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## TITLE 250 – DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

### CHAPTER 120 – AIR RESOURCES

#### SUBCHAPTER 05 - AIR POLLUTION CONTROL

PART 35 - Control of Volatile Organic Compounds and Volatile Hazardous Air Pollutants from Wood Product Manufacturing Operations

#### **35.1 Purpose and Authority**

##### **35.1.1 Purpose**

The purpose of this regulation is to limit emissions of volatile organic compounds and hazardous air pollutants from wood products manufacturing operations.

##### **35.1.2 Authority**

These regulations are authorized pursuant to R.I. Gen. Laws § 42-17.1-2(19) and R.I. Gen. Laws Chapter 23-23, and have been promulgated pursuant to the procedures set forth in the Rhode Island Administrative Procedures Act, R.I. Gen. Laws Chapter 42-35.

#### **35.23 Application**

The terms and provisions of this regulation shall be liberally construed to permit the Department to effectuate the purposes of state law, goals and policies.

#### **35.34 Severability**

If any provision of this regulation or the application thereof to any person or circumstance, is held invalid by a court of competent jurisdiction, the validity of the remainder of the regulation shall not be affected thereby.

#### **35.4 Incorporated Materials**

A. These regulations hereby adopt and incorporate 40 C.F.R. § 51 Method 204, 40 C.F.R. § 63 Appendix A Method 311; 40 C.F.R. § 60 Appendix A-1 Methods 1, 1A, 2, 2A, 2C, and 2D; 40 C.F.R. § 60 Appendix A-2 Method 3; 40 C.F.R. § 60 Appendix A-3 Method 4; 40 C.F.R. § 60 Appendix A-6 Method 18; 40 C.F.R. § 60 Appendix A-7 Methods 24, 25, and 25A (2018) by reference, not including any

further editions or amendments thereof and only to the extent that the provisions therein are not inconsistent with these regulations.

B. These regulations hereby adopt and incorporate the Environmental Protection Agency's "Standard Procedures for Collection of Coating and Ink Samples for VOC Content Analysis by Reference Method 24 and Reference Method 24A" EPA-340/1-91-010 (1991) by reference, not including any further editions or amendments thereof and only to the extent that the provisions therein are not inconsistent with these regulations.-

## **35.5 Definitions**

- A. Unless otherwise expressly defined in this section, the terms used in this regulation shall be defined by reference to [Part 0](#) of this Subchapter (General Definitions). As used in this regulation, the following terms shall, where the context permits, be construed as follows:
1. "Adhesive" means a chemical substance that is applied for the purpose of bonding two (2) surfaces together other than by mechanical means.
  2. "Alternative method" means a method of sampling and analyzing for an air pollutant that is not a reference or equivalent EPA sampling method but that has been demonstrated to the EPA's satisfaction to, in specific cases, produce results adequate for a determination of compliance.
  3. "As applied" means the VOC, VHAP and solids content of the coating material as it is used for coating the substrate, including the contribution of thinners.
  4. "Basecoat" means a coat of colored material, usually opaque, that is applied before graining inks, glazing coats, or other opaque finishing materials and is usually top coated for protection.
  5. "Capture device" means a hood, enclosed room, floor sweep, or other means of collecting solvent emissions or other pollutants into a duct so that pollutants can be directed to a pollution control device such as an incinerator or a carbon adsorber.
  6. "Capture efficiency" means the fraction of all organic vapors generated by a process that are directed to a control device.
  7. "Certified product data sheet" or "CPDS" means documentation furnished by a coating supplier or an outside laboratory that provides the VHAP content, VOC content, solids content, and density of a finishing material, strippable booth coating, adhesive, or solvent, -measured using [40 C.F.R. §](#)

[60. EPA Appendix A-7 Methods 24](#) and [40 C.F.R. § 63 Method 311](#), or an equivalent or alternative method (or formulation data if the coating meets the criteria specified in § 35.12.1(B) of this Part. The purpose of the CPDS is to assist the facility in demonstrating compliance with the emission limitations presented in — §§ 35.7, 35.8, and 35.9 of this Part. Therefore, the VOC and VHAP content should represent the maximum VOC and VHAP emission potential of the finishing material, strippable booth coating, or solvent.

8. "Cleaning operations" means operations in which organic solvent is used to remove coating materials from equipment used in wood products manufacturing operations.
9. "Coating" means a protective, decorative, or functional material applied in a thin layer to a surface. Such materials include, but are not limited to, paints, topcoats, varnishes, sealers, stains, washcoats, basecoats, adhesives, inks, enamels, and temporary protective coatings.
10. "Coating solids" or "Solids" means the part of a coating that remains after the coating is dried or cured; solids content is determined using data from [40 C.F.R. § 60 Appendix A-7EPA Method 24, incorporated in § 35.4\(A\) of this Part](#).
11. "Compliant coating" means a finishing material, adhesive, or strippable booth coating that meets applicable emission limitations specified in §§ 35.7 and 35.8 of this Part.
12. "Contact adhesive" means an adhesive that is applied to two (2) substrates, dried, and mated under only enough pressure to result in good contact. The bond is immediate and sufficiently strong to hold pieces together without further clamping, pressure, or airing.
13. "Continuous coater" means a finishing system that continuously applies finishing materials onto wood parts moving along a conveyor system. Finishing materials that are not transferred to the part are recycled to the finishing material reservoir. Several types of application methods can be used with a continuous coater including spraying, curtain coating, roll coating, dip coating, and flow coating.
14. "Continuous compliance" means that the facility is meeting the applicable emission limitations and other applicable requirements of this regulation at all times and is fulfilling all monitoring and recordkeeping provisions of the regulation in order to demonstrate compliance.

15. "Control device" means any equipment that reduces the quantity of a pollutant that is emitted to the air. The device may destroy or secure the pollutant for subsequent recovery. Control devices include, but are not limited to, incinerators, carbon adsorbers, and condensers.
16. "Control device efficiency" means the ratio of the amount of pollutant released by a control device to the amount of pollutant introduced to the control device, expressed as a fraction.
17. "Control system" means the combination of capture and control devices used to reduce emissions to the atmosphere.
18. "Conventional air spray" means a spray coating method in which the coating is atomized by mixing it with compressed air at an air pressure greater than ten (10) pounds per square inch (gauge) at the point of atomization. Airless, air assisted airless, and electrostatic spray technologies are not considered conventional air spray methods.
19. "Day" means a period of twenty-four (24) consecutive hours beginning at midnight local time, -or beginning at a time consistent with a facility's operating schedule.
20. "Disposed offsite" means sending used organic solvent or coatings outside of the facility boundaries for disposal.
21. "Emission" means the release or discharge, directly or indirectly, of one (1) or more air pollutants into ambient air.
22. "Enamel" means a coat of colored, usually opaque material that is applied as a protective topcoat over a basecoat, primer, or previously applied enamel coats. In some cases, another finishing material may be applied as a topcoat over the enamel.
23. "Equipment leak" means emissions of VOC or VHAP from pumps, valves, flanges, or other equipment used to transfer or apply finishing materials, adhesives, or organic solvents.
24. "Equivalent method" means a method of sampling and analyzing for an air pollutant that EPA has determined to have a consistent and quantitatively known relationship to the reference method, under specific conditions.
25. "Filler" means a finishing material which is applied to a wood surface primarily to build up, or fill the voids and imperfections in, the wood surface to be coated. Edge filler is included in this definition.

26. "Finishing application station" means the part of a finishing operation where the finishing material is applied, e.g., a spray booth.
27. "Finishing material" means a coating other than an adhesive. For the wood products manufacturing industry, such materials include, but are not limited to, basecoats, stains, washcoats, enamels, sealers, and topcoats.
28. "Finishing operation" means those activities in which a finishing material is applied to a substrate and is subsequently air-dried, cured in an oven, or cured by radiation.
29. "Foam adhesive" means a contact adhesive used for gluing foam to fabric, foam to foam, and fabric to wood.
30. "Gluing operation" means those operations in which adhesives are used to join components, for example to apply a laminate to a wood substrate or foam to fabric.
31. "High-solids stains" means stains containing more than one (1) pound of solids per gallon and includes wiping stains, glazes, and opaque stains.
32. "Incinerator" means an enclosed combustion device that thermally oxidizes volatile organic compounds to CO and CO<sub>2</sub>. This term does not include devices that burn municipal or hazardous waste material.
33. "Ink" means a fluid that contains dyes and/or colorants and is used to make markings, but not to protect surfaces.
34. "Low-solids stains" means stains containing one (1) pound of solids per gallon, or less.
35. "Major source of hazardous air pollutants" means a facility that emits or has the potential to emit, in the aggregate, ten (10) tons per year (tpy) or more of any Hazardous Air Pollutant (HAP), twenty-five (25) tpy or more of any combination of HAPs, or such lesser quantity as the EPA may establish by rule.
36. "Malfunction" means any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

- ~~37. "Multi-colored coating" means a coating which exhibits more than one (1) color when applied, and which is packaged in a single container and applied as a single coat.~~
378. "Nonpermanent final finish" means a material such as a wax, polish, nonoxidizing oil, or similar substance that must be periodically reapplied to a surface over its lifetime to maintain or restore the reapplied material's intended effect.
389. "Operating day" means a day, or any part of a day, in which a facility is engaged in manufacturing.
3940. "Operating parameter value" means a minimum or maximum value established for a control device or process parameter that, if achieved by itself or in combination with one (1) or more other operating parameter values, determines that an owner or operator has complied with an applicable emission limitation.
404. "Organic solvent" means a liquid containing VOC that is used for dissolving or dispersing constituents in a coating, adjusting the viscosity of a coating, cleaning, or washoff. When used in a coating, the organic solvent evaporates during drying and does not become a part of the dried film.
412. "Overall control efficiency" means the efficiency of a control system, calculated as the product of the capture and control device efficiencies, expressed as a percentage.
423. "Permanent total enclosure" means a permanently installed enclosure that completely surrounds a source of emissions such that all emissions are captured and contained for discharge through a control device. The enclosure must meet [the requirements in 40 C.F.R. § 51 Appendix M, Method 204, incorporated in § 35.4\(A\) of this Part.](#) ~~applicable EPA criteria.~~
- ~~44. "Pigmented coating" means an opaque coating which contains binders and colored pigments and which is formulated to hide the wood surface, either as an undercoat or topcoat.~~
435. "Recycled onsite" means the reuse of an organic solvent at the facility in a process other than cleaning or washoff.
446. "Sealer" means a finishing material used to seal the pores or grains of a wood substrate before additional coats of finishing material are applied. Washcoats, which are used in some finishing systems to optimize aesthetics, are not sealers.

457. "Shutdown" means the cessation of operation of wood products manufacturing operations for any purpose.
468. "Solvent" means a liquid used in a coating for dissolving or dispersing constituents in a coating, adjusting the viscosity of a coating, cleaning, or washoff. When used in a coating, it evaporates during drying and does not become a part of the dried film.
479. "Stain" means any color coat having a solids content by weight of not more than eight percent (8%) that is applied in single or multiple coats directly to the substrate. Stains include, but are not limited to, nongrain raising stains, equalizer stains, prestains, sap stains, body stains, no-wipe stains, penetrating stains, and toners.
4850. "Startup" means the setting in operation of wood products manufacturing operations for any purpose.
4951. "Strippable booth coating" means a coating that:
- a. Is applied to a booth wall to provide a protective film to receive overspray during finishing operations;
  - b. Is subsequently peeled off and disposed; and
  - c. By achieving §§ 35.5(A)(4951)(a) and (b) of this Part, reduces or eliminates the need to use organic solvents to clean booth walls.
502. "Substrate" means the surface onto which coatings are applied or into which coatings are impregnated.
513. "Thinner" means a volatile liquid that is used to dilute coatings to reduce viscosity, color strength, and solids, or to modify drying conditions.
524. "Toner" means a stain which contains binders and dyes or pigments to add tint to a coated surface or to even the color of an initial application of stain.
535. "Topcoat" means the last film-building finishing material applied in a finishing system.
546. "Touch-up and repair" means the application of finishing materials to cover minor finishing imperfections.
557. "Volatile hazardous air pollutant" and "VHAP" means any of the substances listed in § 35.13 of this Part(Table 2).

568. "Volatile organic compound" or "VOC" means volatile organic compound and halogenated organic compound or "VOC and HOC."

578. "Washcoat" means a transparent special purpose coating having a solids content by weight of twelve percent (12%) or less. Washcoats are applied over initial stains to protect and control uniformity of color, to stiffen the wood fibers, to prepare the wood surface for sanding, and to partially seal the wood from subsequent staining operations.

589. "Washoff operations" means those operations in which organic solvent is used to remove coating from a substrate.

5960. "Wood products facility" means a facility which is engaged in coating the surface of products manufactured of wood or wood products, including, but not limited to, particle board, reed, rattan and wicker.

a. Wood product coating does not include coating of flat wood panels, as defined in Part 19 of this Subchapter (Control of Volatile Organic Compounds from Surface Coating Operations).

60. "Wood products manufacturing operations" means the finishing, gluing, cleaning and washoff operations conducted at a wood products facility.

## 35.6 Applicability

- A. The provisions of this regulation apply to any wood products facility which has the potential to emit twenty-five (25) tons per year or more of volatile organic compounds (VOC) from wood products manufacturing operations or which is a major source of hHazardous aAir pPollutants (HAP) from wood products manufacturing operations.
- B. The owner or operator of a wood products facility which has emissions below the applicability thresholds specified in § 35.6(A) of this Part but above fifteen (15) pounds of VOC in any day shall comply with the recordkeeping and reporting requirements in §§ 35.11(A)(1) through (43) of this Part, but the facility shall not be subject to any other provisions of this regulation. If the facility becomes subject to the regulation at a future date due to an increase in emissions of VOC or VHAP, the facility shall be subject to applicable requirements in this regulation on and after the date that the applicability thresholds are reached or the date that the applicable requirement becomes effective, whichever is later.
- ~~C. Where ever the term Volatile Organic Compound or VOC is used in §§ 35.5 through 35.12 of this Part, this term should be read as Volatile Organic Compound and Halogenated Organic Compound or VOC and HOC.~~

- ~~CD~~. The owner or operator of a facility which is a major source of ~~h~~Hazardous ~~a~~Air ~~p~~Pollutants (HAP) from wood products manufacturing operations but which has not emitted more than ten (10) tons of any one HAP or more than twenty-five (25) tons of any combination of HAP from wood products manufacturing operations in any 12-month period ~~since December 1994~~, may apply to the Director for an exemption from the VHAP emissions limitations in §§ 35.7.2, 35.7.3, 35.8(B), and 35.8(C) of this Part. Exemption will be given in the form of an enforceable document, and will include the following conditions:
1. Average monthly emissions from the facility in any consecutive 12-month period shall not exceed 1,666 pounds of any one HAP or 4,166 pounds of any combination of HAP; and
  2. The following records shall be maintained at the facility for a period of five (5) years and made available to the Department or the EPA upon request:
    - a. The name, identification number, and amount of each finishing, gluing and washoff material used each month at the facility; and
    - b. Certified Product Data Sheets showing the VOC and VHAP content of each finishing, gluing, and washoff material used at the facility; and
    - c. The type and amount of solvent used as thinners and in cleaning operations each month at the facility;
    - d. The average monthly emissions of each HAP from the facility, calculated monthly for the previous 12-month period.
  3. If the limit in § 35.6(~~CD~~)(1) of this Part is exceeded, applicable VHAP emission limitations specified in §§ 35.7 and 35.8 of this Part shall immediately apply.

## 35.7 Emission Limitations for Finishing Operations

### 35.7.1 VOC Emission Limitations for Finishing Operations

- A. ~~On and after March 7, 1996, I~~the owner or operator of a facility subject to this regulation which has the potential to emit greater than or equal to twenty-five (25) tons per year of volatile organic compounds (VOC) shall limit VOC emissions from wood products finishing operations by:
1. Using finishing materials which comply with the emissions limitations in pounds of VOC per ~~pound of solids gallon of coating minus water and exempt compounds~~ listed in § 35.7.1(B) of this Part; or

2. Using a control system that achieves the emissions limitations in pounds of VOC per pound of solids listed in § 35.7.1(B) of this Part; or
3. Using finishing materials with a weighted average VOC content, within a particular category of coatings as identified in § 35.7.1(B) of this Part, which conforms with the provisions specified in § 35.10.2(A) of this Part; or
4. Using a combination of the methods presented in §§ 35.7.1(A)(1) through (3) of this Part which is approved by the Department.

B. ~~Table 1: Emissions Limitations for Finishing Materials~~

<u>Coating operations</u>	<u>lbs VOC/lb of solid</u> <u>as applied</u>
<u>Finishing Operations</u>	
<u>Topcoat</u>	<u>0.8</u>
<u>Finishing system of topcoat and sealer</u>	
<u>Topcoats</u>	<u>1.8</u>
<u>Sealers</u>	<u>1.9</u>
<u>Acid-cured alkyd amino vinyl sealers and acid-cured alkyd amino conversion varnish topcoat system, exclusively</u>	
<u>sealer</u>	<u>2.3</u>
<u>topcoat</u>	<u>2.0</u>
<u>Non-acid-cured alkyd amino vinyl sealers and acid-cured alkyd amino conversion varnish topcoat system, exclusively</u>	
<u>sealers</u>	<u>1.9</u>
<u>topcoat</u>	<u>2.0</u>

<u>Acid-cured alkyd amino vinyl sealers and non-acid-cured alkyd amino conversion varnish topcoat system, exclusively</u>	
<u>sealer</u>	<u>2.3</u>
<u>topcoat</u>	<u>1.8</u>

Coating Category	lbs VOC/ gal coating minus water and exempt compounds	lbs VOC/lb solids
clear topcoats containing HOG	4.6	1.2
clear topcoats not containing HOG	5.7	2.5
fillers	4.2	1.0
high solids stains	5.8	2.7
low solids stains, toners and washcoats containing HOG	4.0	0.9
low solids stains, toners and washcoats not containing HOG	6.7	7.5
inks	4.2	1.0
multi-colored coatings	5.7	2.5
pigmented coatings	5.0	1.6
sealers containing HOG	4.6	1.2
sealers not containing HOG	5.7	2.5

~~C. In addition to complying with the limitations in § 35.7.1(B) of this Part, on and after March 7, 1998, the owner or operator of a facility subject to this regulation which has the potential to emit greater than or equal to twenty-five (25) tons per year of VOC shall:~~

- ~~1. Use topcoats containing no more than 1.8 lbs VOC/lb solids, as applied, and sealers containing no more than 1.9 lbs VOC/lb solids, as applied; or~~

- ~~2. Use waterborne topcoats with a VOC content no greater than 0.8 lb VOC/lb solids, as applied; or~~
- ~~3. Use a control system that achieves equivalent reductions in VOC emissions from topcoats and sealers.~~
- ~~D. A facility subject to the emissions limits in § 35.7.1(B) of this Part may be required, at the discretion of the Department, to undergo a review every two (2) years to determine whether the limitations in §§ 35.7.1(A) and (B) of this Part represent Reasonably Available Control Technology (RACT) for the finishing operations at that facility at that time. Facilities shall comply with emissions limitations determined to be RACT within one (1) year of that determination and shall thereafter operate in compliance with those limitations.~~

### 35.7.2 VHAP Emission Limitations for Finishing Operations at Existing Facilities

- A. ~~On and after March 7, 1998,~~ the owner or operator of a facility subject to this regulation which is a major source of HAP from wood products manufacturing operations and which began operations before December 6, 1994, shall limit VHAP emissions from wood products finishing operations by:
  1. Using stains, washcoats, sealers, topcoats, basecoats, and enamels with VHAP contents no higher than 1.0 lb VHAP/lb solids, as applied; thinners for stains, sealers, and topcoats that contain no more than ten percent (10%) VHAP by weight; ~~and~~ thinners for washcoats, basecoats and enamels that contain no more than three percent (3%) VHAP by weight; or
  2. Using finishing materials with a weighted average VHAP content of no greater than 1.0 lb VHAP/lb solids, as applied, calculated using the procedures in § 35.10.2(B) of this Part, and thinners with VHAP contents as specified in § 35.7.2(A)(1) of this Part; or
  3. Using a control system that achieves a reduction in emissions equivalent to that which would be achieved by complying with the requirements of §§ 35.7.2(A)(1) or (2) of this Part, calculated according to the procedures in § 35.10.3(C) of this Part; or
  4. Using a combination of the methods presented §§ 35.7.2(A)(1) and (3) of this Part which is approved by the Department.
- B. The formaldehyde content of a finishing material shall be calculated as the amount of free formaldehyde present in the finishing material when it is applied.

1. Total formaldehyde use in coatings and adhesives shall be no more than four hundred (400) pounds per rolling twelve (12) month period; or

2. Only low-formaldehyde (less than one percent (1%) formaldehyde by weight) coatings and adhesives shall be used in any wood product manufacturing operations.

- C. The styrene content of a finishing material shall be based on an estimate of unreacted styrene, which shall be calculated by multiplying the amount of styrene monomer in the finishing material when it is applied by a factor of 0.16.

### **35.7.3 VHAP Emission Limitations for Finishing Operations at New Facilities**

- A. ~~On and after March 7, 1996,~~ Ithe owner or operator of a facility subject to this regulation which is a major source of HAP from wood products manufacturing operations and began operation on or after December 6, 1994, shall limit VHAP emissions from wood products finishing operations by:

1. Using stains with VHAP contents no greater than 1.0 lb VHAP/lb solids, as applied; washcoats, sealers, topcoats, basecoats, and enamels with VHAP contents no greater than 0.8 lb VHAP/lb solids, as applied; thinners for stains, sealers, and topcoats that contain no more than ten percent (10%) VHAP by weight; and thinners for washcoats, basecoats and enamels that contain no more than three percent (3%) VHAP by weight; or
2. Using finishing materials with a weighted average VHAP content of no greater than 0.8 lb VHAP/lb solids, as applied, calculated using the procedures in § 35.10.2(B) of this Part, and thinners with VHAP contents as specified in § 35.7.3(A)(1) of this Part; or
3. Using a control system that achieves a reduction in emissions equivalent to that which would be achieved by complying with the requirements of §§ 35.7.3(A)(1) or (2) of this Part, calculated according to the procedures in provisions in § 35.10.3(C) of this Part; or
4. Using a combination of the methods presented §§ 35.7.3(A)(1) and (3) of this Part which is approved by the Department.

- B. The formaldehyde content of a finishing material shall be calculated as the amount of free formaldehyde present in the finishing material when it is applied.

1. Total formaldehyde use in coatings and adhesives shall be no more than four hundred (400) pounds per rolling twelve (12) month period; or

2. Only low-formaldehyde (less than one percent (1%) formaldehyde by weight) coatings and adhesives shall be used in any wood product manufacturing operations.

- C. The styrene content of a finishing material shall be based on an estimate of unreacted styrene, which shall be calculated by multiplying the amount of styrene monomer in the finishing material when it is applied by a factor of 0.16.

### **35.8 Emission Limitations for Cleaning and Gluing Operations**

A. VOC Emission Limitations for Cleaning Operations

1. ~~On and after March 7, 1996,~~ Any strippable booth coating used at a facility subject to this regulation must contain no more than 0.8 lb VOC/lb solids, as applied.

B. VHAP Emission Limitations for Existing Gluing Operations

1. ~~On and after March 7, 1996,~~ The owner or operator of a facility subject to this regulation which is a major source of HAP from wood products manufacturing operations and which began operation before December 6, 1994, shall limit VHAP emissions from contact adhesives used in gluing operations as follows:
- a. For foam adhesives used in products that meet the upholstered seating flammability requirements of California Technical Bulletin 116, 117, or 133, the Business and Institutional Furniture Manufacturers Association's (BIFMA's) X5.7, UFAC flammability testing, or any similar requirements from local, State, or Federal fire regulatory agencies, the VHAP content of the adhesive shall not exceed 1.8 lb VHAP/lb solids, as applied;
  - b. For all other contact adhesives, including foam adhesives used in products that do not meet the standards presented in § 35.8(B)(1)(a) of this Part, the VHAP content of the adhesive shall not exceed 1.0 lb VHAP/lb solids, as applied; or
  - c. By using a control system that will achieve a reduction in VHAP emissions equivalent to that which would be achieved by complying with the requirements of § 35.8(B)(1)(b) of this Part, as calculated using the procedures in § 35.10.3(D) of this Part.

C. VHAP Emission Limitations for New Gluing Operations

1. ~~On and after March 7, 1996, T~~he owner or operator of a facility subject to this regulation which is a major source of HAP from wood products manufacturing operations and which began operation on or after December 6, 1994, shall not use contact adhesives which have VHAP contents higher than 0.2 lb VHAP/lb solids, as applied or shall use a control system that achieves an equivalent reduction in emissions of VHAP, as calculated using the procedures in § 35.10.3(D) of this Part.

## 35.9 Work Practice Standards

### 35.9.1 Work Practice Implementation Plan

- A. The owner or operator of a facility subject to this regulation shall prepare and maintain a written work practice implementation plan that defines work practices for each wood products manufacturing operation and addresses each of the topics specified in §§ 35.9.2 through 35.9.6 of this Part.
- ~~B. The work practice implementation plan shall be developed by May 6, 1996 and shall be subject to the approval of the Department.~~
- ~~B.~~ The owner or operator of the facility shall comply with each provision of the work practice implementation plan.
- ~~B.C.~~ The work practice implementation plan shall be available for inspection by the EPA or the Department upon request and shall be modified by the facility if found to be inadequate.

### 35.9.2 Operator Training Course

- A. Each owner or operator of a facility subject to this regulation shall train all new and existing personnel, including contract personnel, who are involved in finishing, gluing, cleaning, or washoff operations, use of manufacturing equipment, or implementation of the requirements of this Part.
- B. All personnel shall be trained ~~by November 6, 1996, or~~ upon hiring, ~~whichever is later~~. All personnel shall be given refresher training annually.
- C. Initial and refresher trainings shall include, at a minimum, the following topics:
  1. Appropriate application techniques;
  2. Appropriate cleaning and washoff procedures;
  3. Appropriate equipment setup and adjustment to minimize finishing material usage and overspray; and

4. Appropriate management of cleanup wastes.
- D. The facility shall maintain records of the training program. Records shall include, at a minimum, the following:
1. A list of all current personnel by name and job description who are required to be trained and a record of the date that each employee was trained;
  2. An outline of the subjects covered in the initial and refresher training for each position, or group of personnel;
  3. Lesson plans for courses to be given at the initial and the annual refresher training that include, at a minimum, the topics specified in § 35.9.2(C) of this Part; and
  4. A description of the methods to be used to demonstrate successful completion of initial and refresher training.

### **35.9.3 Equipment Operation, Maintenance, Inspection and Repair**

- A. Equipment Leak Inspection and Repair
1. ~~After March 6, 1996, all~~ All equipment used to transfer or apply finishing materials, adhesives, or organic solvents shall be visually inspected for leaks at least once per month.
  2. A first attempt at repair shall be made no later than three (3) calendar days after a leak is detected and final repairs shall be made within ten (10) calendar days, unless the leaking equipment is to be replaced by a new purchase, in which case repairs shall be completed within three (3) months.
  3. ~~The~~ Each owner or operator of a source subject to this regulation shall prepare and maintain a written leak inspection and maintenance plan that includes:
    - a. A schedule for conducting visual inspections required in § 35.9.3(A) of this Part; and
    - b. A log documenting the date and results of each inspection and any repairs that are made.
- B. Operation and Maintenance Requirements

1. At all times, including periods of startup, shutdown, and malfunction, owners or operators shall operate and maintain any equipment associated with wood products manufacturing operations, including associated air pollution control equipment, in a manner consistent with good air pollution control practices for minimizing emissions.
2. Malfunctions shall be corrected as soon as practicable after their occurrence in accordance with the startup, shutdown, and malfunction plan required in § 35.9.3(B)(4) of this Part.
3. The Department will determine whether acceptable operation and maintenance procedures are being used, based on information which may include, but is not limited to, monitoring results, review of operation and maintenance procedures (including the startup, shutdown, and malfunction plan required in § 35.9.3(B)(4) of this Part), review of operation and maintenance records, and inspection of the facility.
4. The owner or operator of a facility subject to this regulation shall develop and implement a written startup, shutdown, and malfunction plan that describes, in detail, procedures for operating and maintaining equipment associated with wood products manufacturing operations during periods of startup, shutdown, and malfunction and a program of corrective action for malfunctioning process and air pollution control equipment used to comply with this regulation. The facility's standard operating procedures (SOP) manual, an Occupational Safety and Health Administration (OSHA) or another plan can be used to fulfill this requirement, provided the plan meets all the requirements of this paragraph. Startup, shutdown, and malfunction plans shall be maintained at the facility and made available to the Department or the EPA for review upon request and shall be revised if determined to be unacceptable.
5. During periods of startup, shutdown, and malfunction, the owner or operator of a facility subject to this regulation shall operate and maintain equipment associated with wood products manufacturing operations (including associated air pollution control equipment) in accordance with the procedures specified in the startup, shutdown, and malfunction plan developed according to the provisions of § 35.9.3(B)(4) of this Part.
6. The owner or operator of a facility subject to this regulation shall keep records of action taken during startups, shutdowns, and malfunctions, including actions taken to correct malfunctions and shall certify, in the semi-annual reports required in § 35.11(G) of this Part, that all such actions were consistent with the procedures specified in the facility's

startup, shutdown and malfunction plan developed under § 35.9.3(B)(4) of this Part.

7. If actions taken by the owner or operator during a startup, shutdown, or malfunction (including an action taken to correct a malfunction) are not consistent with the procedures specified in the facility's startup, shutdown, and malfunction plan, the owner or operator shall record the actions taken and report such actions to the Office of Air Resources within two (2) working days after beginning actions inconsistent with the plan, followed by a letter within seven (7) working days after the end of the event.
8. If a malfunction occurs that was not adequately addressed in the startup, shutdown, and malfunction plan, the owner or operator shall revise the plan within forty-five (45) days after the event to include detailed procedures for operating and maintaining the source during similar malfunction events and a program of corrective action for similar malfunctions of process or air pollution control equipment.

#### **35.9.4 Cleaning and Washoff Solvent Requirements**

- A. The owner or operator of a facility subject to this regulation shall account for organic solvent use in cleaning and washoff operations by recording the following information:
  1. The quantity and types of organic solvent used in washoff and cleaning operations each month;
  2. The number of pieces washed off, and the reason for the washoff; and
  3. The quantity of spent organic solvent generated from each washoff and cleaning activity each month, and whether it is recycled onsite or disposed offsite.
- B. Facilities subject to this regulation shall not use cleaning or washoff solvents that contain any of the pollutants listed in § 35.14 of this Part ([Table 3](#)) in concentrations greater than 0.1%.
- C. Spray Booth Cleaning
  1. Facilities subject to this regulation shall not use compounds containing more than eight percent (8%) by weight of VOC for cleaning spray booth components other than conveyors, continuous coaters and their enclosures, or metal filters, unless the spray booth is being refurbished. If the spray booth is being refurbished, that is, the spray booth coating or

other material used to cover the booth is being replaced, the facility shall use no more than one (1)-0 gallon of organic solvent per booth to prepare the booth prior to applying the booth coating.

D. Storage Requirements

1. All finishing, gluing, cleaning, and washoff materials shall be stored in containers that are closed at all times except when material is being added or removed.

**35.9.5 Application Equipment Requirements**

A. The owner or operator of any wood products facility which has the potential to emit twenty-five (25) tons per year or more of volatile organic compounds (VOC) from wood products manufacturing operations, and is not a major source of HAP from wood product manufacturing operations shall not use conventional air spray guns ~~shall not be used~~ to apply finishing materials, except in the following situations:

- ~~1. When applying finishing materials before March 6, 1998 at a facility which is not a major source of HAP from wood products manufacturing operations or which began operation prior to December 6, 1994;~~
12. When applying finishing materials that have a VOC content no greater than 1.0 lb VOC/lb solids, as applied;
- ~~23.~~ 23. Touch-up or repair that occurs after the completion of a finishing operation;
- ~~34.~~ 34. Touch-up or repair that occurs after the stain and before any other type of finishing material is applied, provided that the touch-up finishing materials are applied from a container that has a volume of no more than two (2)-0 gallons;
- ~~45.~~ 45. If the spray gun is aimed and triggered automatically, not manually;
- ~~56.~~ 56. If emissions from the finishing application station are directed to a control device;
- ~~67.~~ 67. For application of a finishing material if the total usage of that finishing material is no more than five5-0 percent (5-0%) of the total gallons of all finishing materials used at that facility during that semi-annual reporting period, as specified in § 35.11(G)(1)(a) of this Part; or

7. The application of stain on a part for which it is technically or economically infeasible to use any other spray application technology. The facility must demonstrate technical or economic infeasibility by submitting documentation to the Department that the following criteria, either independently or in combination, are met:
  - a. The production speed is too high or the part shape is too complex for one operator to coat the part and the application station is not large enough to accommodate an additional operator; or
  - b. The excessively large vertical spray area of the part makes it difficult to avoid sagging or runs in the stain.
8. Line Cleaning
  - a. All organic solvent used for line cleaning shall be pumped or drained into a container that is closed at all times except when material is being added or removed.
9. Gun Cleaning
  - a. All organic solvent used to clean spray guns shall be collected in a container that is closed at all times except when material is being added or removed.

B. Beginning January 1, 2020, the owner or operator of a facility which is a major source of hazardous air pollutants from wood products manufacturing operations shall not use conventional air spray guns except when all emissions from the finishing application station are routed to a functioning control device.

#### **35.9.6 Washoff Operations**

- A. Emissions from washoff operations shall be controlled by:
  1. Using tanks for washoff that are closed at all times except when material is being added or removed; and
  2. Minimizing dripping by tilting or rotating the part to drain as much organic solvent as possible.

#### **35.9.7 Formulation Assessment Plan**

- A. Each owner or operator of a facility that is subject to this regulation and that is a major source of **h**Hazardous **a**Air **p**Pollutants from wood products manufacturing operations shall prepare and maintain a formulation assessment plan that:

1. Lists all VHAP from § 37.13 of this Part (~~Table 2~~) that are being used in finishing operations at the facility.
2. Establishes a baseline level of usage by the facility for each VHAP as follows:
  - a. The baseline usage level shall be the annual usage from the most recent calendar year ~~1994~~ for each VHAP;
  - b. For formaldehyde, the baseline level of usage shall be based on the amount of free formaldehyde present in the finishing material when it is applied;
  - c. For styrene, the baseline level of usage shall be an estimate of unreacted styrene, which shall be calculated by multiplying the amount of styrene monomer in the finishing material when it is applied by a factor of 0.16; and
  - d. Facilities using a control device to reduce emissions may adjust their baseline usage based on the overall control efficiency of the control system, calculated using Equation 5 in § 35.10.3(C)(1) of this Part.
  - e. The baseline levels for a VHAP that was not used in the most recent calendar year~~1994~~ shall be established as twenty percent (20%) of the Reportable-Minimum Quantity for that substance specified in Part 22 of this of this Subchapter (Air Toxics)~~Table III of Air Pollution Control Regulation No. 22~~.
3. Tracks the annual usage of each VHAP used by the facility.
4. If ~~beginning with the calendar year 1998~~, the usage of a VHAP in any year exceeds its baseline level, then the owner or operator of the facility shall provide a written notification to the Division by January 31 of the following year that specifies the amount of the increase and explains the reasons for the increase. The Department will determine whether the increase would cause an exceedance of the Acceptable Ambient Levels specified in Part 22 of this Subchapter (Air Toxics)~~Rhode Island Air Pollution Control Regulation No. 22 (Air Toxics)~~. If those limits are exceeded, the Department will develop a timetable for the facility to achieve compliance and a schedule for submitting notification of progress.

## **35.10 Compliance Procedures and Monitoring Requirements**

### **35.10.1 Compliance Using Compliant Coatings**

- A. Compliance with the emissions limitations in §§ 35.7 and 35.8 of this Part through the use of compliant coatings shall be demonstrated by the following methods:
1. Maintaining Certified Product Data Sheets (CPDS) documenting that the VOC and/or VHAP content of each topcoat, filler, stain, toner, ink, ~~multi-colored coating, pigmented coating~~ sealer, washcoat, enamel, basecoat, thinner, adhesive and strippable booth coating meets the applicable emissions limitations in §§ 35.7 and 35.8 of this Part in lb VOC/lb of solids, as applied~~gallon of coating~~ or lb VHAP/lb of solids, as applied; and
  2. Maintaining formulation data and related calculations showing that the VOC and VHAP content of each topcoat, filler, stain, toner, ink, ~~multi-colored coating,~~ sealer, washcoat, enamel, basecoat, adhesive and strippable booth coating diluted onsite, as applied, meets the applicable emissions limitations in §§ 35.7 and 35.8 of this Part in lb VOC/lb of solids, as applied~~gallon of coating~~ or lb VHAP/lb of solids, as applied; and
  3. For facilities with continuous coaters, using one of the following procedures:
    - a. Calculating the VOC and VHAP content, as applicable, of the finishing material in the reservoir from information on the CPDS and records of materials added to the reservoir; or
    - b. Monitoring the viscosity of the finishing material in the reservoir with a viscosity meter or testing the viscosity of the initial finishing material and retesting the material in the reservoir each time solvent is added. If this option is chosen, the facility shall maintain data that demonstrates the correlation between the viscosity of the finishing material and the VOC and VHAP content, as applicable, of the finishing material; and
  4. The Department or EPA will determine compliance either by reviewing the records specified in §§ 35.10.1(A)(1) through (3) of this Part or by conducting a performance test according to the specifications in ~~§§ 35.12.1 and 35.12.2 of this Part.~~ If the VOC or VHAP content of a coating determined by a performance test using the procedures specified in §§ 35.12.1 and 35.12.2 of this Part is greater than that indicated on a CPDS or by the facility's formulation or viscosity data, the performance test results shall govern.

#### **35.10.2 Compliance Using Averaging**

A. To demonstrate compliance with the VOC emission limitations in § 35.7.1 of this Part for a particular coating category through the use of averaging, the owner or operator of a facility shall, each week:

1. Calculate the average VOC content for all coatings in that category used at the facility using Equation 1:

Equation 1

$$E_{voc} = \frac{\sum_{i=1}^n V_i C_i}{\sum_{i=1}^n M_i}$$

Where:

EVOC = the weighted average VOC content of coatings in a particular coating category, in lb VOC/lb solids, as applied, excluding water and exempt compounds;

C = the VOC content of a coating in the particular coating category, in lb VOC/lb solids, as applied;

i = subscript denoting an individual coating;

M = the mass of solids. In pounds, in a particular coating in the coating category used during the weekly averaging periods.

~~Equation 1~~

~~$$E_{voc} = \frac{\sum_{i=1}^n V_i C_i}{\sum_{i=1}^n V_i}$$~~

~~Where:~~

~~$E_{voc}$  = the weighted average VOC content of coatings in a particular coating category, in lb VOC/gal coating, as applied, excluding water and exempt compounds;~~

~~C = the VOC content of a coating in the particular coating category, in lb VOC/gal coating excluding water and exempt compounds, as applied;~~

~~i = subscript denoting an individual coating;~~

~~V = the volume of coating, in gallons, as applied, of a particular coating in the coating category used during the weekly averaging period, excluding water and exempt compounds;~~2. Demonstrate that the value calculated for  $E_{VOC}$  is no greater than 0.9 times the emission limitation, in lbs VOC/lb solids/gallon coating minus water and exempt compounds, as applied, for that coating category, as listed in § 35.7.1(B) of this Part.

B. To demonstrate compliance with the VHAP emission limitations in §§ 35.7.2 and 35.7.3 of this Part through the use of averaging, the owner or operator of a facility shall, each month:

1. Calculate the average VHAP content for all finishing materials used at the facility using Equation 2:

Equation 2

$$E_{VHAP} = \frac{\sum_{i=1}^n M_i C_i + \sum_{i=1}^n S_i W_i}{\sum_{i=1}^n M_i}$$

Where:

$E_{VHAP}$  = the weighted average VHAP content of finishing materials, in lb VHAP/lb solids;

C = the VHAP content of a finishing material, in lb VHAP/lb solids, as supplied;

i = subscript denoting an individual coating;

M = the mass of solids, in pounds, in a particular finishing material used during the monthly averaging period;

S = the VHAP content of a solvent, expressed as a weight fraction, added to finishing materials; and

W = the amount of solvent, in pounds, added to finishing materials during the monthly averaging period.

2. Demonstrate that the value calculated for  $E_{\text{VHAP}}$  is no greater than one (1)~~1.0~~ if the facility is complying with § 35.7.2 of this Part and is no greater than 0.8 if the facility is complying with § 35.7.3 of this Part.

### 35.10.3 Initial Compliance Using Control Equipment

- A. The owner or operator of a facility which uses control equipment to comply with the VOC emission limitations in § 35.7.1(B) of this Part or the VHAP limitations in §§ 35.7.3 and/or ~~35.7.3~~ of this Part shall conduct an initial performance test to measure the capture and control efficiency of the control system using the procedures specified in § 35.12.38(C) of this Part within ninety (90) days of start-up ~~by June 4, 1996~~~~Initial performance tests for control equipment which is being used to comply with the VHAP emission limitations in §§ 35.7.2 and/or 35.8(B) of this Part or the VOC emissions limitations for sealers and clear topcoats in § 35.7.1(C) of this Part shall be conducted by September 8, 1998.~~
- B. Initial compliance with VOC emission limitations for finishing materials through the use of a control system shall be determined as follows:
  1. Calculate the overall control efficiency needed ( $R_n$ ) for each finishing material which will be controlled by the control equipment using the following equation:

Equation 3

$$R_n = \left[ \frac{C - EL}{C} \right] (100)$$

Where:

$R_n$  = the overall efficiency of the control system needed, expressed as a percentage.

C = the VOC content of a coating, in lb VOC/lb solids, as applied;

EL = the emission limitation required for the coating, from § 35.7.1(B) of this Part, in lb VOC/lb solids.

2. Document that the value of C used in Equation 3 [in § 35.10.3\(B\)\(1\) of this Part](#) was calculated from the VOC and solids content of the as-applied finishing material.
3. Demonstrate, for all applicable coatings, that the value of  $R_n$  calculated using Equation 3 [in § 35.10.3\(B\)\(1\) of this Part](#) is less than or equal to the actual overall control efficiency ( $R_a$ ) calculated by substituting the capture efficiency (N) and control efficiency (F) of the control system measured in the initial performance test into Equation 4 [in § 35.10.3\(D\)\(3\) of this Part](#).

Equation 4

$$R_a = (F \times N)(100)$$

[Equation 4](#)

$$R_a = (F \times N)(100)$$

- C. Initial compliance with VHAP emission limitations for finishing materials through the use of a control system shall be determined as follows:
  1. Calculate the overall control efficiency needed,  $R_n$ , so that the value of  $E_{ac}$  in Equation 5 is no greater than 1.0 if complying with § 35.7.2 of this Part and so that the value of  $E_{ac}$  in Equation 5 [in § 35.10.3\(C\)\(1\) of this Part](#) is no greater than 0.8 if complying with § 35.7.3 of this Part;

Equation 5

$$R_n = (100)(E_{bc} - E_{ac})/E_{bc}$$

Where:

$R_n$  = the overall efficiency of the control system needed, expressed as a percentage;

$E_{ac}$  = emissions from an emission point or a set of emission points after control equipment is in operation, in lb VHAP/lb solids; and

$E_{bc}$  = emissions from an emission point or set of emission points before controls, calculated as EVHAP in Equation 2 in § 35.10.2(B)(1) of this Part.

2. Demonstrate that the value of  $R_n$  calculated using Equation 5 [in § 35.10.3\(C\)\(1\) of this Part](#) is less than or equal to the actual overall control efficiency ( $R_a$ ) calculated using the capture efficiency (N) and control efficiency (F) of the control system measured in the initial performance test and Equation 4 [in § 35.10.3\(B\)\(3\) of this Part](#).

D. Initial compliance with VHAP emission limitations for gluing materials through the use of a control system shall be determined as follows:

1. Calculate the overall control efficiency of the control system needed ( $R_n$ ) so that the value of  $G_{ac}$  in Equation 6 [in § 35.10.3\(D\)\(1\) of this Part](#) is no greater than 1.0 if complying with § 35.8(B) of this Part and 0.2 if complying with § 35.8(C) of this Part;

Equation 6

$$R_n = (100)(G_{bc} - G_{ac}) / G_{bc}$$

Where:

$R_n$  = the overall efficiency of the control system needed, expressed as a percentage;

$G_{ac}$  = emissions from the gluing operation after control equipment, in lb VHAP/lb solids; and

$G_{bc}$  = emissions from the gluing operation before controls, in lb VHAP/lb solids.

2. Demonstrate that the value of  $R_n$  calculated using Equation 6 [in § 35.10.3\(D\)\(1\) of this Part](#) is less than or equal to the actual overall control efficiency ( $R_a$ ) calculated using the capture efficiency (N) and control efficiency (F) of the control system measured in the initial performance test and Equation 4 [in § 35.10.3\(B\)\(3\) of this Part](#).

#### **35.10.4 Continuous Compliance Using Control Equipment**

- A. The owners or operator of a facility that is complying with the emission limitations in this regulation through the use of a control system shall demonstrate continuous compliance by installing, calibrating, maintaining, and operating appropriate monitoring equipment according to manufacturers' specifications.

- B. The monitoring equipment installed pursuant to § 35.10.4(A) of this Part shall measure operating parameters which indicate ongoing compliance with the control efficiency requirements in this regulation.
- C. Where a thermal incinerator is used, the operating parameter to be monitored shall be minimum combustion temperature, and a temperature monitoring device equipped with a continuous recorder shall be installed in the firebox or in the ductwork immediately downstream of the firebox in a position before any substantial heat exchange occurs.
- D. Where a catalytic incinerator equipped with a fixed catalyst bed is used, the operating parameter to be monitored shall be the minimum gas temperature upstream and downstream of the catalyst bed and temperature monitoring devices equipped with continuous recorders shall be installed in the gas stream immediately before and after the catalyst bed.
- E. Where a catalytic incinerator equipped with a fluidized catalyst bed is used, the operating parameters to be monitored shall be the minimum gas temperature upstream of the catalyst bed and the pressure drop across the catalyst bed, and temperature monitoring devices equipped with continuous recorders shall be installed in the gas stream immediately before the bed. In addition, a pressure monitoring device shall be installed to determine the pressure drop across the catalyst bed. A constant pressure drop, as measured monthly at a constant flow rate, shall be maintained.
- F. Where a carbon adsorber is used, the operating parameters to be monitored shall be either the total regeneration mass stream flow for each regeneration cycle and the carbon bed temperature after each regeneration, or the concentration level of organic compounds exiting the adsorber, unless the owner or operator requests and receives approval from the Department and the EPA to establish other operating parameters. One of the following devices is required to monitor these parameters:
  - 1. An integrating regeneration stream flow monitoring device having an accuracy of  $\pm$  ~~ten~~10 percent (10%), capable of recording the total regeneration stream mass flow for each regeneration cycle; and a carbon bed temperature monitoring device having an accuracy of ~~+one~~ +1% percent of the temperature being monitored expressed in degrees Celsius or  $\pm 0.5^{\circ}\text{C}$ , whichever is greater, capable of recording the carbon bed temperature after each regeneration and within fifteen (15) minutes of completing any cooling cycle;

2. An organic monitoring device, equipped with a continuous recorder, to indicate the concentration level of organic compounds exiting the carbon adsorber; or
  3. Another monitoring device that has been approved by the Department and the EPA.
- G. A facility using a control device not listed in this section to comply with this regulation shall submit to the Office of Air Resources a description of the device, test data verifying the performance of the device, and appropriate operating parameter values that will be monitored to demonstrate continuous compliance with the standard. Compliance using this device is subject to the approval of the Department and the EPA.
- H. Operating parameter values indicating compliance shall be calculated as the arithmetic average of the maximum or minimum value of those parameters, as appropriate, measured during the three (3) test runs of the initial performance test, provided that the initial performance test demonstrated compliance.
- I. The capture or control device shall be operated so that the average of all values for a monitored parameter recorded during each operating day is in compliance with the operating parameter value calculated according to the procedures in § 35.10.4(H) of this Part.

### **35.11 Recordkeeping and Reporting**

- A. The owner or operator of a facility subject to this regulation shall maintain the following records for a period of five (5) years:
1. A certified product data sheet (CPDS) for each finishing material, thinner, adhesive, and strippable booth coating subject to the emission limitations in this regulation;
  2. As applicable, the VOC content in lb VOC/~~lb solids~~gallon of coating, as applied and the VHAP content, in lb VHAP/lb of solids, as applied, of each coating subject to the emission limitations in this regulation, and copies of calculations documenting how the as-applied values were determined. The VOC content of strippable booth coatings shall be expressed in units of lb VOC/lb solids, as applied.
  3. The amount and type of each coating and thinner used at the facility each month.
  4. If viscosity measurements are used to track VOC and/or VHAP concentrations:

- a. Records of dates and amounts of solvent and finishing material added to the continuous coater reservoir;
  - b. Records of dates and results of viscosity measurements; and
  - c. Data demonstrating that viscosity is an appropriate parameter for demonstrating compliance.
- B. The owner or operator of a facility using weekly averaging to comply with the VOC emissions limitations in § 35.7.1 of this Part or monthly averaging to comply with the VHAP emissions limitations in §§ 35.7.2 or ~~35.7.3~~~~35.6(C)~~ of this Part shall maintain the calculations of  $E_{VOC}$  and  $E_{VHAP}$  required in § 35.10.2 of this Part for a period of five (5) years.
- C. The owner or operator of a source using control equipment to comply with the emissions limitations in this regulation shall maintain the following records for a period of five (5) years:
1. Copies of calculations of  $E_{VHAP}$  from Equation 2 in § 35.10.2(B)(1) of this Part and  $R_n$  from Equations 3 in § 35.10.3(B)(1) of this Part, Equation 5 in § 35.10.3(C)(1) of this Part and Equation 6 in § 35.10.3(D)(1) of this Part, as applicable;
  2. Records of the daily average value of each continuously monitored operating parameter for each operating day. If all recorded values for a monitored parameter during an operating day are within the range established during the initial performance test, the owner or operator may record that all values were within the range rather than calculating and recording an average for that day; and
  3. Records of the pressure drop across the catalyst bed for facilities complying with the emission limitations using a catalytic incinerator with a fluidized catalyst bed.
- D. The owner or operator of a facility subject to this regulation shall maintain onsite the work practice implementation plan and for five (5) years shall maintain onsite all records associated with fulfilling the requirements of that plan, as specified in § 35.9 of this Part, including, but not limited to:
1. Records demonstrating that the operator training program is in place;
  2. Records maintained in accordance with the equipment leak inspection and maintenance plan and startup, shutdown, and malfunction plan;
  3. Records associated with the cleaning solvent accounting system;

4. Records associated with the limitation on the use of conventional air spray guns showing total finishing material usage and the percentage of finishing materials applied with conventional air spray guns for each reporting period;
5. Records associated with the formulation assessment plan;
6. Records showing the VOC content of compounds used for cleaning booth components, except for solvent used to clean conveyors, continuous coaters and their enclosures, and/or metal filters;
7. A copy of logs and other documentation developed to demonstrate that the provisions of the work practice implementation plan are followed; and
8. A copy of the compliance certifications, and periodic reports submitted in accordance with the requirements of this regulation.

E. Initial Notifications

1. The owner or operator of a facility subject to this regulation which was constructed before December 7, 1995, and which is a major source of HAP from wood products manufacturing operations shall submit an Initial Notification to the [Division by September 2, 1996, or Office of Air Resources](#) within thirty (30) days of becoming a major source of HAP from wood products manufacturing operations, ~~whichever is later~~. Initial Notifications for facilities constructed before December 7, 1995, shall include the following information:
  - a. The name and address of the owner or operator;
  - b. The address (i.e., physical location) of the facility;
  - c. An identification of the relevant standard, or other requirement, that is the basis of the notification and the facility's compliance date;
  - d. A brief description of the nature, size, design, and method of operation of the facility, including its operating design capacity and an identification of each point of emission for each HAP, or, if a definitive identification is not yet possible, a preliminary identification of each point of emission for each HAP;
  - e. An estimate of the amount of each HAP used and emitted annually from the facility; and

- f. The number of hours per day and days per week that the facility operates.
2. The owner or operator of a facility subject to this regulation which was constructed or reconstructed on or after December 7, 1995, and which is a major source of HAP from wood products manufacturing operations shall submit an Initial Notification in conjunction with its construction permit application. A facility constructed or reconstructed on or after December 7, 1995, which subsequently becomes a major source of HAP shall submit an Initial Notification within thirty (30) days of becoming a major source of HAP. Initial Notifications for facilities constructed on or after December 7, 1995, shall include the following information:
  - a. The date when construction or reconstruction began or is scheduled to begin;
  - b. The anticipated date of startup of the source; and
  - c. The information listed in §§ 35.11(E)(1)(a) through (f) of this Part.
3. A facility subject to this regulation which was constructed or reconstructed after December 7, 1995, shall notify the Division of the actual date of startup of the facility ~~by April 6, 1996, or~~ within fifteen (15) calendar days after the startup date, ~~whichever is later.~~

F. Initial Compliance Certification

1. The owner or operator of a facility subject to the VHAP emission limitations in this regulation shall submit an Initial Compliance Certification for VHAP to the Division. Initial Compliance Certifications for VHAP ~~for facilities which began operation on or after December 6, 1994,~~ shall be submitted ~~within by May 6, 1996, or~~ sixty (60) days ~~of~~ after beginning operation, ~~whichever is later. Initial Compliance Certifications for VHAP for facilities which began operation before December 6, 1994, shall be submitted by May 6, 1998.~~ The owner or operator of a facility that, due to an increase in emissions, becomes a major source of HAP from wood products manufacturing operations after the effective date of the regulation, shall submit an Initial Compliance Certification to the Division no more than sixty (60) days after becoming a major source of HAP.
- ~~2. The owner or operator of a facility subject to the VOC emission limitations in this regulation shall submit an Initial Compliance Certification for VOC to the Division. Initial Compliance Certifications for VOC shall be submitted by May 6, 1998.~~

2. Initial Compliance Certifications shall include the following information:
  - a. For a facility that is complying with emission limitations through the use of compliant materials, Initial Compliance Certifications shall state that each topcoat, filler, stain, toner, ink, ~~multi-colored coating, pigmented coating~~, sealer, washcoat, enamel, basecoat, thinner, adhesive and strippable booth coating is in compliance with applicable emissions limitations in this regulation and identify the method used to determine compliance.
  - b. For a facility monitoring viscosity to demonstrate compliance with emission limitations, the initial compliance report shall state that viscosity is an appropriate parameter for demonstrating compliance, that viscosity is being measured in accordance with the specifications in § 35.10.1(A)(3)(b) of this Part and that viscosity measurements demonstrate that the VHAP and VOC content of the material in the coaters is in compliance with applicable emission limitations.
  - c. For a facility using weekly averaging to comply with the VOC emission limitations in § 35.7.1 of this Part or monthly averaging to comply with the VHAP emission limitations in §§ 35.7.2 or ~~35.7.3-6(C)~~ of this Part, the Initial Compliance Certification shall state that EVOC and EVHAP, as calculated using Equation 1 in § 35.10.2(A)(1) of this Part and Equation 2 in § 35.10.2(B)(1) of this Part, respectively, are no greater than the applicable emission limitations specified in § 35.10.2 of this Part.
  - d. For a facility using a control system to comply with the emission limitations in this regulation, the Initial Compliance Certification shall identify each control device installed, including the identification number, permit number, installation date and equipment controlled. In addition, the following information must be submitted no more than sixty (60) days after completing the initial performance test of the control system:
    - (1) The results of the initial performance test of the control system;
    - (2) The overall control efficiency needed ( $R_n$ ), calculated using Equation 3 in § 35.10.3(B)(1) of this Part for VOC emissions from finishing operations, Equation 5 in § 35.10.3(C)(1) of this Part for VHAP emissions from finishing operations, and

Equation 6 [in § 35.10.3\(D\)\(1\) of this Part](#) for VHAP emissions from gluing operations, as applicable;

- (3) The actual overall control efficiency (Ra) calculated using the results of the initial performance test and Equation 4 [in § 35.10.3\(B\)\(3\) of this Part](#); and
  - (4) A plan for monitoring operating parameters which identifies the operating parameter values which indicate ongoing compliance, calculated as specified in § 35.10.4(H) of this Part, discusses why those parameters are appropriate indicators of compliance, and specifies the frequency that those parameters will be monitored.
- e. Initial Compliance Certifications shall state that a work practice implementation plan has been developed and procedures have been established for implementing the provisions of that plan.
  - f. Initial Compliance Certifications shall be signed by a responsible official of the company that owns or operates the facility.

#### G. Periodic Reports

1. The owner or operator of a facility subject to this regulation shall submit periodic reports to the Office of Air Resources according to the following specifications:
  - a. Periodic reports shall be submitted semi-annually by February 1 of each year for the reporting period of July 1 through December 31 of the previous year and by September 1 for the reporting period of January 1 through June 30, which include the following:
    - (1) The amount and type of VOC and VHAP in each coating used at the facility during the reporting period,
    - (2) A compliance certification, as specified §§ 35.11(G)(1)(b) through (g) of this Part, and
    - (3) Documentation of progress made during the reporting period toward reducing the VOC and VHAP content of coatings used at the facility.
  - b. If the facility is using compliant coatings to comply with the emission limitations in §§ 35.7 and 35.8 of this Part, periodic reports shall state that the VOC and VHAP content of each topcoat,

filler, stain, toner, ink, ~~multi-colored coating, pigmented coating,~~ sealer, washcoat, enamel, basecoat, thinner, adhesive and strippable booth coating used each day at the facility was in compliance with applicable limitations in those sections throughout the reporting period, or should identify periods of noncompliance and the reasons for noncompliance.

- c. If the facility uses viscosity to monitor compliance, the periodic report shall state that the viscosity of the finishing material in the reservoir was monitored according to the specifications in § 35.10.1(A)(3)(b) of this Part and that those measurements demonstrated compliance with applicable emission limitations throughout the reporting period, or should identify the days of noncompliance and the reasons for noncompliance.
- d. If the facility is complying with the VOC emissions limitations in § 35.7 of this Part using averaging, the periodic report shall include the results of the VOC averaging calculation using ~~(Equation 1 in § 35.10.2(A)(1) of this Part)~~ for each week in the reporting period and shall certify that the facility was in compliance with the applicable emission limitations in all weeks during that period, or identify the weeks that these limitations were exceeded and give reasons for those exceedances.
- e. If the facility is complying with the VHAP emissions limitations in § 35.7 of this Part using averaging, the periodic report shall include the results of the VHAP averaging calculation using ~~(Equation 2 in § 35.10.2(B)(1) of this Part)~~ for each month in the reporting period and shall certify that the facility was in compliance with the applicable emission limitations in all months during that period, or identify the months that these limitations were exceeded and give reasons for those exceedances.
- f. If the facility is complying with the emission limitations in this regulation using a control system, the periodic report shall state that the daily average value of each continuously monitored operating parameter was within the acceptable range on each operating day, or identify the days of noncompliance and the reasons for the noncompliance.
- g. Periodic reports shall include a statement certifying that the work practice implementation plan and startup, shutdown, and malfunction plan were followed throughout the reporting period, or

otherwise identify the periods of noncompliance with the work practice standards.

- h. The periodic report shall be signed by a responsible official of the company that owns or operates the facility.
- i. If an exceedance occurs, periodic reports must be submitted quarterly until a request to reduce the reporting frequency has been approved. Submittal frequencies may be reduced to semi-annual provided that the following conditions have been satisfied:
  - (1) The facility has demonstrated a full year of compliance without an exceedance; and
  - (2) The owner or operator of the facility continues to comply with the recordkeeping and monitoring requirements specified in this regulation.

## 35.12 Performance Test Methods

### 35.12.1 VOC and Solids Content

- A. VOC and solids content, by weight, of coatings shall be demonstrated with [40 C.F.R. § 60 Appendix A-7 EPA Method 24, incorporated in § 35.4\(A\) of this Part](#), or an alternative procedure approved by EPA and the Department. Sampling procedures shall follow the guidelines presented in "Standard Procedures for Collection of Coating and Ink Samples for VOC Content Analysis by Reference Method 24 and Reference Method 24A," EPA-340/1-91-010, [incorporated in § 35.4\(B\) of this Part](#).
- B. The owner or operator of a facility that uses a finishing material that does not release VOC reaction byproducts during the cure; for example, if all VOC is solvent; may request permission to use batch formulation information to demonstrate compliance. If the VOC content of a coating determined by [40 C.F.R. § 60 Appendix A-7 an EPA Method 24, incorporated in § 35.4\(A\) of this Part](#), test is greater than that indicated by the facility's formulation data, the [40 C.F.R. § 60 Appendix A-7 EPA Method 24](#) test shall govern.

### 35.12.2 VHAP and Solids Content

- A. [40 C.F.R. § 63 Appendix A EPA Method 311 40 C.F.R. § 63 \(2018\)\), Appendix A, incorporated in § 35.4\(A\) of this Part](#), or an alternative method, if approved by EPA and the Department, shall be used in conjunction with formulation data to determine the VHAP content of the liquid coating. Formulation data shall be used to identify VHAP present in the coating, and Method 311 or an approved

alternative method shall be used to quantify the VHAP identified through the formulation data. [40 C.F.R. § 63 Appendix A EPA Method 311](#) shall not be used to quantify VHAP such as styrene and formaldehyde that are emitted during the cure.

- B. [40 C.F.R. § 60 Appendix A-7 EPA Method 24](#) (~~40 C.F.R. § 60 (2018)~~), [incorporated in § 35.4\(A\) of this Part](#), shall be used to determine the solids content by weight and the density of coatings for the purpose of showing compliance with VHAP emission limitations.
- C. The owner or operator of a facility that uses a finishing material that does not release VOC or VHAP byproducts during the cure; for example, if all VOC and VHAP present in the coating is solvent; may request permission to use batch formulation information to demonstrate compliance.
- D. If the VOC content of a coating as determined by [40 C.F.R. § 60 Appendix A-7 Method 24](#) or [40 C.F.R. § 63 Appendix A EPA Method 24/311](#), incorporated in § 35.4(A) of this Part test is higher than that indicated by a facility's formulation data, the [40 C.F.R. § 60 Appendix A-7 Method 24](#) or [40 C.F.R. § 63 Appendix A EPA Method 24/311](#) test shall govern, unless the facility can demonstrate to the satisfaction of the Department that formulation data are correct.
- E. Sampling procedures shall follow the guidelines presented in "Standard Procedures for Collection of Coating and Ink Samples for VOC Content Analysis by Reference Method 24 and Reference Method 24A," EPA-340/1-91-010, [incorporated in § 35.4\(B\) of this Part](#).

### **35.12.3 Control Equipment Efficiency**

- A. [40 C.F.R. § 60 Appendix A EPA Methods 18, 25, or 25A](#), [incorporated in § 35.4\(A\) of this Part](#), shall be used to determine the VOC concentration of gaseous air streams. EPA Method 18 shall be used to determine the VHAP concentration of gaseous air streams. The test shall consist of three (3) separate runs, each lasting a minimum of thirty (30) minutes.
- B. [40 C.F.R. § 60 Appendix A-1 EPA Method 1 or 1A](#), [incorporated in § 35.4\(A\) of this Part](#), shall be used for sample and velocity traverses.
- C. [40 C.F.R. § 60 Appendix A-1 EPA Method 2, 2A, 2C, or 2D](#), [incorporated in § 35.4\(A\) of this Part](#), shall be used to measure velocity and volumetric flow rates.
- D. [40 C.F.R. § 60 Appendix A-2 EPA Method 3](#), [incorporated in § 35.4\(A\) of this Part](#), shall be used to analyze exhaust gases.

- E. [40 C.F.R. § 60 Appendix A-3EPA Method 4](#), [incorporated in § 35.4\(A\) of this Part](#), shall be used to measure the moisture content of stack gas when required.
- F. [40 C.F.R. § 60 Appendix A EPA Methods 2, 2A, 2C, 2D, 3, and 4](#), incorporated in § 35.4(A) of this Part shall be performed, as applicable, at least twice during each test run.
- G. VOC and VHAP control systems must be constructed so that volumetric flow rates and VOC and/or total VHAP concentrations, as applicable, can be determined by the test methods specified in §§ 35.12.3(A) through (F) of this Part, as applicable.
- H. Capture efficiency shall be measured using measures approved by the EPA.
- I. Testing shall be performed while all affected emission points are connected and operating at maximum production rate.
- J. The efficiency § 35.12.3(F) of this Part of the control device shall be determined using Equation 7 [in § 35.12.3\(J\) of this Part](#):

Equation 7

$$F = \frac{\sum_{i=1}^n Q_{bi} C_{bi} - \sum_{j=1}^p Q_{aj} C_{aj}}{\sum_{i=1}^n Q_{bi} C_{bi}}$$

Where:

F = control device efficiency, expressed as a fraction.

$C_{bi}$  = the concentration of VOC or VHAP, as applicable, in gas stream (i) entering the emission control device, in parts per million by volume.

$C_{aj}$  = the concentration of VOC or VHAP, as applicable, in gas stream (j) exiting the emission control device, in parts per million by volume.

$Q_{aj}$  = the volumetric flow rate of gas stream (j) exiting the emission control device, in dry standard cubic meters per hour.

$Q_{bi}$  = the volumetric flow rate of gas stream (i) entering the emission control device, in dry standard cubic meters per hour.

- K. Determine the efficiency (N) of the capture system using Equation 8 [in § 35.12.3\(K\) of this Part](#):

Equation 8

$$N = \frac{\sum_{i=1}^n Q_{di} C_{di}}{\sum_{i=1}^n Q_{di} C_{di} + \sum_{k=1}^p Q_{fk} C_{fk}}$$

Where:

N = the capture system efficiency, expressed as a fraction.

$C_{di}$  = the concentration of VOC or VHAP, as applicable, in gas stream (i) entering the emission control device from the affected emission point(s), in parts per million by volume.

$C_{fk}$  = the concentration of VOC or VHAP, as applicable, in each uncontrolled gas stream (k) emitted directly to the atmosphere from the affected emission point(s), in parts per million by volume.

$Q_{di}$  = the volumetric flow rate of gas stream (i) entering the emission control device from the affected emission point(s), in dry standard cubic meters per hour.

$Q_{fk}$  = the volumetric flow rate of each uncontrolled gas stream (k) emitted directly to the atmosphere from the affected emission point(s), in dry standard cubic meters per hour.

- L. If all effected emissions points are surrounded by a permanent enclosure that is demonstrated to be total by procedures acceptable to the Department and the EPA, the control device capture efficiency, N, is equal to 1.

**35.13 Table 2 List of Volatile Hazardous Air Pollutants (VHAPs)**

<b>Chemical name</b>	<b>Chemical name</b>
Acetaldehyde	75070

Acetamide	60355
Acetonitrile	75058
Acetophenone	98862
2-Acetylaminofluorine	53963
Acrolein	107028
Acrylamide	79061
Acrylic acid	79107
Acrylonitrile	107131
Allyl chloride	107051
4-Aminobiphenyl	92671
Aniline	62533
o-Anisidine	90040
Benzene	71432
Benzidine	92875
Benzotrichloride	98077
Benzyl chloride	100447
Biphenyl	92524
Bis(2-ethylhexyl)phthalate (DEHP)	117817
Bis(chloromethyl)ether	542881

Bromoform	75252
1,3-Butadiene	106990
Caprolactam	105602
Carbon disulfide	75150
Carbon tetrachloride	56235
Carbonyl sulfide	463581
Catechol	120809
Chloroacetic acid	79118
2-Chloroacetophenone	532274
Chlorobenzene	108907
Chloroform	67663
Chloromethyl methyl ether	107302
Chloroprene	126998
Cresols (isomers and mixture)	1319773
o-Cresol	95487
m-Cresol	108394
p-Cresol	106445
Cumene	98828
2,4-D (2,4-Dichlorophenoxyacetic acid, including	

salts and esters)	94757
DDE (1,1-Dichloro-2,2-bis(p-chlorophenyl)ethylene)	72559
Diazomethane	334883
Dibenzofuran	132649
1,2-Dibromo-3-chloropropane	96128
Dibutylphthalate	84742
1,4-Dichlorobenzene	106467
3,3'-Dichlorobenzidine	91941
Dichloroethyl ether (Bis(2-chloroethyl)ether)	111444
1,3-Dichloropropene	542756
Diethanolamine	111422
N,N-Dimethylaniline	121697
Diethyl sulfate	64675
3,3'-Dimethoxybenzidine	119904
4-Dimethylaminoazobenzene	60117
3,3'-Dimethylbenzidine	119937
Dimethylcarbamoyl chloride	79447
N,N-Dimethylformamide	68122
1,1-Dimethylhydrazine	57147

Dimethyl phthalate	131113
Dimethyl sulfate	77781
4,6-Dinitro-o-cresol, and salts	
2,4-Dinitrophenol	51285
2,4-Dinitrotoluene	121142
1,4-Dioxane (1,4-Diethyleneoxide)	123911
1,2-Diphenylhydrazine	122667
Epichlorohydrin (1-Chloro-2,3-epoxypropane)	106898
1,2-Epoxybutane	106887
Ethyl acrylate	140885
Ethylbenzene	100414
Ethyl carbamate (Urethane)	51796
Ethyl chloride (Chloroethane)	75003
Ethylene dibromide (Dibromoethane)	106934
Ethylene dichloride (1,2-Dichloroethane)	107062
Ethylene glycol	107211
Ethylene oxide	75218
Ethylenethiourea	96457
Ethylidene dichloride (1,1-Dichloroethane)	75343

Formaldehyde	50000
Glycol ethers	0
Hexachlorobenzene	118741
Hexachloro-1,3-butadiene	87683
Hexachloroethane	67721
Hexamethylene-1,6-diisocyanate	822060
Hexamethylphosphoramide	680319
Hexane	110543
Hydrazine	302012
Hydroquinone	123319
Isophorone	78591
Maleic anhydride	108316
Methanol	67561
Methyl bromide (Bromomethane)	74839
Methyl chloride (Chloromethane)	74873
Methyl chloroform (1,1,1-Trichloroethane)	71556
Methyl ethyl ketone (2-Butanone)	78933
Methylhydrazine	60344
Methyl iodide (Iodomethane)	74884

Methyl isobutyl ketone (Hexone)	108101
Methyl isocyanate	624839
Methyl methacrylate	80626
Methyl tert-butyl ether	1634044
4,4'-Methylenebis(2-chloroaniline)	101144
Methylene chloride (Dichloromethane)	75092
4,4'-Methylenediphenyl diisocyanate (MDI)	101688
4,4'-Methylenedianiline	101779
Naphthalene	91203
Nitrobenzene	98953
4-Nitrobiphenyl	92933
4-Nitrophenol	100027
2-Nitropropane	79469
N-Nitroso-N-methylurea	684935
N-Nitrosodimethylamine	62759
N-Nitrosomorpholine	59892
Phenol	108952
p-Phenylenediamine	106503
Phosgene	75445

Phthalic anhydride	85449
Polychlorinated biphenyls (Aroclors)	1336363
Polycyclic Organic Matterb	0
1,3-Propane sultone	1120714
beta-Propiolactone	57578
Propionaldehyde	123386
Propoxur (Baygon)	114261
Propylene dichloride (1,2-Dichloropropane)	78875
Propylene oxide	75569
1,2-Propylenimine (2-Methyl aziridine)	75558
Quinone	106514
Styrene	100425
Styrene oxide	96093
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746016
1,1,2,2-Tetrachloroethane	79345
Tetrachloroethylene (Perchloroethylene)	127184
Toluene	108883
2,4-Toluediamine	95807
Toluene-2,4-diisocyanate	584849

o-Toluidine	95534
1,2,4-Trichlorobenzene	120821
1,1,2-Trichloroethane	79005
Trichloroethylene	79016
2,4,5-Trichlorophenol	95954
2,4,6-Trichlorophenol	88062
Triethylamine	121448
Trifluralin	1582098
2,2,4-Trimethylpentane	540841
Vinyl acetate	108054
Vinyl bromide	593602
Vinyl chloride	75014
Vinylidene chloride (1,1-Dichloroethylene)	75354
Xylenes (isomers and mixture)	1330207
o-Xylene	95476
m-Xylene	108383
p-Xylene	106423
<sup>a</sup> Includes mono- and di-ethers of ethylene glycol, diethylene glycols and triethylene glycol; R-(OCH <sub>2</sub> CH <sub>2</sub> ) <sub>n</sub> -OR where: n = 1, 2, or 3,	

R = alkyl or aryl groups

R' = R, H, or groups which, when removed, yield glycol ethers with the structure: R-(OCH<sub>2</sub>CH<sub>2</sub>)<sub>n</sub> - OH. Polymers are excluded from the glycol category.

<sup>b</sup>Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100°C.

35.14 ~~Table 3:~~ Pollutants Excluded from use in Cleaning and Washoff Solvents

<b>Chemical Name</b>	<b>CAS No.</b>
4-Aminobiphenyl	92671
Styrene oxide	96093
Diethyl sulfate	64675
N-Nitrosomorpholine	59892
Dimethyl formamide	68122
Hexamethylphosphoramide	680319
Acetamide	60355
4,4'-Methylenedianiline	101779
o-Anisidine	90040
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746016
Beryllium salts	-
Benzidine	92875
N-Nitroso-N-methylurea	684935
Bis(chloromethyl)ether	542881
Dimethyl carbamoyl chloride	79447
Chromium compounds (hexavalent)	-
1,2-Propylenimine (2-Methyl aziridine)	75558
Arsenic and inorganic arsenic compounds	9999990 4

