

Dwell means 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.

Existing cleaning machine means a cleaning machine constructed or reconstructed on or before November 29, 1993.

Freeboard height means; for a batch vapor cleaning machine, the distance from the solvent-air interface, as measured during the idling mode, to the top of the cleaning machine; For an in-line cleaning machine, it is the distance from the solvent-air interface to the bottom of the entrance or exit opening, whichever is lower as measured during the idling mode. The freeboard height for a batch cold cleaning machine is the distance from the solvent fill line (the lie that the sump is filled to) to the lip of the cleaning machine.

Freeboard ratio means the ratio of the solvent cleaning machine freeboard height to the smaller interior dimension (length, width, or diameter) of the solvent cleaning machine. For example, if the height of the freeboard is 2 meters and the smaller interior dimension is 1.8 meters, the freeboard ratio would be 2 meters/1.8 meters or 0.9.

Freeboard refrigeration device (also called a chiller) means a set of secondary coils mounted in the freeboard area that carries a refrigerant or other chilled substance to provide a chilled air blanket above the solvent vapor.

Freeboard zone, for a batch vapor cleaning machine, means the area from the solvent-air interface, as measured during the idling mode, to the top of the cleaning machine; for an in-line cleaning machine, it is the area within the solvent cleaning machine that extends from the solvent-air interface to the bottom of the entrance or exit opening, whichever is lower. The freeboard zone for a batch cold cleaning machine is the area from the solvent fill line (the line that the sump is filled to) to the lip of the cleaning machine.

Hoist means a mechanical device that carries the parts and parts baskets from the loading area into the solvent cleaning machine and to the unloading area at a controlled speed. A hoist may be operated by controls or may be programmed to cycle parts through the cleaning cycle automatically.

Idling mode means the time period when a solvent cleaning machine is turned on but is not actively cleaning parts.

Idling-mode cover means any cover or solvent cleaning machine design that allows the cover to shield the cleaning machine openings during the idling mode. A cover that meets this definition can also be used as a working-mode cover if that definition is also met.

Lip exhaust means a device installed at the top of the opening of a solvent cleaning machine that draws in air and solvent vapor emissions from the freeboard area and ducts the air and vapor away from the solvent cleaning area.

Major source, as defined in 40 CFR Part 63, Subpart A, means any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants, unless the authority (e.g., approved Title V permitting authority) establishes a lesser quantity, or in the case of radionuclides, different criteria from those specified in this sentence.

New cleaning machine means a solvent cleaning machine the construction or reconstruction of which is commenced after November 29, 1993.

Potential to emit, as defined in 40 CFR Part 63, Subpart A, means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the stationary source to emit a pollutant, including air pollution equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable.

For solvent cleaning machines, potential to emit is determined on the basis of the yearly hours of operation, the working-mode uncontrolled emission rate, and the solvent/air interface area. Unless otherwise restricted by a federally enforceable requirement, the hours of operation must be based on the total number of hours in a year (8,760 hours). A facility's total potential to emit is the sum of the HAP emissions from all solvent cleaning operations, plus all HAP emissions from other sources within the facility.

Primary cleaning time means the amount of time it takes a part to reach the vapor zone temperature.

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

Reconstruction, as defined in 40 CFR Part 63, Subpart A, means the replacement of components of an affected or a previously unaffected stationary source to such an extent that:

(1) The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable new source; and

(2) It is technologically and economically feasible for the reconstructed source to meet the relevant standard(s) established by the Administrator (or a State) pursuant to Section 112 of the Act. Upon reconstruction, an affected source, or a stationary source that becomes an affected source, is subject to relevant standards for new sources, including compliance dates, irrespective of any change in emissions of hazardous air pollutants from that source.

Reduced room draft means decreasing the flow or movement of air across the top of the freeboard area of the solvent cleaning machine to less than or equal to 15.2 meters per minute (50 feet per minute). Methods of achieving a reduced room draft include, but are not limited to, redirecting fans and/or air vents so that they do 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.

Remote reservoir continuous web cleaning machine means a continuous web cleaning machine in which there is no exposed solvent sump. In these units, the solvent is pumped from an enclosed chamber and is typically applied to the continuous web part through a nozzle or series of nozzles. The solvent then drains from the part and is collected and recycled through the machine, allowing no solvent to pool in the work or cleaning area.

Solvent fill line means the line, typically on the interior of a solvent cleaning machine sump, that indicates the level to which the cleaning machine should be filled with solvent.

Solvent-air interface, means; for a vapor cleaning machine, the location of contact between the concentrated solvent vapor layer and the air. This location of contact is defined as the midline height of the primary condenser coils; for a cold cleaning machine, it is the location of contact between the liquid solvent and the air.

Solvent-air interface area for a vapor cleaning machine, means the surface area of the solvent vapor zone that is exposed to the air. For an in-line cleaning machine, it is the total surface area of all the sumps; for a cold cleaning machine, it is the surface area of the liquid solvent that is exposed to the air.

Solvent vapor zone, for a vapor cleaning machine, means the area that extends from the liquid solvent surface to the level at which the solvent vapor is condensed. This level is defined as the midline height of the primary condenser coils.

Squeegee system means a system that uses a series of pliable surfaces to remove the solvent film from the surfaces of the continuous web part. These pliable surfaces, called squeegees, are typically made of rubber or plastic media, and need to be periodically replaced to ensure continued proper function.

Sump means the part of a solvent cleaning machine where the liquid solvent is located.

Superheated part technology means a system that is a part of the continuous web process that heats the continuous web part either directly or indirectly to a temperature above the boiling point of the cleaning solvent. This could include a process step, such as tooling die that heats the part as it is processed, as long as the part remains superheated through the cleaning machine.

Super-heated vapor system means a system that heats the solvent vapor, either passively or actively, to at least 10 degrees Fahrenheit (5 degrees Celsius) above the solvent's boiling point. Parts are held in the super-heated vapor before exiting the machine to evaporate the liquid solvent on them. Hot vapor recycle is an example of a Super-heated vapor system.

Water cover, for a cold cleaning machine, means a layer of water that floats above denser solvent and provides control of solvent emissions. If the solvent used is not denser than water, a water layer (water cover) will not float above your cleaning solvent and control solvent emissions. In many cases the solvent used in batch cold cleaning machines is sold containing the appropriate amount of water to create a water cover.

Working-mode means the time period when the solvent cleaning machine is actively cleaning parts.

Working-mode cover means any cover or solvent cleaning machine design that allows the cover to shield the cleaning machine openings from outside air disturbances during the working mode (i.e., while parts are in the cleaning machine) and during the idling and downtime modes. A working-mode cover is opened only during parts entry and removal. A cover that meets this definition can also be used as an idling-mode cover if that definition is also met.

CONVERSION CHART

Multiply	By	To Obtain
Centimeters	0.3937	Inches
Cubic centimeters	3.531×10^{-5}	Cubic feet
Cubic centimeters	6.10×10^{-2}	Cubic inches
Cubic centimeters	10^{-6}	Cubic meters
Cubic feet	0.02832	Cubic meters
Cubic inches	5.787×10^{-4}	Cubic feet
Cubic inches	16.39	Cubic centimeters
Cubic meters	10^{6}	Cubic centimeters
Cubic meters	35.31	Cubic feet
Cubic meters	61,023	Cubic inches
Cubic yards	7.646×10^{5}	Cubic centimeters
Cubic yards	27	Cubic feet
Cubic yards	0.7646	Cubic meters
Feet per minute	0.01829	Kilometers per hour
Feet per minute	0.3048	Meters per minute
Gallons	0.1337	Cubic feet
Kilograms	2.2046	Pounds
Kilograms	1.102×10^{-3}	Tons (short)
Kilograms per cubic meter	0.06243	Pounds per cubic foot
Kilograms per cubic meter	3.61×10^{-5}	Pounds per cubic inch
Meters	100	Centimeters
Meters	3.2808	Feet
Meters	39.37	Inches
Meters per minute	1.667	Centimeters per second
Meters per minute	3.281	Feet per minute
Meters per minute	0.05468	Feet per second

Multiply	By	To Obtain
Meters per second	1968	Feet per minute
Meters per second	3.284	Feet per second
Pounds	453.6	Grams
Pounds	16	Ounces
Pounds	0.4536	Kilograms
Pounds per cubic foot	0.01602	Grams per cubic centimeter
Pounds per cubic foot	16.02	Kilograms per cubic meter
Pounds per cubic foot	5.787×10^{-4}	Pounds per cubic foot
Pounds per cubic foot	1728	Pounds per cubic foot
Pounds per foot	1.488	Kilograms per meter
Pounds per inch	178.6	Grams per centimeter
Pounds per square foot	4.882	Kilograms per square meter
Pounds per square foot	6.944×10^{-3}	Pounds per square inch
Pounds per square inch	703.1	Kilograms per square
Pounds per square inch	144	Pounds per square foot
Square feet	144	Square inches
Square feet	0.09290	Square meters
Square inches	6.452	Square centimeters
Square inches	6.944×10^{-3}	Square feet
Square meters	10.764	Square feet
Square yards	0.8361	Square meters
Yards	91.44	Centimeters
Yards	3	Feet
Yards	36	Inches
Yards	0.9144	Meters

APPENDIX A

PERCENT BY WEIGHT SOLVENT DETERMINATION

If you own a solvent cleaning machine in which you use less than 5 percent by weight of carbon tetrachloride, chloroform, perchloroethylene, 1,1,1-trichloroethane, trichloroethylene, or methylene chloride, 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

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

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. For clarification see the example calculation that follows.

$$WS = S\% * TW$$

Step

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).

$$TB = WS_1 + WS_2 + WS_3 + ...$$

Step Divide TB by M. Then multiply by 100. The result of this calculation is the total weight percent (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	

Step 2:

TW		S%		WS
20g	x	0.3	=	6g
30g	x	0	=	0
10g	x	1.0	=	10g
				TB = 16g

Step 3:

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

Sept 4:

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

Page A-5 of this Appendix provides a blank calculation sheet for your convenience. This blank calculation sheet is not required; any calculation sheet recordkeeping format incorporating the required documentation would be acceptable.

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:

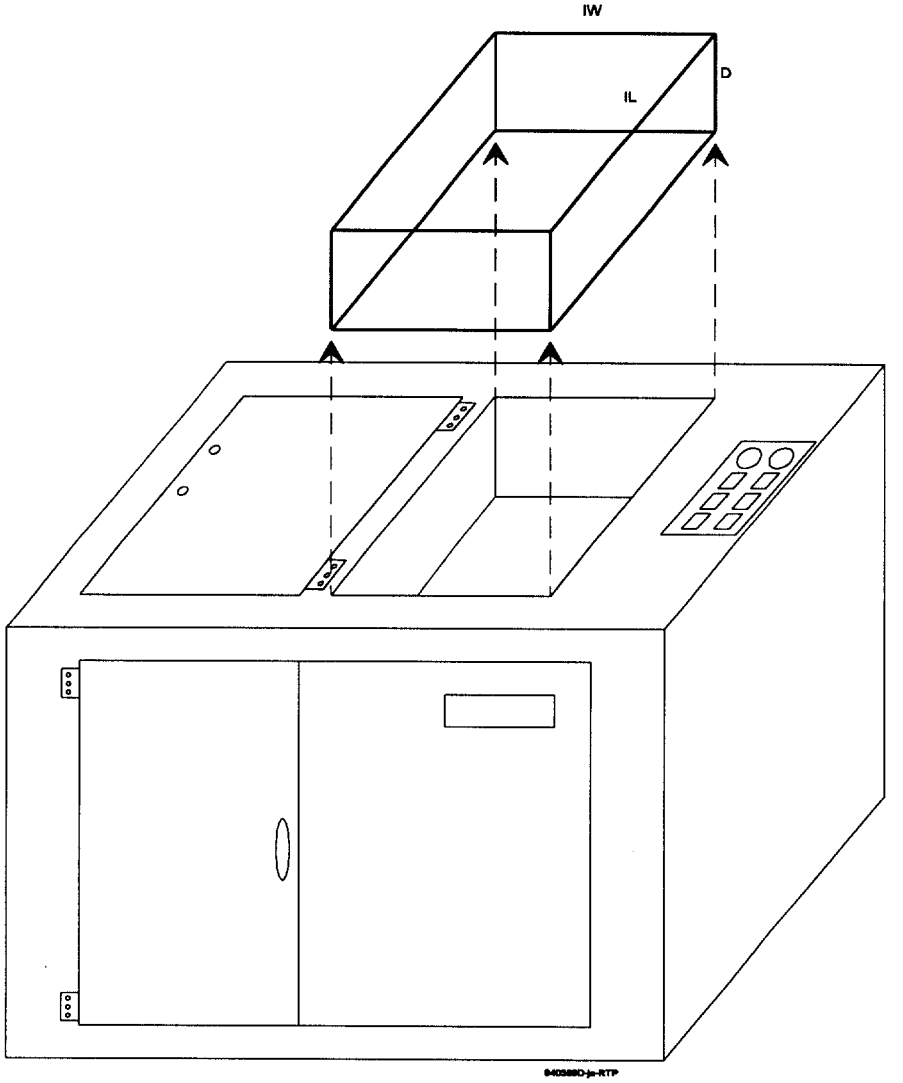
$$(TB \div M) \times 100 = TW\%$$

APPENDIX B

CLEANING CAPACITY AND CLEANING CAPACITY LIMIT DETERMINATION

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;



Solvent Cleaning Machine Cleaning Capacity = IW x IL x D

- 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.

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.

TABLE B-1

EMISSION LIMITS FOR CLEANING MACHINES WITHOUT A SOLVENT-AIR INTERFACE

Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])	Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])	Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])
0.00	0	0.90	310	1.80	470
0.05	55	0.95	320	1.85	477
0.10	83	1.00	330	1.90	485
0.15	106	1.05	340	1.95	493
0.20	126	1.10	349	2.00	500
0.25	144	1.15	359	2.05	508
0.30	160	1.20	368	2.10	515
0.35	176	1.25	377	2.15	522
0.40	190	1.30	386	2.20	530
0.45	204	1.35	395	2.25	537
0.50	218	1.40	404	2.30	544
0.55	231	1.45	412	2.35	551
0.60	243	1.50	421	2.40	558
0.65	255	1.55	429	2.45	565
0.70	266	1.60	438	2.50	572
0.75	278	1.65	446	2.55	579
0.80	289	1.70	454	2.60	585
0.85	299	1.75	462	2.65	592

TABLE B-1 (CONTINUED)

Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])	Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])	Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])
2.70	599	3.60	712	4.50	814
2.75	605	3.65	718	4.55	819
2.80	612	3.70	723	4.60	824
2.85	619	3.75	729	4.65	830
2.90	625	3.80	735	4.70	835
2.95	632	3.85	741	4.75	840
3.00	638	3.90	747	4.80	846
3.05	644	3.95	752	4.85	851
3.10	651	4.00	758	4.90	856
3.15	657	4.05	764	4.95	862
3.20	663	4.10	769	5.00	867
3.25	669	4.15	775	5.05	872
3.30	675	4.20	781	5.10	877
3.35	682	4.25	786	5.15	882
3.40	688	4.30	792	5.20	887
3.45	694	4.35	797	5.25	893
3.50	700	4.40	803	5.30	898
3.55	706	4.45	808	5.35	903

TABLE B-1 (CONTINUED)

Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])	Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])	Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])
5.40	908	6.30	996	7.20	1079
5.45	913	6.35	1000	7.25	1083
5.50	918	6.40	1005	7.30	1088
5.55	923	6.45	1010	7.35	1092
5.60	928	6.50	1015	7.40	1097
5.65	933	6.55	1019	7.45	1101
5.70	938	6.60	1024	7.50	1105
5.75	943	6.65	1029	7.55	1110
5.80	947	6.70	1033	7.60	1114
5.85	952	6.75	1038	7.65	1119
5.90	957	6.80	1042	7.70	1123
5.95	962	6.85	1047	7.75	1127
6.00	967	6.90	1052	7.80	1132
6.05	972	6.95	1056	7.85	1136
6.10	977	7.00	1061	7.90	1140
6.15	981	7.05	1065	7.95	1145
6.20	986	7.10	1070	8.00	1149
6.25	991	7.15	1074	8.05	1153

TABLE B-1 (CONTINUED)

Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])	Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])	Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])
8.10	1158	9.00	1233	9.90	1306
8.15	1162	9.05	1237	9.95	1310
8.20	1166	9.10	1241	10.00	1314
8.25	1171	9.15	1246	10.05	1318
8.30	1175	9.20	1250	10.10	1322
8.35	1179	9.25	1254	10.15	1326
8.40	1183	9.30	1258	10.20	1329
8.45	1187	9.35	1262	10.25	1333
8.50	1192	9.40	1266	10.30	1337
8.55	1196	9.45	1270	10.35	1341
8.60	1200	9.50	1274	10.40	1345
8.65	1204	9.55	1278	10.45	1349
8.70	1208	9.60	1282	10.50	1353
8.75	1213	9.65	1286	10.55	1357
8.80	1217	9.70	1290	10.60	1360
8.85	1221	9.75	1294	10.65	1364
8.90	1225	9.80	1298	10.70	1368
8.95	1229	9.85	1302	10.75	1372

TABLE B-1 (CONTINUED)

Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])	Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])	Cleaning capacity (cubic meters[a])	3-Month rolling average monthly emission limit (kilograms/ month[b])
10.80	1376	11.20	1406	11.60	1436
10.85	1380	11.25	1410	11.65	1440
10.90	1383	11.30	1414	11.70	1444
10.95	1387	11.35	1417	11.75	1447
11.00	1391	11.40	1421	11.80	1451
11.05	1395	11.45	1425	11.85	1455
11.10	1399	11.50	1429	11.90	1458
11.15	1402	11.55	1432	11.95	1562

[a] Divide cubic feet by 35.31 to obtain the cleaning capacity in cubic meters.
[b] Multiply kilograms/month by 2.2046 to obtain the 3-month rolling average monthly emission limit in pounds/month.

Note: 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.

An example recordkeeping form is included for your convenience. This form is not required; any report format incorporating the required information would be acceptable.

HALOGENATED SOLVENT CLEANER NESHAP:

CLEANING CAPACITY DETERMINATION RECORDKEEPING FORM

Cleaner Identification Number	IW (1)	IL (2)	D (3)	Capacity* (1) x (2) x (3)

IW = Internal width of cleaner tank (in meters [or in feet]).
IL = Internal length of cleaner tank (in meters[or in feet[).
D = Depth of cleaner tank (in meters [or in feet]).

*Note: The units of measure for (1), (2), and (3) need to be consistent with one another (i.e., all in meters or all in feet) in order to determine the cleaning capacity of your machine.

If your machine has a cleaning capacity greater than 11.95 cubic meters (421.95 cubic feet), you will need to calculate your emission limit. The steps necessary to calculate your emission limit and an example calculation follows. Note that this calculation requires the use of metric units specified in each of the steps. Multiply cubic feet by 0.02832 to obtain cubic meters and kilograms by 0.4536 to obtain pounds.

Step

Gather the following information for each cleaning machine.

- VOL - The cleaning capacity of the cleaning machine (cubic meters).

Step

Multiply the VOL of your cleaning machine(s) raised to the 0.6 power by 330, this is the EL (the three-month rolling average monthly emission limit for your cleaning machine in kilograms per month)

$$(VOL)^{.6} \times 330 = EL \text{ (kilograms per month).}$$

Examples:

If your machine has a 1.00 cubic meter cleaning capacity, you would carry out the following calculation:

$1.00^{.6} \times 330 =$
$1.00 \times 330 = 330$ kilograms per month

If your machine has a 2.00 cubic meter cleaning capacity, you would carry out the following calculation:

$2.00^{.6} \times 330 =$
$1.52 \times 330 = 500$ kilograms per month

COMPLIANCE DEMONSTRATION

You will need to do the following mathematical calculation for each solvent cleaning machine you own or operate that does not have a solvent-air interface area.

Step

Gather the following information for each machine you own or operate that does not have a solvent-air interface area.

SA - The amount of halogenated solvent added (kilograms of solvent added [or pounds of solvent added]) that month.

LSR - The amount of halogenated solvent removed (kilograms of liquid solvent removed[or pounds of solvent removed]) that month.

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

- This information can be obtained by using the EPA test method 25D-Determination of the Volatile Organic Concentration of Waste Samples (56 FR 33544). This test method requires the use of a flame ionization detector (FID) or an electrolytic conductively detector (ELCD), which should not be attempted by someone unfamiliar with this equipment.
- From engineering calculations.

Step

Subtract LSR and SSR from SA. Then, from this, divide by 3. The result is the E_1, the monthly emissions (kilograms of solvent emissions [or pounds of solvent emissions]) for that month.

$$\frac{SA - (LSR + SSR)}{3} = E_1 \text{ (kilograms emitted [or pounds emitted])}$$

An example recordkeeping form that can be used to document this determination is included for your convenience. This form is <u>not</u> required. Any record format incorporating the required information would be acceptable.

HALOGENATED SOLVENT CLEANER NESHAP:

MONTHLY EMISSIONS RECORDKEEPING FORM COMPLIANCE DEMONSTRATION

(For Machines That Do Not Have a Solvent-Air Interface Area)

Cleaning Identification Number: _____

Month/Year	SA (1)	LSR (2)	SSR (3)	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).

APPENDIX C

RECORDKEEPING FORMS

**[NOTE: NONE OF THESE FORMS ARE REQUIRED.
THE USE OF THESE FORMS IS OPTIONAL.]**

TABLE OF CONTENTS

PAGE

HALOGENATED SOLVENT CLEANER NESHAP:

COMPLIANCE DETERMINATION WORKSHEET

Cleaner Identification Number	Use Halogenated Solvent?[a]	New or Existing?		Pick One			Solvent Air Interface Area?	Other[b]
		N	E	Batch Cold	Batch Vapor	In-Line		

[a] Greater than 5 percent.

[b] Miscellaneous notes, including cleaning capacity if machine is a batch vapor cleaning machine with no solvent air interface.

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

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:

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:

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:

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:

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:

ANNUAL SOLVENT CONSUMPTION

Year	Cleaner Identification Number	Type of Cleaner			Annual Solvent Consumption (kilograms or pounds)	Other[a]
		Batch Cold	Batch Vapor	In-Line		

[a] Miscellaneous notes, including method used to determine annual consumption estimate (e.g., mass balance) and reference to appropriate calculation sheets (e.g., Attachment 1).

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]).

HALOGENATED SOLVENT CLEANER NESHAP:

OVERALL EMISSIONS
3-MONTH ROLLING AVERAGE MONTHLY EMISSIONS
RECORDKEEPING FORM

Cleaning Identification Number: _____

Month/Year	E_1 (1)	E_2 (2)	E_3 (3)	3-Month Rolling Average Monthly Emissions $\frac{(1)+(2)+(3)}{3}$

E_1 = Monthly emissions (kilograms per square meter [or pounds per square foot]) for the current month.

E_2 = Monthly emissions (kilograms per square meter [or pounds per square foot]) from the previous month.

E_3 = Monthly emissions (kilograms per square meter [or pounds per square foot]) from two months prior.

APPENDIX D

EPA TEST METHOD NUMBER 307

TABLE OF CONTENTS

PAGE

APPENDIX D

EPA TEST METHOD NUMBER 307

TABLE OF CONTENTS

PAGE

The following is an example calculation of idling emissions using EPA Test Method Number 307:

Date: 11/21/94 Run: 1

Solvent Type: Methylene Chloride
Solvent density, g/m^3 (lb/ft^3): 1,364,500 g/m^3, (or 85.21 lb/ft^3)

Length of boiling sump (S_B), m (ft): 3m, (10 ft)
Width of boiling sump (W_B), m (ft): 2m, (7 ft)

Length of immersion sump (S_I), m (ft): 3m, (10 ft)
Width of immersion sump (W_I), m (ft): 2m, (7 ft)

Length of solvent vapor/air interface (S_V), m (ft): 6m, (20 ft)
Width of solvent vapor/air interface (W_V), m (ft): 2m, (7 ft)

Clock Time	Boiling Sump Reading (cm)	Immersion Sump Reading	Flow Rate Reading (mpm)
6:00 am	$L_{Bi} = 0.3$	$L_{Ii} = 0.15$	12
10:00 pm	$L_{Bf} = 0.5$	$L_{If} = 0.3$	11

From the data the following calculations can be made:

Area of Solvent/Air Interface

$$A_V = S_V W_V$$
$$A_V = (6m)(2m)$$
$$A_V = 12m^2 \text{ (or } 129.17 ft^2)$$

Where:

A_V = area of solvent/air interface, m^2 (or ft^2)
S_V = length of solvent/air interface, m (or ft)
W_V = width of solvent/air interface, m (or ft)

Calculation of Sump Interfaces

Boiling Sump -

$$A_B = S_B W_B$$
$$A_B = (3m)(2m)$$
$$A_B = 6m^2 \text{ (or } 64.58 \text{ ft}^2\text{)}$$

Where:

A_B = area of the boiling sump interface, m^2 (or ft^2)
S_B = length of the boiling sump, m (or ft)
W_B = width of the boiling sump, m (or ft)

Immersion Sump -

$$A_I = S_I W_I$$
$$A_I = (3m)(2m)$$
$$A_I = 6m^2 \text{ (or } 64.58 \text{ ft}^2\text{)}$$

Where:

A_I = area of the immersion sump interface, m^2 (ft^2)
S_I = length of the immersion sump, m (ft)
W_I = width of the immersion sump, m (ft)

Calculation of the Emission Rate

$$E = \frac{(L_{B_f} - L_{B_i})\rho\ A_B + (L_{I_f} - L_{I_i})\rho\ A_I}{K\ A_V\ \theta}$$

Where:

LB_f = final boiling sump inclined liquid level indicator reading, cm (or in)
= 0.5 cm (or 0.2 in)
LB_i = initial boiling sump inclined liquid level indicator reading, cm (or in)
= 0.3 cm (or 0.11811 in)
LI_f = final immersion sump inclined liquid level indicator reading, cm (or in)
= 0.3 cm (0r 0.11811 in)
LI_i = initial immersion sump inclined liquid level indicator reading, cm (or in)
= 0.15 cm (or 0.06 in)

ρ	=	density of solvent, g/m^3 (lb/ft^3)
	=	1,364,500 g/m^3 (or 85.21 lb/ft^3) (for methylene chloride)
A_B	=	area of boiling sump interface, m^2 (or ft^2)
	=	6 m^2 (or 211.86 ft^2)
A_I	=	area of immersion sump interface, m^2 (or ft^2)
	=	6 m^2 (or 211.86 ft^2)
K	=	100,000 cm*g/m*kg for metric units
	=	12 in/ft for English units
A_V	=	area of solvent-air interface, m^2 (or ft^2)
	=	12 m^2 (or 423.72 ft^2)
Θ	=	test time, hr
	=	16 hrs

Therefore:

$$E = \frac{[((0.5cm-0.3cm)(1{,}364{,}500g/m^3)(6m^2))+((0.3cm-0.15cm)(1{,}364{,}500g/m^3)(6m^2))]}{(100{,}000cm * g/m * kg)\ (12m^2)\ (16hrs)}$$

$$E = 0.149kg/m^2 * hr$$

Appendix D-3 page contains a blank recordkeeping form that can be used to document the idling emissions for your cleaning machine. Note that this recordkeeping form is <u>not</u> required; any recordkeeping format incorporating the required information would be acceptable.

HALOGENATED SOLVENT CLEANER NESHAP:

Idling Emission Limit Initial Test Recordkeeping Form

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

Date:_____ Run:_____

Solvent Type:_____

Solvent density, (ρ):_____

Length of boiling sump (S_B), m (or ft):_____

Width of boiling sump (W_B), m:_____

Length of immersion sump (S_I), m (or ft):_____

Width of immersion sump (W_I), m (or ft):_____

Length of solvent vapor/air interface (S_V), m (or ft):_____

Width of solvent vapor/air interface (W_V), m (or ft):_____

Clock Time	Boiling Sump Reading (cm or inches)	Immersion Sump Reading	Windspeed Flow Rate Reading (meters or feet per minute)
6:00 am	L_{Bi} =	L_{Ii} =	
10:00 pm	L_{Bf} =	L_{If} =	

HALOGENATED SOLVENT CLEANER NESHAP:

Idling Emission Limit Initial Test Recordkeeping Form (Continued)

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

From the data the following calculations can be made:

1. Area of Solvent/Air Interface

$$A_V = S_V * W_V$$
$$A_V = \_\_\_\_\_$$

Where:

A_V = area of solvent/air interface, m^2 (or feet)
S_V = length of solvent/air interface, m (or feet)
W_V = width of solvent/air interface, m (or feet)

2. Calculation of Sump Interfaces

Boiling Sump -

$$A_B = S_B * W_B$$
$$A_B = \_\_\_\_\_$$

Where:

A_B = area of the boiling sump interface, m^2 (or m^2)
S_B = length of the boiling sump, m (or ft)
W_B = width of the boiling sump, m (or ft)

HALOGENATED SOLVENT CLEANER NESHAP:

Idling Emission Limit Initial Test Recordkeeping Form (Continued)

Immersion Sump -

$$A_I = S_I W_I$$

$$A_I = \_\_\_\_\_$$

Where:

A_I = area of the immersion sump interface, m^2 (or ft^2)
S_I = length of the immersion sump, m (or ft)
W_I = width of the immersion sump, m (or ft)

3. Calculation of the Emission Rate

$$E = \frac{(L_{B_f}-L_{B_i})\rho A_B+(L_{I_f}-L_{I_i})\rho A_I}{K A_V \Theta}$$

Where:

LB_f	=	final boiling sump inclined liquid level indicator reading, cm (or in)
LB_i	=	initial boiling sump inclined liquid level indicator reading, cm (or in)
LI_f	=	final immersion sump inclined liquid level indicator reading, cm (or in)
LI_i	=	initial immersion sump inclined liquid level indicator reading, cm (or in)
ρ	=	density of solvent, g/m^3 (or lb/ft^3)
A_B	=	area of boiling sump interface, m^2 (or ft^2)
A_I =	area of immersion sump interface, m^2 (or ft^2)	
K	=	100,000 cm*g/m*kg (or 12 in/ft)
A_V	=	area of solvent-air interface, m^2 (or ft^2)
Θ	=	test time, hr

Calculation:

APPENDIX E

EQUIPMENT STANDARD WORK PRACTICE COMPLIANCE REQUIREMENTS

Table of Contents

HALOGENATED SOLVENT CLEANER NESHAP
Solvent Cleaning Procedures
Test

General Questions

1. What is the maximum allowable speed (if the size of the parts or basket is less than 50 percent of the solvent-air interface area) for parts entry and removal for all machines except for continuous web in-line cleaning machines?

   A. 85 meters per minute (28 feet per minute)
   B. 34 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. Cloth rollers used in the continuous web cleaning machine as part of the cleaning process once they have been removed from the cleaning machine/process
D. All of the above

Control Device Specific Questions

*****Mark those control devices that apply with an X.*****

☐ Freeboard Refrigeration Device (FRD)

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

Solvent Cleaning Procedures Test 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

BATCH VAPOR AND IN-LINE WORK PRACTICE SUMMARY

MAINTAIN EQUIPMENT AS RECOMMENDED BY THE MANUFACTURER.

MINIMIZE AIR DISTURBANCES IN THE MACHINE AND THE ROOM

- Sources of air disturbances include the following:
  - Fans
  - Open doors
  - Open windows
  - Ventilation vents

MINIMIZE AIR DISTURBANCES DUE TO PARTS MOVEMENT.

- Limit speed of parts entry and removal to less than 3.4 meters per minute (11 feet per minute).
- You must measure parts entry and removal by measuring the time it takes the parts to travel a measured distance.

MINIMIZE SOLVENT LOSS DUE TO SPRAYING OPERATIONS.

- Spray within the enclosed area of the machine to prevent splashing and spraying solvent outside the machine.

REDUCE THE POOLING OF SOLVENT ON AND IN PARTS.

- Ensure that parts are positioned so that solvent drains freely from them.
- Ensure that parts or parts baskets are not removed from the machine until parts are clean and solvent dripping has stopped.

FOLLOW PROPER STARTUP AND SHUTDOWN PROCEDURES.

- During startup, turn on the primary condenser, then the sump heater.
- During shutdown, turn off the sump heater then the primary condenser.

FOLLOW PROPER SOLVENT TRANSFER PROCEDURES.

- Solvent must be added to and removed from the machine with leak-proof couplings.
- Solvent must be added to and removed from the machine with the end of the pipe in the solvent sump below the liquid solvent.

STORE SOLVENT WASTE IN CLOSED CONTAINERS.

DO NOT CLEAN ABSORBENT MATERIALS.

- Examples of materials prohibited from being cleaned in this machine include sponges, fabrics, paper, and wood. Note that this does not include the cloth rollers used during/as part of the continuous web cleaning process.

BE PREPARED TO TAKE AND PASS AN OPERATOR TEST.

APPENDIX F

BATCH VAPOR AND IN-LINE MACHINE REPORTING FORMS

[NOTE: NONE OF THESE FORMS ARE REQUIRED, THE USE OF THESE FORMS IS OPTIONAL.]

TABLE OF CONTENTS

HALOGENATED SOLVENT CLEANER NESHAP

Initial Notification Report for Existing* Machines

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

***Existing cleaning machines are cleaners installed on or before November 29, 1993.**

HALOGENATED SOLVENT CLEANER NESHAP

Initial Notification Report for Existing* Machines

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

Cleaner Identification Number: _____

1. Type of machine (check one):

___Batch vapor ___In-line ____Continuous web in-line

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

3. Existing controls

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

___Carbon adsorber
___Reduced room draft
___Dwell

4. Date of installation (attach documentation)_____

5. Anticipated compliance approach

___Basic equipment standard
___Alternative standard
___Idling emission standard

6. Annual estimate of halogenated HAP solvent consumption

_____ kilograms/year (or pounds/year)

***Existing cleaning machines are cleaners installed on or before November 29, 1993.**

HALOGENATED SOLVENT CLEANER NESHAP

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

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

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

HALOGENATED SOLVENT CLEANER NESHAP

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

PART TWO - Information Required per 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

___Continuous web in-line

2. Solvent/air interface area_____ square meters (or 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 (or 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 ___Continuous web in-line

2. Solvent/air interface area_____ square meters (or 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
___Carbon adsorber
___Reduced room draft
___Dwell
___Other Control_____
___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.
___ Squeegee System	• Maximum product throughput • Total amount of continuous web product processed since squeegees last replaced • Weekly calculation of length of continuous web cleaned • Re-determine maximum product throughput if solvent film visible on product	• Ensure squeegees are replaced at or before the maximum product throughput. • Visual inspection of continuous web parts leaving machine for solvent film.
___ Air Knife System	• Determine parameter value that demonstrates the air knife system is properly operating (i.e., no visible solvent film remains on the continuous web part after it exits the machine). • Redetermine value if solvent film remains on the continuous web part after it exits the machine.	• Visual inspection of continuous web parts leaving machine for solvent film.
___ 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
___ Superheated Part Technology	• Temperature of part traveling through the machine.	• At least 10°F above the solvent's boiling point • Use a thermometer, thermocouple, or other temperature measurement device.

_____ 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 Machines Complying with the Alternative Standard

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

Cleaner Identification Number:_____

1. Type of machine (check one):

   ___Batch vapor ___In-line ___Continuous web in-line

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

   b) Cleaning capacity: _____ cubic meters (or cubic feet), 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 (or pounds 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 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 _____ kg/yr (or lb/yr).

☐ Alternative Standard

Cleaning machine size:

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

Average monthly solvent consumption _____ kg (or lb)

Three month rolling average emission estimates: (calculations attached)

1. _____ kg(or lb) From _____ To _____
Date Date

2. _____ kg (or lb) From _____ To _____
Date Date

3. _____ kg (or lb) 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

HALOGENATED SOLVENT CLEANER NESHAP

Exceedance Report

PART TWO - Information Required per 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 G

BATCH COLD CLEANING MACHINE WORK PRACTICE REQUIREMENTS AND REPORTING FORMS

TABLE OF CONTENTS

PAGE

BATCH COLD CLEANING MACHINE WORK PRACTICE REQUIREMENTS

COMPLY WITH THE FOLLOWING WORK PRACTICES (MACHINES WITH WATER LAYER EXEMPT FROM WORK PRACTICES).

- Store solvent waste in closed containers.
- Minimize the pooling of solvent on and in parts.
- Clean up spills immediately.
- Do not agitate solvent to the point of causing splashing.
- Flush parts in freeboard area.
- Do not fill machine above fill line.
- Store wipe rags in closed containers.
- When cover is open, control room drafts.
- Do not clean absorbent materials.

HALOGENATED SOLVENT CLEANER NESHAP:

Initial Notification Report for Batch Cold Cleaners Report

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:

Initial Notification 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

Machine Installation Date: _____

Anticipated Equipment Control Combination Compliance Approach (circle one):

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

Annual Solvent Consumption Estimate: _____ kg/yr or lb/yr.

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

APPENDIX H

HALOGENATED SOLVENT CLEANER NESHAP REGULATION

This document is an elaboration of the appropriate legal document(s), and the final authority rests solely in the legal document(s). Refer to the Office of the Federal Register website for the latest regulatory text for this rulemaking: http://www.gpoaccess.gov/fr/index.html

APPENDIX I

EPA REGIONAL OFFICE CONTACT PHONE NUMBERS

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) 918-1650
2	NJ, NY, Puerto Rico, Virgin Islands	(212) 637-4080
3	DE, MD, PA, VA, WV, District of Columbia	(215) 814-3483
4	AL, FL, GA, KY, MS, NC, SC, TN	(404) 562-9105
5	IL, IN, MI, WI, MN, OH	(312) 353-2211
6	AR, LA, NM, OK, TX	(214) 665-7224
7	IA, KS, MO, NE	(913) 551-7020
8	CO, MT, ND, SD, UT, WY	(303) 312-6007
9	AZ, CA, HI, NV, American Samoa, Guam	(415) 744-1219
10	AK, ID, WA, OR	(206) 553-4273